4-28-2017 12:00 AM

Exploring Factors Influencing Children's Use of a Free Recreation Access Pass: Does Geography Matter?

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A thesis submitted in partial fulfillment of the requirements for the Master of Arts degree in Geography

Abstract

Only a small proportion of Canadian children achieve the recommend daily minimum amount of moderate-vigorous physical activity (PA). The Grade 5 ACT-i-Pass (G5AP) program in London, Ontario offers fifth-grade children a free access pass to multiple PA opportunities at recreation facilities for an entire school year. This thesis used a mixed-methods approach to examine barriers and enablers to children's use of those PA opportunities. In-depth interviews with recreation service providers afforded an understanding of potential factors influencing pass use. Surveys of child participants and their parents provided data on participant demographics, parental and peer support, and pass usage. Spatial analysis generated environmental variables such as neighbourhood socioeconomic status and distance between home and participating facilities. Statistical analysis examined individual, intrapersonal, and environmental determinants on pass use using logistic regression. Findings from service provider interviews revealed potential barriers to pass use related to participant knowledge, economic means, and geographic access. Spatial analysis found both hot and cold spot clusters of pass use, and logistic regression modelling found sex, recruitment method, and parental support significantly influenced use of the G5AP. Findings support development of PA interventions focused on spatial distribution of activities and promotion of PA opportunities.

Keywords

Children; physical activity; recreation; in-depth interviews; geographic accessibility; mixed-methods

Co-Authorship Statement

Each integrated article within this thesis will be submitted for publication in peer-reviewed journals. Below are details of co-authorship and journal targets for both integrated articles.

Chapter 3 was written by Joannah Campbell with Dr. Jason Gilliland and Dr. Andrew Clark as co-authors. Joannah Campbell performed all data collection, conducted analyses, and is the primary author of the article. Dr. Jason Gilliland is the principal investigator and conceived the original ACT-i-Pass study. Both Dr. Gilliland and Dr. Clark provided guidance and were involved in the development of procedures and analyses.

Chapter 3: Campbell, J.M., Clark, A.F., Gilliland, J.A. (2017) Service Provider Perspectives on Barriers to and Benefits of London's Grade 5 ACT-i-Pass Program.

Chapter 4 was written by Joannah Campbell with Dr. Jason Gilliland, Dr. Andrew Clark, Dr. Piotr Wilk, and Martin Healy. Joannah Campbell performed data collection, analyses, and is the primary author of the article. Dr. Jason Gilliland is the principal investigator and conceived the original ACT-i-Pass study. Dr. Gilliland and Dr. Clark provided guidance and were involved in the development of procedures and analyses. Dr. Wilk provided guidance during statistical analysis and Martin Healy provided guidance during spatial analysis.

Chapter 4: Campbell, J.M., Clark, A.F., Gilliland, J.A., Wilk, P., Healy, M.A. (2017) Examining the Influence of Individual and Environmental Factors on Children's Use of a Free Recreation Access Pass.

Acknowledgments

In support of a two academic year degree, that spans four calendar years:

To Dr. Jason Gilliland: I cannot thank you enough for your guidance over these many years of my post-secondary and graduate studies. You have been endlessly supportive of my research and personal goals. I would not have been able to accomplish this without you.

To Dr. Andrew Clark: You have been instrumental in the success of the ACT-i-Pass project and the HEAL Lab. I want to extend endless thank yous to you for the time you have spent assisting me with map-making, statistical analysis, and providing advice whenever necessary.

To the Christines: my saviors! The two of you were the backbone of ACT-i-Pass research, planning, organizing, and analyzing. I am so glad we were able to support each other through countless pizza lunch focus groups, hilarious telephone interviews, and never-ending survey distribution and inputting. Thank you.

To my fellow Western academics: This thesis could not have been completed without the assistance of Dr. Jeff Hopkins as a co-supervisor and diligent reviewer of multiple drafts, the qualitative advice of Dr. Jerry White, the geospatial expertise of Martin Healy, and NVivo software training from Wes Kinghorn.

To my wonderful HEAL family (especially the PA side ;) I am so incredibly glad that I was able to commit an entire summer to full-time studies with your beautiful faces in the lab. Every single one of you helped to complete my research and supported me through this tireless endeavor. From helping me with my poster presentation, transcription review, and most importantly childcare & supporting my Donnie's addiction ☺ I couldn't have done it without you.

To my friends & family: thank you, thank you, thank you. Without your love and support, I never would have been able to achieve my goals of earning a Master's Degree and landing my dream job. I am forever indebted to you for the hours I spent talking about my research and promising that it would be over soon. Especially to my **Dad** (also a forever-academic ☺) who always knew what I was trying to say even when the words escaped me.

To Josh, Lachlan, & Lyra: I did this all for you & I could not have done it without you.

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Chapter 1

1 Introduction

1.1 Research Context

Canadian children have exhibited a decline in physical activity levels over the last few decades (Tremblay, et al., 2010). Research has established that there are numerous physical, psychological, emotional, and behavioural health benefits associated with regular physical activity (Janssen & LeBlanc, 2010; Baranowski, et al., 1992; Williams, Wake, Hesketh, Maher, & Waters, 2005). Despite widespread knowledge regarding the benefits of physical activity, especially during the adolescent years, only 7% of Canadian children (ages 5 – 11 years) and youth (aged 12 – 17 years) are meeting the minimum recommendations for moderate-vigorous physical activity (60 minutes on most days) (ParticipACTION, 2016; Tremblay, et al., 2010). The adolescent years are of particular interest to health researchers because it has been shown that PA levels significantly decrease between the ages of 10 and 15 (Aaron, Storti, Robertson, Kriska, & LaPorte, 2002; Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). Sedentary behaviours exhibited by inactive children also often translate into decreased adult physical activity levels (Hallal, Victoria, Azevedo, & Wells, 2006). This knowledge has prompted additional research focusing on identifying the determinants of children's physical activity levels, particularly the factors associated with increased participation during transition years (around ages 9-12 years) in the hope that the findings may be used to guide development of successful and effective child and youth physical activity interventions.

The current field of research involving children's physical activity has been dominated by cross-sectional studies focused on correlations of active transportation, school-based activity, and childhood obesity in general (Biddle, Atkin, Cavill, & Foster, 2011). While these existing scholarly works have provided a platform on which to base further research to increase children's activity levels, much less research has focused on community-

based interventions and evaluation studies regarding destination recreation spaces for physical activity such as pools, arenas, and community centres.

This thesis focuses on the less-often evaluated influence of accessibility on participation in destination recreation activities. Few researchers believe that motorized transport can increase physical activity participation, in fact, the 2013 Active Healthy Kids Canada Report Card was titled *Are We Driving Our Kids to Unhealthy Habits?,* suggesting that sedentary behaviours are influenced by vehicular transportation (Active Healthy Kids Canada, 2013). Researchers from a variety of disciplines including public health, urban planning, and geography are interested in better understanding the relationship between children's health and the environment. It is believed that by exploring the connections between physical activity levels and how they are influenced by the features of the surrounding (built and natural) environment, we will be better able to institute environmental changes to increase physical activity levels. Children are afforded a very limited independent mobility and are therefore more greatly influenced by extrinsic factors such as the ability to register for programs and travel to and from destinations outside their home neighbourhood (Loebach & Gilliland, 2014). Because of these recognized influences, this thesis research will focus on children's access to destination recreation facilities in London, Canada.

This thesis will use London's Grade 5 ACT-i-Pass program (G5AP) as a case study. The G5AP is a naturally-occurring, community-based physical activity intervention for children which offers researchers and community stakeholders a unique opportunity to evaluate how children use different features within the built environment (public and private recreation facilities) for physical activity. By gaining a better understanding of the influence of these facilities as physical activity destinations, we can strategically inform future population health interventions (Sallis, et al., 2006). Exposure and engagement within these recreation environments can either facilitate or constrain youth physical activity levels and should be evaluated as a significant influence on recreation participation.

This research examines how accessibility to recreation spaces enables or constrains use of physical activity opportunities for children. This thesis will employ a longitudinal cohort study design which follows and evaluates a group of 881 children from the end of their grade 4 year through to the end of grade 5. The purpose of the overarching G5AP intervention is to improve children's knowledge of and access to current physical activity opportunities in the City of London. This thesis aims to evaluate the success of the G5AP program and provide recommendations to recreation service providers and other health promoters regarding children's use of destination recreation centres.

1.2 Theoretical Framework

The decision to participate in physical activity opportunities is a complex one effectively described by a socio-ecological framework. This approach is commonly used in academic research to understand physical activity behaviours, particularly in children and youth (Giles-Corti & Donovan, 2002; Larouche, Barnes, & Tremblay, 2013; Holt, et al., 2009). This framework was originally introduced in the 1970's by Urie Bronfenbrenner in his seminal work *Ecological Models of Human Development* where he describes environments as contexts of development including: microsystems, mesosystems, exosystems, and macrosystems (Bronfenbrenner, 1979). Bronfenbrenner argued that the entire ecological system in which growth occurs should be considered when attempting to understand human behaviour and as a result designated five socially organized subsystems (1979). His ecological paradigm has since been adapted multiple times by health researchers to examine very specific health behaviours [e.g. (Stokols, 1996)]. The most relevant application to this thesis is that by James Sallis and colleagues who described how ecological models of health behaviour can be applied to understanding factors that influence physical activity (Sallis, Owen, & Fisher, 2008; Sallis, et al., 2006). This thesis will employ a socio-ecological model adapted from Sallis and colleagues' to help understand the many complex factors that contribute to a child's decision to participate in physical activity opportunities.

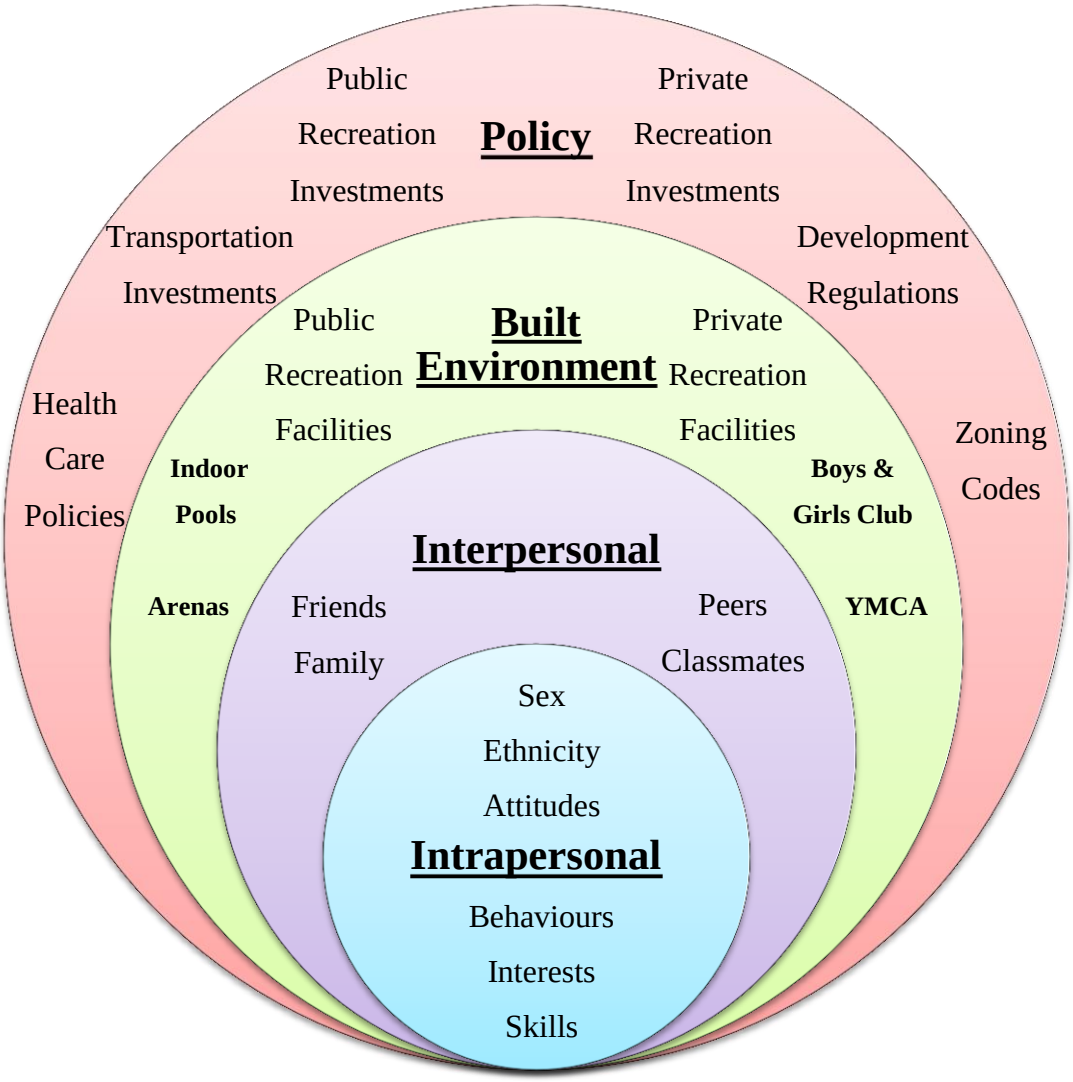

Figure 1.1. Socio-ecological model of children's participation in destination physical activity programs - adapted from Sallis, Owen, & Fisher (2008).

There are four primary domains of influence described by this model and they include intrapersonal, interpersonal, environment (built and natural), and policy. Giles-Corti and colleagues reviewed the use of ecological models in studies of physical activity and recommended that increased specificity in the model is required to help determine possible outcomes for the research at hand (Giles-Corti, Timperio, Bull, & Pikora, 2005). Their findings suggest that the more activity and environment-specific a model is, the more accurately it will be able to account for all the potential realms of influence on the behaviour being studied (Giles-Corti, Timperio, Bull, & Pikora, 2005). As a result of this

recommendation, the socio-ecological model above (Figure 1.1), has been adapted numerous times from the version offered by Stokols (1996) to specifically focus on children's participation in destination physical activity programs (community centres, swimming pools, arenas, private recreation facilities). The model shown above focuses on four spheres of influence, all of which are commonly identified in research pertaining to child and youth physical activity. This thesis will concentrate specifically on how physical activity at destination recreation centres is determined by those factors.

The initial sphere of this approach acknowledges the intrapersonal influence on physical activity behaviours for adolescents. This includes individual factors such as age, sex, ethnicity, attitudes, behaviours, interests, and skills, which have all been identified in previous literature (Sallis, Owen, & Fisher, 2008). The interpersonal sphere describes how the target population interacts with and is influenced by those around them, such as friends, family members, classmates, and peers (Stokols, 1996). For the purpose of this study, the environment focus will be on built recreation facilities such as community centres, pools, and arenas. Some of the influential features of these environments may include program offerings, aesthetics, quality equipment, operating hours, surrounding land uses, and geographic accessibility. The final tier of influence comes from the policy level and includes public and private recreation investments, transportation investments, zoning codes, development regulations, health care policies/initiatives, and general municipal support for programs (Sallis, Owen, & Fisher, 2008).

Socio-ecological models are well-suited for studying physical activity because of the various behaviour and location specific contexts that can be studied. These approaches are able to integrate both environmental and behavioural based health promotion initiatives that generally support both active and passive interventions (Stokols, 1996). Multi-level interventions targeting population-wide health behaviours such as the G5AP are well-supported through the socio-ecological model because the intervention itself is impacted by all of the spheres of influence.

One of the most significant challenges with utilizing an ecological model is determining which influences have the greatest impact on the intervention or study population being

examined. For this reason, it is critical that researchers consider the multiple sources of influence on the complex health behaviour that is physical activity.

1.3 Research Purpose

The overarching purpose of the Grade 5 ACT-i-Pass (G5AP) program is to assess how provision of a free recreation access pass can lead to increased knowledge, registration, and participation in physical activity programs for children in London, Ontario. The evaluation of the entire intervention will contribute to the growing body of knowledge relating to children's physical activity levels. More specifically, the aim of the research presented in this thesis is to both spatially and non-spatially analyze cohort data to identify factors that influenced children's use of the pass. The primary research question addressed in this thesis is: **"what factors influence children's use of a free recreation access pass?"**

In evaluating physical activity opportunities for children in London, I considered the decision to participate as a spatial behaviour. Behavioural geography focuses on the time-space activity patterns of people, and in this particular study, the focus is on the decision to travel to a destination recreation facility to participate in free programming (Gregory, Johnson, Pratt, Watts, & Whatmore, 2009). As a result, I will also explore the following supplemental questions:

1. What are the service provider perspectives on factors that influence use of a free recreation access pass?

2. How do individual, household, socioeconomic, and environmental factors influence use of a free recreation access pass?

By exploring these questions, we will gain the knowledge necessary to inform decisions about future recreation facility and program development as well as cultivate best practices for physical activity interventions in other cities. The information gathered herein will also be beneficial to the current participants and child residents in London as they will gain a greater understanding of what is available not only within their neighbourhood, but within the context of the greater municipality.

1.4 The Grade 5 ACT-i-Pass Program Study Design

The Grade 5 ACT-i-Pass Program (G5AP) is a naturally-occurring physical activity intervention created for the purpose of improving access to and knowledge of recreation opportunities in London, Canada. The program is available to all grade 5 students in the city and provides free access to over 20 public and private facilities and hundreds of hours of programming options. The G5AP program was initiated by the Child and Youth Network (CYN) with the intention of improving children's access to community recreation opportunities and increasing overall physical activity levels.

The G5AP takes on the physical form of a wallet-sized card that allows all registered students (plus one guest) that live or attend school in the City of London the opportunity to access (free of charge) recreation programs at municipal pools, arenas, and community centres, one round of golf, and drop-in programs at private recreation facilities based on pre-determined service provider schedules. Figure 1.2 shows an example of the schedule for one season of pass use detailed by each service provider.

The G5AP intervention itself was made possible through the generous support of the CYN and Ontario Sports and Recreation Community Fund Grant. The research of the project is headed by Dr. Jason Gilliland, Director of the Human Environments Analysis Laboratory (HEAL) at Western University and facilitated by students, staff, and faculty within the HEAL. Funding for on-going research of the intervention has been provided through the Canadian Institutes of Health Research and the Canadian Cancer Society.

Multiple observational tools were employed to assess children's activity levels pre, during, and post intervention. These included both parent and child surveys (paper and online) at four points throughout the intervention, service provider tracking of pass registration and use, and finally follow-up focus groups and interviews with multiple stakeholders involved in the project.

ACT-I-Pass 2015 Fall Schedule

Please contact Service Providers for more information about programs offered, including start/end dates, program details, and cancellations.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Basketball Knollwood PS Ages 10-12 7:00-8:00pm 269586 **Floor Hockey** Byron Somerset PS Ages 10-12 7:15-8:15pm 269673 **Soccer** Byron Somerset PS Ages 10-12 7:15-8:15pm 268740 **Boys Basketball** Wilfrid Jury PS Ages 10-12 6:45-7:45pm 269643	**Girls Basketball** Glen Cairn PS Ages 10-12 7:00-8:00pm 270144 **Cheerleading** Jack Chambers PS Ages 10-12 7:00-8:00pm 270046 **Volleyball** Ryerson PS Ages 10-12 7:00-8:00pm 270155 **Cardio Funk** South London CC Ages 7-9 7:15-8:15pm 269360 **Hip Hop** Wilfrid Jury PS Ages 10-12 7:15-8:15pm 269435 **Glee** Berkshire Club Ages 7-9 6:30-7:30pm 269405 **Glee** Berkshire Club Ages 10-12 7:30-8:30pm 269411 **Girls Basketball** Wilfrid Jury PS Ages 10-12 7:00-8:00pm 269649 **Martial Arts-Aikido Kids** CHOCC Ages 10-12 6:15pm-7:00pm 269757	**Badminton** Ryerson PS Ages 10-12 6:30-7:30pm 270219 **Cheerleading** Northbrae PS Ages 10-12 7:00-8:00pm 271484 **Floor Hockey** Lord Nelson PS Ages 10-12 7:00-8:00pm 269941 **Dance Mix** Earl Nichols Arena Ages 7-9 7:15-8:15pm 269427 **Basketball** Byron CC Ages 7-9 7:00-8:00pm 269834 **Volleyball** Westmount PS Ages 7-9 6:00-7:00pm 269804 **Volleyball** Westmount PS Ages 10-12 7:00-8:00pm 269796	**Football** Wilton Grove PS Ages 10-12 7:00-8:00pm 270251 **Cheerleading** White Oaks PS Ages 7-9 6:00-7:00pm 269662 **Cheerleading** White Oaks PS Ages 10-12 7:00-8:00pm 269659 **Floor Hockey** Westmount PS Ages 7-9 7:15-8:15pm 269686	Only these specific spectrum programs are offered as part of the Act-i-Pass program. Please preregister by phone at 519-661-5575 or in person before attending. Please note that all Grade 5's, regardless of their age, are eligible to register for any Spectrum programs offered through Act-i-Pass.	**Soccer** South London CC Ages 7-9 9:00-10:00am 269400 **Dance - Move it!** CHOCC Ages 10-12 10:30am-11:30am 269884 **Cardio Funk** Kinsmen Arena Ages 10-12 10:30-11:30am 269355 **Basketball** South London CC Ages 10-12 10:30-11:30am 269369 **Martial Arts-Aikido Kids** CHOCC Ages 10-12 6:15pm-7:00pm 269757	
GOLF - Hickory 9 Hole – use the pass on one occasion and bring a friend/parent for free.						
SKATING - Free entry to all public skating/family skating September through to the end of March at all City Facilities.						
Swimming 7:30pm-9:00pm Carling Heights Pool			**Swimming** 3:30pm-5:00pm South London Community Pool			**Swimming** 3:00pm-5:00pm Canada Games Aquatic Centre
Boys and Girls Club Drop-In Programs 184 Horton Street www.bgclondon.ca 4:00pm-8:00pm					**Boys and Girls Club Drop-In Program** 184 Horton Street www.bgclondon.ca 1:00pm-4:00pm	
YMCA Drop-In Program (Centre Branch, Stoney Creek, or The Bob Hayward) 4:00pm-9:30pm					**YMCA Drop-In Program** (Centre Branch, Stoney Creek, or The Bob Hayward) 9:00am-4:00pm	
Act-i-Pass users are welcome to go to any of the 3 YMCA branches for any evening or weekend family swims offered! **Please refer to the individual facility schedules for family swim times throughout the week.**						

PLEASE NOTE: Not all Spectrum programs run the full fall period. Specific session dates and times, as well as new fall schedules, can be found at inmotion4life.ca.

Figure 1.2. Example of Grade 5 ACT-i-Pass Program Schedule

1.4.1 Study Area and Population

The larger research project associated with the G5AP was conducted in the City of London, beginning in fall 2013 and continued until spring 2016. The component of the longitudinal cohort study on which this thesis focuses involved following an intervention group of students from the end of their grade 4 year (June 2014) until the end of their grade 5 year (May/June 2015) and included participants who attend school within the

municipal boundary. Located in southwestern Ontario, London provides a wide range of indoor and outdoor recreation opportunities. London also experiences seasonal differences in weather that are likely to impact activity levels (Tucker & Gilliland, 2007). With a population of approximately 366,000 according to the 2011 Canadian Census (Statistics Canada, 2012), London can be described as a mid-size North American city.

1.4.2 Participant Recruitment

Prior to commencement of subject recruitment, approval for this project was granted by the Non-Medical Ethics Board of the University of Western Ontario (REB#103954). See Appendix A for the research ethics approval form for use of human participants. Internal ethics boards at all 4 school boards granted permission to complete the G5AP research presentations, surveys, and focus groups/interviews. Once permission had been granted by principals at participating schools, all current grade 4 students were provided with an information package about the G5AP program using one of two recruitment methods. Half of the schools (n=50) were visited by members of the HEAL research team and were given a classroom presentation to explain the project, recruit students, and distribute materials. All other schools (n=49) were provided with the same information package through passive distribution by the Child and Youth Network. All communication to and from those schools was facilitated by the school board internal mail system and representatives from the CYN. All interested students were provided with a package including a registration form, program information sheet about the project, and a parental consent form. Once interested participants returned a completed registration package, they were officially registered for the program and were subsequently provided with the G5AP card. All registered participants were eligible to opt out of participating in the full study at any time, but could remain active G5AP users. See Appendices B, C, D, and E for examples of the registration form, letter of information, parental consent form, and child survey.

The G5AP intervention was successfully offered in 99 elementary schools and boasted a registration rate of 45.9% of eligible grade 5 students (n = 1709). This cluster sample included all 4 local school boards representing; public, private, English, French, and catholic schools. The locations of all participating schools as well as the service provider

facilities are illustrated in Figure 1.3 below. The map, published by Gilliland and colleagues (2015) also provides median household income levels throughout London to give demographic context in the form of census tract level socio-economic status.

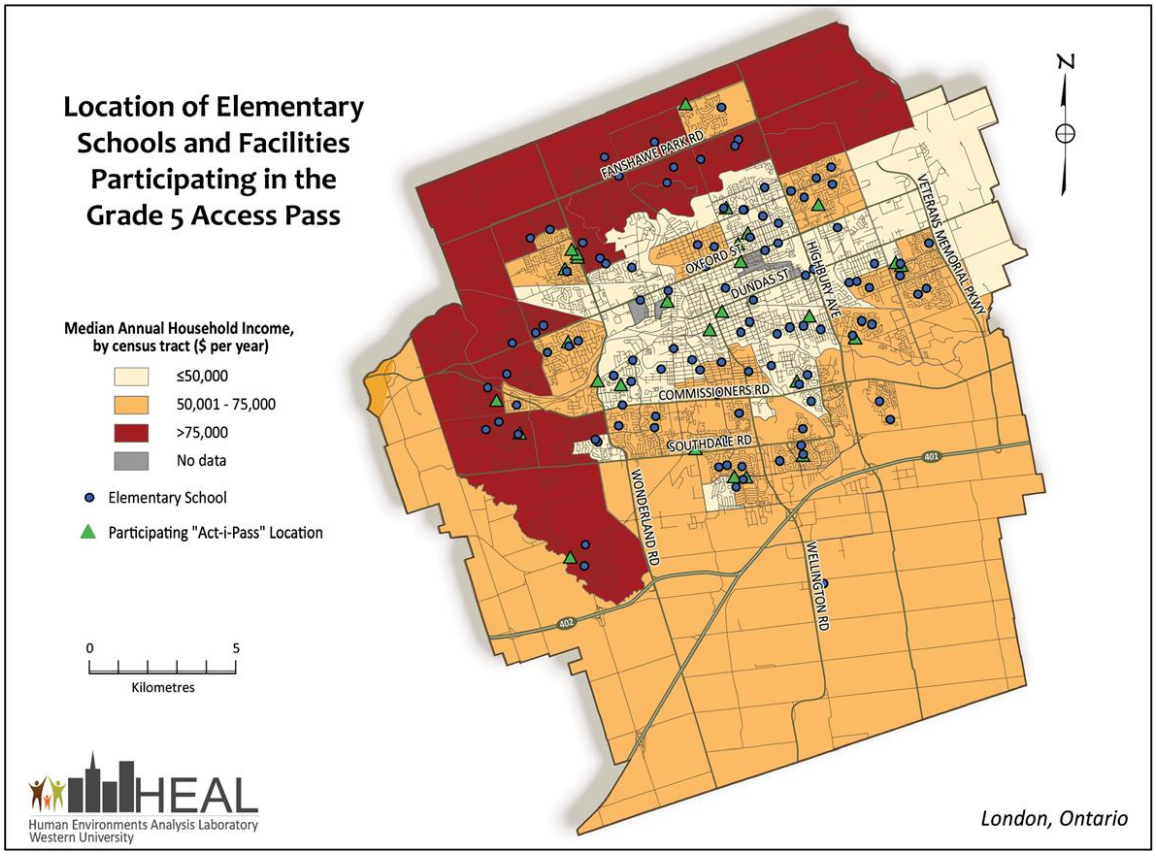

Figure 1.3 Location of service provider facilities and elementary schools participating in the Grade 5 ACT-i-Pass program (Gilliland, et al., 2015)

1.4.3 Child Surveys

Students with signed parental permission and child assent forms were contacted 3-4 times throughout the study period to complete a survey eliciting information about their demographics and physical activity patterns. The content of the survey was adapted from the Physical Activity Questionnaire for Children (PAQ-C), a 7-day recall questionnaire with high validity for measuring general physical activity levels in elementary school aged children (Janz, Lutuchy, Wenthe, & Levy, 2008). The PAQ-C questionnaire has been implemented and evaluated by multiple other researchers and found that it is a

successful and cost-effective tool for assessing the school year activity levels of children and youth (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997; Crocker, Eklund, & Kowalski, 2000). The questions contained within the G5AP youth survey elicit information on socio-demographics, postal code, sedentary behaviours, physical activity behaviours, barriers to physical activity, perceived accessibility to recreational facilities in their neighbourhood, and use of recreational facilities and programs.

Figure 1.4 G5AP participants completing the child survey at school

1.4.4 Stakeholder Interviews

Each of the participating service providers were contacted at the end of the cohort study to conduct follow-up interviews regarding their experience with the pass. Management-level employees were recruited to share their perspectives on factors that influenced use of the pass and benefits of the G5AP program itself. A semi-structured interview guide was employed to elicit responses from those directly involved with delivery of the program at each facility. Interviews were digitally recorded and transcribed verbatim following each meeting. The organization styles outlined by Miller and Crabtree (1999) were followed to assist with data collection during the stakeholder interviews.

1.4.5 Integrated Knowledge Translation

The findings of this thesis will be shared in 3 different mediums to ensure the knowledge contained herein can support development of policies and practices related to children's PA and overall health. The integrated knowledge translation and exchange (KTE) plan involves collaboration among researchers at the HEAL and dissemination of results through our website (www.theheal.ca). The KTE plan includes a workshop with our LEAP (Local Expert Advisory Panel), presentations to health professionals, policy makers, and at conferences, as well as publication of findings in various formats.

1.5 Thesis Format

This thesis is written in the integrated article format and will present the analysis and results of two separate but related studies examining the same population of G5AP participants and service partners using two different methods. The two studies were completed independently of one another, but are complimentary in that they examine the same physical activity intervention program. Both papers will serve the same overarching purpose of examining factors influencing children's use of a free recreation access pass. Each study aims to explore accessibility to recreation opportunities throughout the municipality and uncover the barriers and facilitators to use. Mixed research methods will be used to provide both qualitative and quantitative analysis of the G5AP intervention with the goal of informing future policy and research related to children's physical activity opportunities.

Chapter 2 provides context for the thesis research through a systematic literature review focused on child and youth access to physical activity destinations. The results from the systematic review found that a large volume of academic work has been conducted regarding child and youth physical activity at school, in open spaces, or using active transportation, but relatively little specific research focuses on destination facilities. The studies included in this thesis aim to provide context for children's participation in physical activity opportunities at destination recreation centres and gain a better understanding of factors influencing use.

Chapter 3 presents the often-overlooked service provider perspectives on child and youth physical activity and access to recreation facilities. This study uses semi-structured interviews with management-level employees at all service providers participating in the G5AP program. The interview questions were developed to explore stakeholder perspectives on factors influencing children's access to physical activity opportunities. These service provider interviews provide experiential context to the G5AP intervention from those who deliver the program on the front-line. The results of these semi-structured interviews will help to identify opportunities to improve or overcome barriers, facilitators, and enablers for children's physical activity.

Chapter 4 investigates the influence of individual, household, socioeconomic, and environmental on use of the Grade 5 ACT-i-Pass. Geographic Information Systems will be used to spatially examine the impact of distance between each registered child's postal code and the nearest service provider (programs and facilities) location. Additional statistical analysis will integrate the results of the child surveys to assess whether any additional individual, household, or socioeconomic factors influenced use of the pass. Results of this quantitative analysis will provide context on factors influencing use of a free recreation access pass and inform future physical activity research and interventions on the importance of location and use.

Chapter 5 synthesizes and discusses the findings from the two research studies. The final chapter draws conclusions from both papers, identifies research limitations, provides policy recommendations, and suggests opportunities for future research.

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Chapter 2

2 Literature Review of Child and Youth Geographic Access to Physical Activity Destinations

2.1 Background

Physical activity (PA) is a critical component of healthy child development, yet levels of PA in Canadian youth have been steadily decreasing in recent decades (Tremblay, et al., 2010). According to the 2016 ParticipACTION Report Card on Physical Activity for Children and Youth, very few children and youth (barely 7%) in Canada meet the 60 minutes of moderate-to-vigorous physical activity (MVPA) recommendations (ParticipACTION, 2016). Continued research in the field of children's health and the environment aims to determine why this generation of youth is so inactive when compared to previous generations and attempt to provide viable solutions (King, 1998; Stone, McKenzie, Welk, & Booth, 1998). The benefits of physical activity and detriments of sedentary behavior are well documented, but there has been little research on participation in physical activity opportunities outside of school, home neighbourhood, or active transportation. Researchers continue to explore the importance of physical activity for children and youth and aim to gain a better understanding of the factors that influence participation in and barriers to recreation programming. This review synthesizes research from peer-reviewed studies in the field to ascertain the current depth of knowledge, critique current and past study methods, and identify opportunities for future study regarding geographic access to physical activity opportunities.

In order to obtain a greater understanding of the current level of knowledge regarding the interrelationship between physical activity levels and geographic accessibility in youth, a systematic literature review strategy was utilized. The purpose of the literature review is to specifically analyze the current scholarly knowledge on the topic of child and youth access to recreation facilities as a destination, and more specifically, to examine the published research which relates to how distance and transportation modes encourage or constrain participation.

2.2 Human Environments Analysis Laboratory Research in Children's Health and Physical Activity

The Human Environments Analysis Laboratory (HEAL) at Western University has done a significant amount of research on child and youth physical activity and those publications have contributed to this thesis. Graduate students, staff, and faculty members have shared their knowledge and experience and this thesis will build upon the platform they have established while contributing results from my own analysis.

A number of graduate thesis from the HEAL have evaluated children's physical activity and overall health through a variety of different lenses. Many of those studies focused on the built environment influence on children's healthy behaviour. Most recently, Mitchell (2016) examined the impact of neighbourhood opportunities and contextual environmental exposure on children's physical activity. Others chose to conduct research on the influence of active transportation and children's health (Hill, 2012; Fitzpatrick, 2013). Additional HEAL graduate theses have examined influences such as sleep (McIntosh, 2014), healthy eating (Rangel, 2013), and physical activity (Richard, 2014).

Most comparable to this thesis was Loebach's doctoral dissertation that focused on children's use and perception of their home neighbourhood and how those spaces were used for healthy activity (2013). Her analysis of children's neighborhood mobilities and multiple factors of influence is similar to the concept of spatial behaviours and geographic accessibility to service provider facilities as examined in this thesis.

Members of the HEAL have had their work regarding children's health and physical activity published in academic journals. Of all work published by members of the HEAL; eleven have focused specifically on child, youth, and adolescent physical activity. The work contained within those publications helps to establish a platform for continued research.

Although this thesis does not examine school-based physical activity, it is often the location of choice when assessing physical activity levels in children as they spend a large majority of their time there. Three papers have been published by the HEAL

regarding school-based research. Gilliland et al. (2012) conducted research with 10-14 year old students in London, Ontario and used multi-level analyses to find that built environment features had a significant effect on body mass index and that close proximity to public recreation opportunities (<500m) was also significantly associated with lower BMI z-scores. Additional research was conducted with children in London regarding their travel to and from school. Active transportation was the focus of two papers examining influences on mode of travel to and from school. Larsen et al. (2009) found that active travel was significantly associated with environmental characteristics and recommended that these factors should be considered in school planning to encourage physical activity among students. In a similar study, researchers combined survey responses with geographic information systems (GIS) and found that environmental factors significantly influenced walking routes for students and suggested that urban planners take this into consideration when developing school plans (Larsen, Gilliland, & Hess, 2012).

Geospatial technologies were employed in many studies focusing on child and youth physical activity, specifically in London. GPS units, accelerometers, and GIS were used in combination to examine opportunities for children's PA within neighbourhood environments and results showed that children's physical activity differs significantly according to sex (Mitchell, Clark, & Gilliland, 2016). As part of her doctoral research and publication, Loebach & Gilliland (2014) used GPS units to examine children's neighbourhood mobilities and activity levels and found that nearby land uses, safety, and neighbourhood type were significant influences on local activity levels. Another map-based analysis of physical activity levels of children and youth recommended that geographic distribution of recreational opportunities be considered by health and planning professionals to ensure all areas of the municipality are offered equal access to formal play spaces (Gilliland, Holmes, Irwin, & Tucker, 2006). Additional research examining environmental influences on youth physical activity combined GIS and questionnaires to establish that objective and subjective measures of recreational opportunities positively associated with PA (Tucker, et al., 2009).

A variety of qualitative methods have also been employed through HEAL research. Loebach and Gilliland (2010) examined child-perceptions of their home environments by following children on guided walks through their neighbourhoods and as a result recommended that engagement of children can be effective in revealing their experiences. A different qualitative method was used by Tucker et al. (2008) who facilitated focus groups with adolescents to examine influences on their PA and dietary behaviours. Regarding physical activity, that study found schools, parks, and opportunity structures to be significant influences on PA.

This thesis complements the work done by previous graduate students, staff, and faculty members in the HEAL by evaluating additional factors that influences children's participation in physical activity using a mixed-methods approach. Although much of the published work also focuses on built environment factors influencing physical activity levels, this thesis aims to better understand service provider perspectives on access to physical activity opportunities for children and youth in London, Canada and evaluate socio-ecological factors influencing use of a free recreation access pass.

2.3 Literature Review Strategy

Following an initial scoping review of academic literature, it was determined that three databases would provide a broad spectrum of results from all relevant disciplines spanning transportation, recreation, and children and youth physical activity. The selected databases include: GeoBase – a database designed to provide relevant context for geography and transportation, SPORT Discus – a database of scholarly research on recreation and leisure, and PubMed – a database of relevant academic research in the field of health and physical activity.

The review began with a clear outline of the research question to be analyzed and the development of a list of key related terms. The purpose of the review was to determine the influence of distance, proximity and transportation (i.e. geographic accessibility) as potential barriers to accessing recreation facilities by children and youth. The key terms chosen for this systematic review were selected based on their ability to generate results from all databases across all of the aforementioned disciplines of interest. A full list of

the key terms that were included in the preliminary stages of the review can be found in Table 1.

Table 2.1. Literature review key terms

Terms for Subgroup Physical Activity	Terms for Subgroup Children	Terms for Subgroup Accessibility
"physical activity"	child*	proxim*
recreation	youth	acces*
play	adolescen*	geograph*
sport*	young*	distance
exercise	--	transport*

Following the development of the key terms, the review began with purposeful keyword searches involving a combination of each individual term in every sub-group in combination with the entire list from the two remaining sub-groups. Subsequent searches would navigate each individual term through the three categories. A sample of the database query is outlined below.

```
(("physical activity"[Title/Abstract]) AND
(child*[Title/Abstract] OR youth[Title/Abstract] OR
adolescen*[Title/Abstract] OR young*[Title/Abstract])) AND
(proxim*[Title/Abstract] OR acces*[Title/Abstract] OR
geograph*[Title/Abstract] OR distance[Title/Abstract] OR
transport*[Title/Abstract])
```

Figure 2.1. Database keyword query example

All results from each individual database query were then exported and stored in an external citation management software (Mendeley Desktop version 1.16.1). The next step

in this search strategy was to determine a set of inclusion and exclusion criteria to ensure only published work relevant to the subject would be reviewed. A detailed summary of the established criteria can be found in Table 2, below.

Table 2.2. Inclusion and exclusion criteria

Inclusion	Exclusion
Independent Mobility	Not written in English
Children and/or Youth Population	Nutrition Focused
Physical Activity Focused	Active Transportation Focused
Recreation as Destination	Preschool, Adults, Elderly Population
Transportation Focused	Clinical Population

Upon completion of the keyword searches and subsequent data import, each reference was then checked to ensure duplicate sources were eliminated and a title review commenced. The title of each remaining source was compared against the inclusion and exclusion criteria to determine if it would provide valuable context to the research proposed in this study. Once all titles had been scrutinized, the remaining sources were reviewed for content of their academic abstract describing the studies in greater detail. The final phase in the systematic search involved researcher review of full text journal articles for all remaining sources to ensure compliance with the eligibility criteria. A detailed summary of articles that were included through each phase of the review is shown in Figure 2.2.

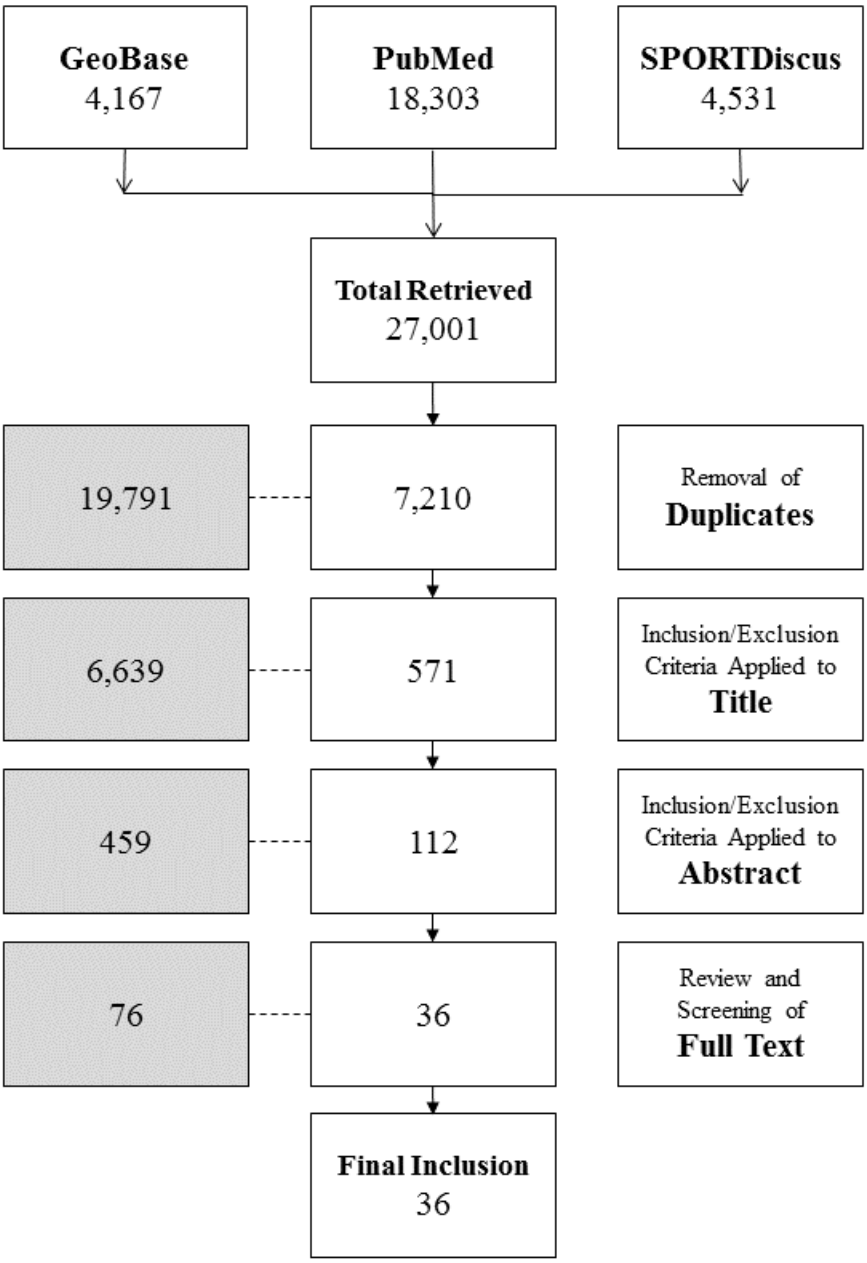

Figure 2.2 Flow chart of systematic review inclusion and exclusion criteria

A final collection of 36 peer-reviewed journal articles was included in the initial phase of literature review for this thesis. The following three sections of this chapter will summarize the findings of this review and discuss the current state of academic knowledge on the study of youth geographic access to physical activity opportunities.

One significant limitation of this review which should be noted is that the review was completed by a single researcher; while this method was ideal for ensuring accurate organization and consistent evaluation, it left room for human error. As a single researcher, I was not able to rely on a team of colleagues to ensure articles were not unintentionally discarded. As a result, it is likely that relevant research might have been overlooked or erroneously dismissed. Thus, it is recommended that future research of this nature be conducted in a pair or team whenever possible, so as to limit research bias and provide a secondary reviewer.

2.4 Summary of Key Findings

Once the full process described above was complete, I created a systematic review table to summarize my findings. The table included 13 components of review including database, authors, year, title, journal, country of publication, purpose, study population, sample size, methods, type of recreation facility included, threshold or buffer distance in analysis, and mode of transportation examined. A full copy of the summary table can be found in Appendix i at the end of this chapter. Through the development of the table I was able to condense the results into three major themes of research on the topic of youth geographic access to physical activity destinations, each of which have been described in detail below.

2.4.1 Availability and Proximity of Programs and Facilities

The most salient factors in determining who is able to utilize available recreation facilities are directly correlated to the potential participant's proximity to the facility and availability of programs at that location. This notion was reflected throughout the reviewed literature and a majority of the included journal articles mentioned availability and proximity as determining accessibility factors. One of the studies used participatory and qualitative GIS to conclude that one of the most fundamental features in physical

activity focused community planning is accessibility (Wridt, 2010). This finding was also reflected in the work of several other researchers whose studies found that one of the keys to promoting active lifestyles in youth is increased access to recreation facilities (Tucker, et al., 2009; Alexander, Brunner Huber, Piper, & Tanner, 2013; Moore, et al., 2010; Potwarka, Kaczynski, & Flack, 2008).

When discussing accessibility of recreation programming specifically, a commonly identified potential barrier was the distance to the facilities themselves. Decreased activity levels were associated with greater distance from facilities in six studies (Moore, et al., 2010; Maljak, et al., 2014; Tucker, et al., 2009; Roemmich, et al., 2006; Potwarka, Kaczynski, & Flack, 2008; Powell, Chaloupka, Slater, Johnston, & O'Malley, 2007; Ries, Yan, & Voorhees, 2011; Maddison, et al., 2010). There are many factors that contribute to the significance of proximity to facilities when evaluating child and youth access to recreation programming. Hjorthol and Fyhri (2009) noted that the car plays an important role in everyday children's leisure mobility but not all interested users have regular access to private vehicular transportation. As a result of this, eight studies commented that distance is a significant barrier that should be addressed in future research of this nature (Utter, Denny, Robinson, Ameratunga, & Watson, 2006; Reimers, et al., 2014; Fyhri & Hjorthol, 2009; Tucker, et al., 2009; Hjorthol & Fyhri, 2009; Moore, et al., 2010; Skelton, 2012; Moore, et al., 2014; Maddison, et al., 2010).

Another factor contributing to the use of and participation in recreation programming is the scheduling and availability of the programs themselves. Moore et al. (2014) found weekends and evenings to be ideal times to be active, but also noted that facilities are often busy or unavailable for youth programming during these peak times. In a focus group-based study, Moore and colleagues also found youth facilities and programs to be significant features of physical activity participation. Results from that qualitative research indicated a variety of factors including intrapersonal, interpersonal, and environment level influences (Moore, et al., 2010). A similar conclusion was drawn by Beaulac, Bouchard, and Kristjansson (2009), who found that in order to facilitate youth participation, programming needed to be fun, safe, and relevant for the target age group. Although youth-specific programming offered at a variety of facilities and during ideal

times is a potential solution for increasing use of facilities, this remains largely within the control of the recreation service providers, and not the participants themselves. That being said, transportation to and from the facilities is much more easily controlled by the participants.

Of the identified studies, 5 focused on sport-specific destination facilities and found that this type of registered private programming often takes place within the municipality, not necessarily within one's neighbourhood (Kemperman & Timmermans, 2011; Steinmayr, Felfe, & Lechner, 2011; Reimers, et al., 2014; Powell, Chaloupka, Slater, Johnston, & O'Malley, 2007; Skelton, 2012). These findings also support research by Reimers and colleagues (Reimers, et al., 2014) who studied relationships between specific sports facilities and participation in corresponding sports activities. They found that increased distance to the private facilities resulted in decreased participation in those activities. A common finding among multiple researchers was the notion that provision of publically available recreation facilities will have a greater influence on youth physical activity than private sources (Alexander, Brunner Huber, Piper, & Tanner, 2013; Ries, Yan, & Voorhees, 2011). By providing public access opportunities, the financial cost is reduced and this inherently increases the accessibility of those facilities.

Due to the fact that many children and youth are unable to access facilities that are outside a walkable distance from their home or school, many of the studies included participation and responses from parents regarding youth activity levels, as parents exert control of children's mobility (Tappe, Glanz, Sallis, Zhou, & Saelens, 2013; Beaulac, Bouchard, & Kristjansson, 2009; Fyhri & Hjorthol, 2009). Tappe and colleagues (Tappe, Glanz, Sallis, Zhou, & Saelens, 2013) found that parents perceived risk to be lower in their immediate neighbourhood and therefore found that closer proximity recreation choices were prioritized for PA engagements.

The results of more than half of the studies identified a need for more public and policy level support for youth recreation opportunities. When referring to the accessibility of these programs many researchers found that future development of physical activity facilities should be well-distributed throughout municipalities and also located in close

proximity to low socio-economic status (SES) neighbourhoods and underserved populations whenever possible to limit the need for supervised transportation to and from facilities (Norman, et al., 2006; Limstrand & Rehrer, 2008; Ries, Yan, & Voorhees, 2011; Powell, Chaloupka, Slater, Johnston, & O'Malley, 2007). This focus on public availability of programs was commonly identified through all included research and will be addressed in the following two sections of this chapter.

2.4.2 Supervised Transportation versus Independent Mobility

Another primary theme that was noted by researchers was the concept of youth independent mobility. While many children walk to school or neighbourhood parks, it is much more difficult to gain access to farther destination facilities such as specialized recreation centres, which are not often present within a walkable distance (Utter, Denny, Robinson, Ameratunga, & Watson, 2006).

Independent mobility is described as a child's ability to travel to destinations without adult supervision (Oliver, et al., 2011). Most of the academic research included herein refers to travel between home and school or home and a neighbourhood park. One of the most interesting findings of this review focusing on destination recreation centres is that children are not typically afforded the independent mobility to travel outside of their home neighbourhood. This means that in order to visit a private or sport-specific recreation centre children either need to use public transit or coordinate schedules with an adult who is able to provide supervised vehicular transportation (Maljak, et al., 2014; Demant Klinker, Schipperijn, Toftager, Kerr, & Troelsen, 2015). If children do not have sufficient independent mobility to travel between destinations they must rely on supervised transportation either from a parent, friend, or family member. A study completed in Finland found that children were allowed to travel independently with active transportation but most required adult accompaniment for longer trips to organized recreation facilities/activities (Fagerholm & Broberg, 2011). Similar results were found in multiple North American studies where higher independent mobility to visit local destinations and greater distances to destination facilities was identified as a significant barrier to access (Page, Cooper, Griew, & Jago, 2010; Utter, Denny, Robinson, Ameratunga, & Watson, 2006). As a result of these findings it is critical to note that

while neighbourhood facilities may be available, they may not offer programs of interest to local residents or programs may not be available at convenient times. For these reasons, the greater-distance and program-specific facilities may be the preferred option for many children despite challenges associated with travelling between locations.

Another crucial factor facilitating children's ability to participate in local physical activity programs was the parent's perception of safety and accessibility. Five of the studies involving parental support for physical activity noted that safety and supervision were determining factors in whether a child was allowed or encouraged to participate (Veitch, Salmon, & Ball, 2008; Beaulac, Bouchard, & Kristjansson, 2009; Tappe, Glanz, Sallis, Zhou, & Saelens, 2013; Nichol, Janssen, & Pickett, 2010). The safety concern was not only limited to the trip between two destinations, but also was discussed as programs with adult supervision depending on the age of the participating children (Holt, et al., 2009; Beaulac, Bouchard, & Kristjansson, 2009). Parents and guardians are the key decision-makers when it comes to child and youth participation in physical activity programs, this means that in order to encourage increased involvement in PA programs parents need to be satisfied that the program is a viable use of their time. This consideration is particularly influential if it will require supervised travel in order to utilize the program or facility.

As a result of this focus on children's independent mobility and the need for supervised transportation and programming, many of the reviewed articles discussed the need for future policy change and involvement of public organizations regarding children's transportation to and from physical activity opportunities. It was recommended that future research focus on informing policy-makers of alternative means of transport and the need for more publically available transit systems or non-motorized forms of travel for youth (Lin & Yu, 2011; Bjerkan & Nordtomme, 2014; Goodman, Jones, Roberts, Steinbach, & Green, 2014; Sener, Copperman, Pendyala, & Bhat, 2008). This policy change can and should be enforced at a variety of levels from school boards, public organizations, transportation planners and government officials.

2.4.3 Policy Change and Community Engagement

The final key conclusion that can be drawn from the review of this literature is that in order to improve children's physical activity levels, change needs to come from all levels of influence. The two most common recommendations for improved interest and use of recreation programming were policy change and community engagement. Keeping in mind the socio-ecological model for this research, it is clear that multiple factors influence the decision to use recreation facilities. It has already been noted that future research should focus on children's mobilities, specifically vehicular transport to recreation destinations, but the availability of programs and facilities also merits further study.

The next step for researchers and policy makers alike is to address the urgent need for development and realization of plans to tackle inactivity among youth (Aarts, van de Goor, van Oers, & Schuit, 2009). There is a need for public support of community engagement interventions as well as available facilities and programming. Multiple studies discussed that facilities should be publically available and distributed throughout as many neighbourhoods as possible to help provide equitable access (Ries, Yan, & Voorhees, 2011; Skelton, 2012; Oliver, et al., 2011). This includes ensuring that less advantaged neighbourhoods with lower socio-economic status are still given the opportunity to participate in public recreation opportunities (Ziviani, et al., 2008). Many of the children and families residing in these target neighbourhoods are not provided enriching physical activity programs commonly offered at private centres as they are limited not only by proximity to the programs but potentially by financial strain as well (Maddison, et al., 2010). Development of new neighbourhood resources and revitalization of existing ones should focus on environments that encourage active living for both parents and children (Roemmich, et al., 2006).

Continuing to focus on community engagement and encouraging partnership among service organizations will be a critical next step in positively influencing youth physical activity. Some of the published recommendations for how to implement policy change and public engagement included utilization of public spaces such as school parking lots as "drop-off" zones so that even when vehicular transport was necessary to travel to a

destination facility, the participants could still experience valuable independent mobility from a safe public place (Larouche, Barnes, & Tremblay, 2013). This type of partnership and collaboration project is an ideal next step in introducing viable solutions to combat youth inactivity.

The following section will review the specific methods employed in the studies described herein and aim to identify opportunities for future research and opportunities to improve upon exiting methods.

2.5 Methodological Considerations

The academic journal articles included in this literature review were generated by researchers across multiple disciplines and as a result have utilized a wide variety of qualitative and quantitative methods. The dominant source of data collection and research was employed by geographic researchers and included geospatial technologies such as geographic information systems (GIS), global position systems (GPS), and accelerometry, in combination with statistical analysis.

Approximately one third of the literature examined in this review used data from geospatial technologies to gather information regarding child/youth spatial behaviours as they pertain to physical activity. The data collected in these studies was used to determine whether the participants were meeting the daily and weekly recommendations for moderate-vigorous physical activity (MVPA) (Oliver, et al., 2011). The studies included a variety of models to analyze their quantitative data depending on the type of data collected and the observed variables. The most commonly used model was a logistic regression analysis to compare the influence of distance on activity levels (Lin & Yu, 2011; Bjerkan & Nordtomme, 2014; Alexander, Brunner Huber, Piper, & Tanner, 2013; Tappe, Glanz, Sallis, Zhou, & Saelens, 2013; Reimers, et al., 2014). In each of these cases the model was used to determine whether distance had a significant influence on physical activity levels within the study population. While a quantitative statistic is able to illustrate a correlation between two variables it does very little to provide context.

Some of the benefits of conducting research with specific quantitative measures such as accelerometry, GPS and GIS analysis include the ability to empirically define the results of the data analysis and easily control for multiple factors of influence. While this type of analysis provides a solid base level of knowledge on activity levels and use, it is difficult to understand the multiple influences that caused those results to occur.

These analyses were often further supported by activity diaries or follow-up questionnaires to provide background detail for the experiences documented in the data (Fagerholm & Broberg, 2011; Collins, Al-Nakeeb, Nevill, & Lyons, 2012; Demant Klinker, Schipperijn, Toftager, Kerr, & Troelsen, 2015; Ries, Yan, & Voorhees, 2011; Moore, et al., 2014). This mixed-methods approach is preferred as it allows researchers to better understand the underlying factors contributing to the results found in the statistical analysis. Although not all of the studies explicitly discuss the benefits of combining these methods, it is clear that this approach provides a well-rounded view of the sample population.

Alternately, many of the study designs examined in this review employed strictly qualitative analysis. This research was conducted through many forms including depth-interviews, focus groups, questionnaires, and activity diaries. Multiple studies identified that the qualitative focus provided opportunity for participants to discuss their perceptions of youth physical activity levels, parents' perceptions of safety and use, as well as hear recommendations for improvement from those who would be most directly influenced (Beaulac, Bouchard, & Kristjansson, 2009; Maljak, et al., 2014; Oliver, et al., 2011; Moore, et al., 2010). On numerous occasions, it was found that the personal accounts of these experiences provided a rich explanation of the factors influencing youth activity levels. While this depth of knowledge from the participant perspective is beneficial, it can be challenging to interpret potential bias in the sample and fully understand the context of the discussion from an outside perspective.

Some of the other methods used to illustrate the physical activity levels of children and youth and the influence of recreation facilities included behavior maps of neighbourhoods completed by kids (Veitch, Salmon, & Ball, 2008), and other qualitative

GIS approaches to mapping locations in combination with child and parental perceptions of opportunities (Tucker, et al., 2009; Wridt, 2010).

The body of literature associating child and youth physical activity levels and access to physical activity destinations suggests that it is critical to combine both quantitative and qualitative data collection and analysis in order to obtain a comprehensive understanding of the population being studied. Based on the experiences of the researchers included in this review, it is clear that a mixed-methods approach would provide an ideal combination of both these measures of physical activity opportunities and experiences. A qualitative examination involving interviews and/or focus groups allows those influenced by physical activity interventions to describe their experiences in detail and provide valuable context to assist in the development of further empirical study. On the other hand, a quantitative analysis focused on the influences of distance to, knowledge of, and financial costs for specific recreation facilities provides statistical data regarding use of and access to recreation centres. It is believed that through implementation of these two methods this thesis will be able to better explain the relationship between youth participation in and use of physical activity programs and distance to recreation facilities.

2.6 Opportunities for Future Research

Overall findings conclude that the car (or personal motorized vehicle) plays a significant role in children's participation in leisure activities and as a result warrants additional research (Hjorthol & Fyhri, 2009). All of the articles included in this review discussed the current state of physical inactivity among youth and identified recreation opportunities as both a barrier and facilitator to participation. The key factors to consider moving forward were described in the summaries above: availability and proximity of recreation destinations; supervised transportation and independent mobility; and finally, policy change and community engagement.

The influential factors defined above fall within the social-ecological framework as described in Chapter 1. This framework was also commonly referenced throughout the literature reviewed and places emphasis on the importance of understanding the spheres of influence and ensuring that these factors are considered when conducting research.

Ten of the articles discussed the importance of researcher awareness of individual, social, and environmental factors when conducting studies related to child and youth physical activity (Utter, Denny, Robinson, Ameratunga, & Watson, 2006; Larouche, Barnes, & Tremblay, 2013; Norman, et al., 2006; Maddison, et al., 2010; Lin & Yu, 2011; Fyhri & Hjorthol, 2009; Kemperman & Timmermans, 2011; Hjorthol & Fyhri, 2009; Moore, et al., 2010; Ries, Yan, & Voorhees, 2011). Future research in the field should aim to address all of these considerations in order to improve the status of youth physical activity levels and access to recreation.

2.7 Conclusion

Through this literature review, it has been established that there is a need for further research examining the influence of geographic accessibility to recreation facilities on use of those facilities. The primary objective of this thesis is to examine factors that influence children's use of free recreation access pass for physical activity. As a result of their contributions to the current body of research, Skelton (2012) suggested that more research needs to be done on what these opportunities are if the overall goal is to provide opportunities to everyone.

A systematic review of existing scholarly work linking geographic accessibility to children's physical activity levels, has revealed several knowledge gaps that this thesis aims to fill. Ultimately, the final goal of this research is to provide policy makers and the community as a whole with a better understanding of the importance of increasing children's accessibility to physical activity opportunities. This review revealed that recommendations can be made to urban planners, government officials, school boards, non-government organizations and the general public based on the findings of this research. The goal is to increase awareness and opportunities in the hope that if potential participants are aware of these programs and facilities, ideally located within their neighbourhood and at little-to-no cost, they will be able to choose to participate in physical activity opportunities.

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Appendix i: Full Systematic Review Table with Data Extracted from Studies Included Broken Down by Database

Table 2.3 Systematic review table with data extracted from GeoBase (part A)

	Authors	*Year*	*Article Title*	*Journal*	*Country*	*Purpose*
1	Wridt, P.	2010	A qualitative GIS approach to mapping urban neighborhoods with children to promote physical activity and child-friendly community planning	Planning and Design	United States of America	consider the role of neighborhood in supporting children's physical activity
2	Sener, I., Copperman, R., Pendyala, R, Bhat, C.	2008	An analysis of children's leisure activity engagement: Examining the day of week, location, physical activity level, and fixity dimensions	Transportation	United States of America	provide a detailed analysis of discretionary activity engagement of children
3	Lin, J., Yu, T.	2011	Built environment effects on leisure travel for children - trip generation and travel mode	Transport Policy	China	empirical analysis of the effect of built environment on leisure lives of children
4	Bjerkan, K., Nordtomme, M.	2014	Car use in the leisure lives of adolescents - Does household structure matter	Transport Policy	Norway	investigation of transport mode choices
5	Fyhri, A., Hjorthol, R.	2009	Children's independent mobility to school, friends and lesiure activities	Journal of Transport Geography	Norway	investigate influences on children's transport to leisure or school
6	Kemperman, A., Timmermans, H.	2011	Children's recreational physical activity	Leisure Sciences	Netherlands	examination of socio-ecological influences on children's participation in recreational physical activity
7	Hjorthol, R., Fyhri, A.	2009	Do organized leisure activities for children encourage car use	Transportation Research Part A	Norway	analysis of children's mobility and trips to organized activities
8	Tucker, P., Irwin, J., Gilliland, J., He, M., Larsen, K, Hess, P.	2009	Environmental influences on physical activity levels in youth	Health & Place	Canada	examination of objectively measured recreation opportunities versus parents' perceptions of opportunities
9	Fagerholm, N., Broberg, A.	2011	Mapping and characterising children's daily mobility in urban residential areas in Turku, Finland	Fennia	Finland	analysis of children's daily mobility and associated physical activities
10	Holt, N., Cunningham, C., Sehn, Z., Spence, J., Newton, A., Ball, G.	2009	Neighborhood physical activity opportunities for inner-city children and youth	Health & Place	Canada	study of percieved opportunities and barriers to physical activity opportunities for inner-city youth
11	Alexander, D., Brunner Huber, L., Piper, C., Tanner, A.	2013	The association between recreational parks, facilities and childhood obesity - A cross-sectional study of the 2007 national survey of children's health	Journal of Epidemiology & Community Health	United States of America	examination of associations between obesity and access to recreational parks and facilities
12	Collins, P. Al-Nakeeb, Y., Nevill, A., Lyons, M.	2012	The impact of the built environment on young people's physical activity patterns - A suburban-rural comparison using GPS	International Journal of Environmental Research and Public Health	United Kingdom	analysis of how youth in rural and suburban environments use their neighborhood for physical activity
13	Goodman, A., Jones, A., Roberts, H., Steinbach, R., Green, J.	2014	We can all just get on a bus and go - rethinking independent mobility in the context of the universal provision of free bus travel to young Londoners	Mobilities	United Kingdom	exmanination of independent mobility after provision of a free bus pass
14	Demant Klinker, C., Schipperijn, J., Toftager, M., Kerr, J., Troelsen, J.	2015	When cities move children - development of a new methodology to assess context-specific physical activity behaviour among children and adolescents using accelerometers and GPS	Health & Place	Denmark	classification of children's and adolescent's physical activity into domains and sub-domains

Table 2.4 Systematic review table with data extracted from GeoBase (part B)

	Study Population	*Sample Size*	*Methods*	*Recreation Facility*	*Distance*	*Mode of Transportation*
1	5th grade 10-12 year olds	32	photography, drawing, time diaries, focus groups, and cognitive mapping	school playgrounds, playing fields, neighbourhood park, regional recreation facility	<1km for boys and girls	car travel for outings
2	children 5-15 year olds	1,810	Mixed multiple discrete-continuous extreme value formula	structured activities outside home and school	modeled	car, carpool, bus, walk, bike
3	4th - 6th grade 10-12 year olds	382	negative binomial regression	leisure facility	modeled	walk, bike, bus, car, motorcycle
4	13-17 year olds	1,790	binary logistic regression model	leisure facilities	<2 km & >4km	private motorized vehicle
5	parents of children 6-12 years old	1,282	multivariate analysis & structural equation modeling	sport activities & youth club	modeled	walk, bike, public transit, car
6	primary school 4-11 year olds	4,293	bayesian relief network	recreation areas	0.5, 1.0, 2.5, 5, 10 (km)	passenger car, walking, biking, public transit, other
7	6-12 year olds	1,282	chi-square	sports club & youth centre	1.0, 2.0, 3.0+ (km)	on foot, bicycle, public transport, car
8	7th & 8th grade 11-13 year olds	811	previous day physical activity recall & parent demographic and neighbourhood questionnaire	public recreation facilities	neighbourhood (500m)	walk, bike, car
9	5th grade 10-11 year olds	35	GPS tracking, mobility diaries, interviews, & questionnaires	sports centre & leisure activities	nearby (500m)	bus, car, bicycling, walking
10	children (12 year olds) school staff, & youth workers	80	interviews	leisure activities	1.5 km^2 (municipal neighbourhoods)	walk, bike, public transit, car
11	6-17 year olds	42,278	cross-sectional study with logistic regression	recreation/community centre, playground area	neighborhood	walk, bike, car
12	13-14 year olds	50	GPS & PA diary with descriptive statistics and ANOVA	public recreation facilities	1.2 & 3.1 (mi)	automobile, walk, bicycle
13	Young Londoners 12-18 year olds	118	in-depth interviews	leisure, sport, and recreation opportunities	municipality	public transit (bus), walk
14	5th - 8th grade 10-13 year olds	523	accelerometer & GPS physical activity patterns	sports facilities	minutes (per GPS & Accelerometer)	walking, biking, vehicle

Table 2.5 Systematic review table with data extracted from PubMed (part A)

	Authors	*Year*	*Article Title*	*Journal*	*Country*	*Purpose*
15	Ziviani, J., Wadley, D., Ward, H., Macdonald, D., Jenkins, D., Rodger, S.	2008	A place to play - socioeconomic and spatial factors in children's physical activity	Australian Occupational Therapy Journal	Australia	explore socioenvironmental contributions to children's physical inactivity
16	Moore, J., Jilcott, S., Shores, K., Evenson, K., Brownson, R., Novick, L.	2010	A qualitative examination of perceived barriers and facilitators of physical activity for urban and rural youth	Health Education Research	United States of America	explore socioecgological facilitators and barriers to physical activity
17	Roemmich, J., Epstein, L., Raja, S., Yin, L., Robinson, J., Winiewicz, D.	2006	Association of access to parks and recreational facilities with the physical activity of young children	Preventive Medicine	United States of America	explore associations between television watching and home neighbourhood on children's physical activity
18	Veitch, J., Salmon, J., Ball, K.	2008	children's active free play in local neighborhoods - a behavioral mapping study	Health Education Research	Australia	understand children's access to places for active free play in their neighborhood
19	Tappe, K., Glanz, K., Sallis, J., Zhou, C., Saelens, B.	2013	children's physical activity and parents' perception of the neighborhood environment - neighborhood impact on kids study	International Journal of Behavioral Nutrition and Physical Activity	United States of America	examination of associations between children's physical activity and perceptions of home neighborhood environmental attributes
20	Page, A., Cooper, A., Griew, P., Jago, R.	2010	Independent mobility, perceptions of the built environment and children's participation in play, active travel and structured exercise and sport - the PEACH project	International Journal of Behavioral Nutrition and Physical Activity	United Kingdom	examination of independent mobility and perceptions of the built environment on physical activity in children
21	Oliver, M., Witten, K., Kearns, R., Mavoa, S., Badland, H., Carroll, P., Drumheller, C., Tava'e, N., Asiasiga, L., Jelley	2011	Kids in the city study - research design and methodology	BioMed Central	New Zealand	explore children's independent mobilities and how urban environments enable or restrict physical activity
22	Utter, J., Denny, S., Robinson, E., Ameratunga, S., Watson, P.	2006	Perceived access to community facilities, social motivation, and physical activity among New Zealand Youth	Journal of Adolescent Health	New Zealand	analysis of motivations for physical activity and recreational facilities
23	Potwarka, L., Kaczynski, A., Flack, A.	2008	Places to play - association of park space and facilities with healthy weight status among children	Journal of Community Health	Canada	examine how youth healthy-weight status is associated to proximity-based park variables
24	Reimers, A., Wagner, M., Alvanides, S., Steinmayr, A., Reiner, M., Schmidt, S., Woll, A.	2014	Proximity to sports facilities and sports participation for adolescents in Germany	Public Library of Science	Germany	assess the relationship between participation in sports and proximity to their corresponding facilities
25	Powell, L., Chaloupka, F., Slatter, S., Johnston, L., O'Malley, P.	2007	The availability of local-area commercial physical activity-related facilities and physical activity among adolescents	American Journal of Preventive Medicine	United States of America	examination of associations between physical activity behavior and availability of commercial physical activite facilities
26	Ries, A., Yan, A., Voorhees, C.	2011	The neighborhood recreational environment and physical activity among urban youth - an examination of public and private recreational facilities	Journal of Community Health	United States of America	individual and environmental correlates of physical activity and use of rec facilities
27	Larouche, R., Barnes, J., Tremblay, M.	2013	Too far to walk or bike	Canadian Journal of Public Health	Canada	suggestion of methods to encourage active transportation for children
28	Aarts, M., van de Goor, I., van Oers, H., schuit, A.	2009	Towards translation of environmental determinants of physical activity in children into multi-sector policy measures - study design of a Dutch project	BioMed Central	Netherlands	evaluation of multi-sector policy measures to stimulate children's physical activity
29	Limstrand, T., Rehrer, N.	2008	Young people's use of sports facilities - a Norwegian study on physical activity	Scandanavian Journal of Public Health	Norway	study the effect of age, gender, and relative activity level on sports facility usage

Table 2.6 Systematic review table with data extracted from PubMed (part B)

	Study Population	*Sample Size*	*Methods*	*Recreation Facility*	*Distance*	*Mode of Transportation*
15	parents of 6-7 year olds	318	cross-sectional investigation of environmental factors using a priori comparisons	parks & public facilities	neighborhood	public transport, walk, cycle
16	middle school youth & parents	41 youth 50 parents	focus groups	physical activity facilities	neighbourhood	walk, public transit, car
17	4-7 year olds	59	ANOVA, univariate correlations, heirarchical regression models	recreation area	0.5 (mi)	walk, bicycle, drive
18	8-12 year olds	212	behavioural mapping	neighbourhood active free play	<100m	walk, bicycle, public transportation
19	parents & children 6-11 year olds	724	survey + accelerometer with multi-variate regression models	parks and recreation sites	census blocks	walk, bicycle, car
20	10-11 year olds	1,307	Surveys and logistic regression	structured exercise/sport	<1.0 km	walk, bicycle, car, bus, train
21	9-11 year olds	160	mixed methods: GPS, accelerometers, GIS, observations	recreation destination	800 m	walk, bicycle, drive
22	13-17 year olds	9,699	survey questionnaire	recreational facilities	walking distance	walk, bike, automobile
23	random family sample	108	logistic regression models	park facilities	1.0 km	no specific modes identified
24	11-17 year olds	1,768	GIS nearest-distance & logistic regression	sports facilities	linear home-facility	public transport
25	8th, 10th & 12th grade	N/A	survey, observation, and empirical models	commercial physical-activity-related facilities	zip-code	no specific modes identified
26	9th-12th grade	327	Actigraph Accelerometers, GIS, & online survey	recreation facilities	5 min drive or 10 min walk	walk, drive
27	children & youth	N/A	commentary	exercise destination	"walkable"	walk, bicycle, automobile
28	9-13 year olds	3,449	questionnaires regarding physical activity behaviour and physical and social environmental		limited results	walk, bicycle, automobile
29	5th - 10th grade 6-16 year olds	662	cross tabs, chi-square, logistic regression	sports facilities	suburbs	reference to distance

Table 2.7 Systematic review table with data extracted from SPORTDiscus (part A)

	Authors	*Year*	*Article Title*	*Journal*	*Country*	*Purpose*
30	Nichol, M., Janssen, I., Pickett, W.	2010	Associations between neighborhood safety, availability of recreational facilities, and adolescent physical activity among Canadian youth	Journal of Physical Activity & Health	Canada	influence of neighbourhood parks and facilities on adolescent physical activity
31	McCaughtry, N., Kulik, N., Martin, J., Shen, B., Whalen, L., Fahlman, M.	2014	Challenges in offering inner-city after-school physical activity clubs	American Journal of Health Education	United States of America	examination of challenges faced by physical activity clubs from perspectives of leaders and students
32	Norman, G., Nutter, S., Ryan, S., Sallis, J., Calfas, K., Patrick, K.	2006	Community design and access to recreational facilities as correlates of adolescent physical activity and mody mass index	Journal of Physical Activity & Health	United States of America	establishing a link between physical activity and weight staus for adolescents
33	Maddison, R., Jiang, Y., Vander Hoorn, S., Ni Mhurchu, C., Exeter, D., Utter, J.	2010	Perceived versus actual distance to local physical-activity facilities - does it really matter	Journal of Physical Activity & Health	New Zealand	assessment of level of agreement between objectively measured and self-reported proximity to physical activity resources
34	Beaulac, J., Bouchard, D., Kristjansson, E.	2009	Physical activity for adolescents living in a disadvantaged neighbourhood - views of parents and adolescents on needs, barriers, faciltators, and programming	Leisure	Canada	examination of factors influencing participation in physical activity for socio-economically disadvantaged adolescents
35	Steinmayr, A., Felfe, C., Lechner, M.	2011	The closer the sportier - children's sports activity and their distance to sports facilities	European Review of Agining and Physical Activity	Germany	investigation of whether distance between sports facilities matters for participation in sports activities
36	Moore, H., Nixon, C., Lake, A., Douthwaite, W., O'Malley, C., Pedley, C., Summerbell, C., Routen, A.	2014	The environment can explain differences in adolescents' daily physical activity levels living in a deprived urban area - cross-sectional study using accelerometry, GPS, and Focus Groups	Journal of Physical Activity & Health	United Kingdom	measurement of physical activity and description of environmental context to determine where adolescents were most and least active

Table 2.8 Systematic review table with data extracted from SPORTDiscus (part B)

	Study Population	*Sample Size*	*Methods*	*Recreation Facility*	*Threshold or Buffer Distance*	*Mode of Transportation*
30	6th - 10th grade	9,114	multi-level logistic regression models	parks and recreational facilities	5 km buffer	no specific modes identified
31	students and adult leaders	278 students 126 leaders	population based health-promotion model with field notes and interviews	physical activity club	1.0 mi	walk, carpool, parent driven
32	11-15 year olds	799	GIS, accelerometers & spatial analysis	recreational facilities	1.0 mi	walk, automobile
33	high school 12-18 year olds	110	GIS, accelerometers & weighted Kappa indices	physical activity resources	minutes (per GPS & Accelerometer)	walk, car
34	adolescents & mothers	17 adolescents 13 mothers	focus groups	physical activity programming	neighborhood	accessibile
35	children 3-10 year olds	17,641	propensity score-matching estimator	gym, sports grounds, tennis courts, indoor pools	2.5 km	accessibile
36	adolescents 11-14 year olds	28	cross-sectional study with GPS & accellerometry	physical activities	1.0 km	walk, bicycle, automobile

Chapter 3

3 Service Provider Perspectives on Barriers to and Benefits of London's Grade 5 ACT-i-Pass Program

3.1 Introduction

Child and youth physical activity levels in Canada have decreased significantly over the last few decades (Tremblay, et al., 2010)**.** The 2015 Active Healthy Kids Canada Report Card indicates that four primary factors influence children's activity levels: access to organized sport, a predisposition to sedentary behaviour, engagement in active play, and participation in active transportation such as walking or biking (2015). The 2016-updated version of the ParticipACTION report card cites similar findings, indicating that most children and youth in Canada do not meet the recommended levels of MVPA (ParticipACTION, 2016). The same report also notes that some Canadian parents indicated a lack of accessibility as a physical activity (PA) barrier for their children; meaning that opportunities for PA and distance to facilities have a significant impact on children's participation in PA (ParticipACTION, 2016). In response to the 'epidemic' of sedentary behaviours among Canadian children and youth, there is growing interest among researchers and policy makers to identify the barriers to participation that are influencing the overall decline in PA by the current generation of children and youth.

A child's decision to participate in physical activity is a complex one that involves multiple factors of influence. For the purpose of this study, the variables influencing the choice to participate in PA will be examined using an adapted version of the socio-ecological model of health behaviours (Sallis, Owen, & Fisher, 2008). Sallis and colleagues describe the four key domains of active living as intrapersonal (e.g., demographics, behaviors), interpersonal (e.g., household income, education, occupation), environmental (both natural and built features), and policy e.g., (school and government policies) (Sallis, et al., 2006).

Intrapersonal factors have been evaluated in multiple other research studies, which consistently conclude that boys are generally more active than girls during childhood and

adolescence (Trost, et al., 2002). Other examples of intrapersonal influences on PA include how boys tend to be afforded a greater amount of independent mobility than girls and that the two sexes engage in varying types of physical activities (Villanueva, et al., 2012). Interpersonal factors and built environment factors often work in combination with one another. Recent studies on children and youth indicate that activity levels decrease significantly with age and children from less affluent families are more significantly influenced (Grant & Manuel, 2011). One such study found that participation in physical activity increased as SES increased and contrastingly found that as remoteness increased, PA participation decreased (Eime, Charity, Harvey, & Payne, 2015). Additionally, from the built environment realm, proximity and availability of recreation facilities have consistently been associated with increased levels of PA among adolescents (Sallis, Floyd, Rodriguez, & Saelens, 2012). Because of these findings, it has been recommended that future research should focus on evaluating comprehensive interventions based on ecological models. This knowledge from previous literature frames the objective of this study, which is to **explore service providers' perspectives on children's use of a free recreation access pass.**

Researchers, policymakers, service providers, and other child health advocates frequently recommend community-based PA interventions as an instrument to increase participation and interest in PA opportunities for children (van Sluijs, McMinn, & Griffin, 2007; Perry, Garside, Morones, & Hayman, 2012) but evaluations of the effects of such targeted initiatives are rare and tend to be limited in scope. The Grade 5 ACT-i-Pass program (G5AP), as outlined in section 1.4, offers an excellent opportunity to evaluate the effectiveness of a naturally-occurring physical activity intervention, and identify opportunities for improvement and future investment. This study will examine the interpersonal, built environment, and policy level influence of recreation service providers offering the program and their perceptions of program success, challenges, and recommendations for enhancement.

This qualitative analysis will concentrate on recreation service providers and their perceptions of increasing physical inactivity and use of their facilities by local children. When developing community-based health interventions, parks and recreation services

are frequently included in the programs, but are not often cited as a critical influence on program effectiveness. It is commonly noted in academic literature that parent and child/youth perceptions of safety, fun, and enjoyment are highly influential in determining whether adolescents will engage in physical activity (Tappe, Glanz, Sallis, Zhou, & Saelens, 2013; Grow, et al., 2008). On the other hand, the influence of the recreation service providers is rarely referenced in discussions regarding children's physical activity, despite the fact that these organizations hold considerable power in determining which activities will be offered, where they will be located, who will lead the programs, how many spaces will be made available, and what costs will be associated. This population of influence is less often examined yet plays an integral role in successful implementation of PA programs.

Service providers have not been neglected entirely, as some scholarly work has focused on the service provider influence in public health partnership projects, but in a much broader scope than this study proposes. Partnership projects such as the G5AP have been reviewed in the past and studies commonly found that coordination and commitment to a unified effort was a critical component of success (Frisby, Thibault, & Kikulis, 2004, Leichty, et al., 2014, Giles-Corti B. , 2006, Casey, Payne, Brown, & Eime, 2009). In a specific review of organizational dynamics of these projects, Frisby and colleagues (2004) interviewed management and staff in partnership organizations in ten Canadian cities and found that insufficient training, poor coordination, and lack of guidelines negatively impacted the success of the project. A similar Australian study reviewed population health interventions and identified through staff interviews that long-term commitment from organizations and pragmatic program design building on existing business practices were important (Casey, Payne, Brown, & Eime, 2009). In another study, Zarrett, Skiles, Wilson, and McClintock (2012) conducted interviews with 12 school staff members who were involved in a 17-week after-school intervention focused on promoting PA in underserved adolescents. The results of that study indicated that insight from those facilitating the programs was a crucial component of establishing effective interventions for increasing youth PA (Zarrett, Skiles, Wilson, & McClintock, 2012). Leichty and colleagues (2014) summarized the findings of existing research by reiterating that collaboration among contributors is key to partnership success.

Children and youth have very little control over their physical activity opportunities outside of their neighbourhood because their independent mobility is often constrained to a walkable distance (Moore, et al., 2010, Loebach & Gilliland, 2014). Because adult figures have such a large amount of control over children's participation in and access to PA opportunities, this study will review one of the contributing adult influences. This study employs a very similar research process to the intervention reviews discussed above; in-depth interviews were conducted with 14 departmental managers from G5AP recreation service provider partners throughout the City of London, Ontario. Service providers were selected as the target population of this study because they have a significant influence on the accessibility of destination recreation opportunities and are seldom consulted directly when developing or evaluating physical activity interventions. The purpose of these interviews was to gather information about the G5AP intervention from those who deliver the program. The overall purpose of this thesis is to explore factors that influence access to recreation opportunities for children in London through provision of a free access pass at various partner facilities. This qualitative analysis focuses on the more specific study objective of evaluating service provider perspectives on accessibility of children's PA opportunities. The results will be shared to inform and motivate participating organizations to continue to improve the quality and implementation of the program and in doing so, encourage children in London to remain active for years to come.

3.2 Methods

This study includes interviews with G5AP service providers to allow management-level employees affiliated with each partner organization to voice their experiences with the pass thus far and seek guidance for future program development and evaluation. Service providers are key actors to interview because the objective of this thesis is to determine factors that influence access and use, and the recreation facilities encompass the three outer spheres of the socio-ecological model that frame this work. The employees at each facility play a significant interpersonal role in the experience each participant has upon entering a program; the location of the facility itself and the equipment available within

covers the built environment realm of the model, and the available programs and policies that frame them fall within the policy sphere.

This study follows an existing Grade 5 ACT-i-Pass research protocol developed by colleagues in the Human Environments Analysis Laboratory (HEAL) at Western University (Gilliland, et al., 2015). The G5AP study protocol paper published by Gilliland et al. (2015) establishes the basis of the research and outlines the proposed methods to be used in program evaluation.

In-depth interviews were employed in this project to provide an analysis of factors that may have influenced children's use of the G5AP. These interviews derive the experiences of the adults who significantly influence the availability of children's PA opportunities, and therefore also attribute to the success of the G5AP program. While the G5AP protocol identifies a conceptual model to explain the expected outcomes, these interviews aim to identify unaccounted for factors that may provide a better understanding of the varying levels of uptake and use seen throughout the intervention (Gilliland, et al., 2015). This qualitative research will follow the organization styles outlined by Miller and Crabtree (1999) as well as those recommended by Baxter and Eyles (1997) to assist with data collection and analysis.

3.2.1 Recruitment

A purposeful sample of participants was recruited through the G5AP program partners and collaborators. The first step was to contact each participating service provider and support agency to ask if they would participate in a 30 to 45-minute interview to discuss their experience with the G5AP program, as the second year of the intervention ended. Contact was initiated through email correspondence from the G5AP email account directly to the corresponding program provider contact. The email contained a detailed description of the purpose of the interview, opportunities to arrange a meeting or phone call, and an attached Letter of Information describing research ethics and a study description. Interested parties were instructed to respond to the email to indicate their availability for a meeting to be finalized for a future date and time.

The study population included G5AP collaborators from the London Child and Youth Network, as well as department and organization managers from the three primary service providers: City of London (Spectrum/Arenas/Aquatics), the YMCA of Western Ontario, and the Boys and Girls Club of London. This sample was chosen to ensure that employees who were knowledgeable about the G5AP intervention from all participating agencies had opportunity to discuss their experiences and provide input.

3.2.2 Procedure

Initial recruitment included email contact with 25 potential interviewees and after three months of follow-up interviews were scheduled with a final sample of 14 service providers. A total of 13 semi-structured interviews were held in 2015-16 based on the initial intervention cohort (1 interview involved 2 service providers). Interviews were conducted either over the phone (n = 10) or in person (n = 4) based on interviewee preference. In person interviews were facilitated either in an office space at the service provider facility, or in a conference room at the University of Western Ontario. Each interview was one-on-one with respondent, with the exception of one that included two respondents from the same service organization.

Table 3.1. Service Provider Recruitment by Agency

	City of London	**YMCA**	**BGCL**	**CYN**	**Total**
n =	3	5	3	3	14

Interviews were conducted after I completed qualitative analysis coursework and obtained guidance and moderator training from staff at the HEAL to prepare for the interview process. A semi-structured interview guide was developed to facilitate the interviews. All interview sessions were digitally voice recorded and detailed interviewer notes were taken as a backup should an equipment malfunction occur during the session and to describe non-auditory cues such as body language and facial expressions. All interviews were transcribed verbatim and then the transcripts were peer-reviewed by a second researcher (not present during interviews) to ensure words and phrases were interpreted accurately and to generate a higher level of data validity. Transcriptions were

shared with interviewees to make sure there were no gaps or inaccuracies in the reporting. The transcription process followed a pre-determined protocol that was developed prior to the start of qualitative research by HEAL researchers working on the G5AP project. Interview sessions lasted 20-35 minutes on average.

The questions were mindfully crafted to elicit comments from the service providers regarding children and youth physical activity levels and accessibility of programming at their facilities. The guide included topics such as: management knowledge of how the pass functions overall and at their specific site, suggestions to increase use and develop the program, benefits of the G5AP, challenges in implementation, and barriers to access. The interview guide was developed with the intention of initiating a conversation around children's access to recreation opportunities at a variety of destination recreation locations throughout the municipality. The interview protocol followed an outline (Appendix E) for discussion but was flexible in allowing participants to describe personal experiences in detail and divert from the original questions. This technique also allowed me to adapt to the conversation and prompt as necessary should any unanticipated topics arise in the discussion.

3.2.3 Analysis

All 13 transcripts were included in the data analysis and coding process. Two independent coders (myself and a researcher who was not directly involved in data collection) reviewed the transcripts to identify emerging themes and develop and define an operational codebook for the project. The two coders consulted with one another to review their findings and used the results to develop one final master codebook. Each of the 13 transcripts were then analyzed to identify and assign appropriate codes to relevant text within the documents. Following independent coding of each transcript, the two coders met to discuss and review coding decisions and resolve discrepancies between the two. The coding and comparison process was completed using NVivo Pro (version 11) qualitative data analysis software for storage and organization (QSR International, 2015).

The initial phase of qualitative review involved setting up 'nodes' to identify themes or specific quotations from each interviewee. Once the transcripts had been properly coded

‘coding stripes’ were used to visually represent areas of interest. The second phase of analysis employed ‘chart document coding’ and ‘nodes most frequently coded’ within the NVivo analysis software to clearly identify nodes that were most significantly represented within the transcripts.

Rigor of this data collection and analysis was achieved by following the four criteria as identified by Baxter and Eyles (1997). Table 2 below describes how data trustworthiness was achieved by the researchers involved in performing this study. Rigor was enhanced in this qualitative study by focusing on these four criteria throughout data collection and analysis.

Table 3.2. Measures to Ensure Data Trustworthiness (Rigor)

Credibility	At the end of each interview session the questions were member checked to ensure that researchers accurately understood the interview responses. Additional credibility was established through qualitative assessment of agreement between coders over time. Re-reading transcripts with “fresh-eyes” helped to remove researcher interpretation bias when coding.
Confirmability	One researcher independently performed inductive content analysis to commence the data analysis process. A second researcher (not involved in data collection) concurrently performed a similar analysis and the two later met to compare findings. Data was examined for differences and similarities throughout the interviews, and emerging themes were acknowledged. The researchers discussed and summarized analysis to develop a coding guide.
Dependability	Following the completion of the interview process two researchers met to debrief and summarize. Additionally, any biases were expressed and this was recorded. Details regarding each respondent’s organizational affiliation, position, and location were documented.

Transferability A detailed description of research process has been provided so that future researchers could easy replicate the methods used in this study to conduct similar studies

3.3 Results

3.3.1 Physical Activity Accessibility

After reviewing transcribed interviews and establishing trends in responses, three primary themes emerged relating to accessibility of PA opportunities for youth in London, Ontario. The common themes identified by all participating respondents were economic, information, and geographic barriers to access. Multiple academic sources (Burns & Bond, 2008; Dahmann, Wolch, Joassart-Marcelli, Reynolds, & Jerrett, 2010; Tucker et al. 2009) also identified these as common barriers to access. The Venn Diagram below helps to visualize the interconnectivity of the three commonly identified barriers. Figure 3.1 shows how a combination of any two of the three accessibility features can enable a person to explore their options, but leaves them without one component of full access.

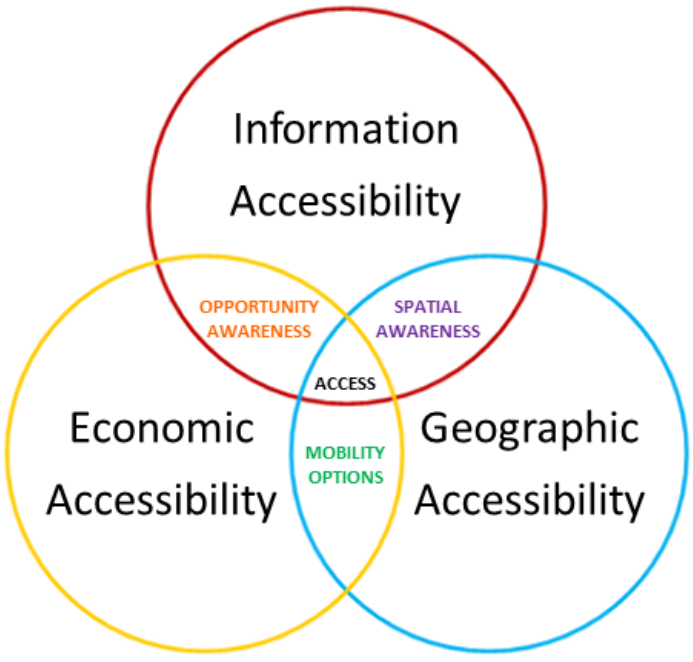

Figure 3.1. Physical Activity Program Access Model

Opportunity awareness is presented when a participant has the financial means to participate in a program and has knowledge of information related to the program. With a combination of these two pieces of accessibility, a potential participant is aware of the opportunities available to them, yet may still not have geographic accessibility.

Spatial awareness occurs when a potential participant is aware of physical activity programming options and when the program is geographically available within their neighbourhood. However, despite having knowledge of and geographic proximity to a recreation option, potential users may be limited by their financial means to participate. The financial limitation may be one or a combination of transportation, registration, equipment, or multiple other factors.

Mobility options are available to any potential user when they hold both the financial means to participate and also have access to transportation or live within close proximity to the program. In this circumstance, the missing piece of accessibility is information. Although two of three accessibility requirements are met, if a potential user is not aware of the program, they will still not be able to access it.

It should be noted that humans often make imperfect decisions despite meeting all three accessibility factors included in obtaining full access. These spatial behaviours are influenced by much more than simply the constructs described above. While this model does illustrate the three barriers commonly identified by G5AP service providers, it does not consider human behaviour and the impact of cultural, social, societal, and personal choices. For example, a potential participant in a physical activity program may have the financial means to participate, be knowledgeable about the facility and program, and also have geographic access to it, yet still choose not to partake.

This concept of full access as modeled in the diagram above describes an objective view of spatial behaviour. As a human geographer, I am cognizant of the fact that humans are not always rational and do not make decisions objectively. There are a multitude of influences and the intent of these depth interviews is to understand the outcomes of decisions made by children (and/or decision-making adult influences) and the constraints set by their environments, society, and their personal preferences.

The following results sections will describe the questions asked during the interview process and sample quotations from interviewees to provide an overall narrative of the outcomes. The findings regarding constraints have been broken down into the three major themes that emerged during the data transcription: information accessibility, economic accessibility, and geographic accessibility. The latter half of the results will discuss benefits of the program and opportunities for development and improvement.

3.3.1.1 Information Accessibility

One of the overarching themes of the service provider discussions was the concept of knowledge about the G5AP program and access to information about recreation opportunities in general. The majority of respondents agreed that the spatial behaviour of traveling to destination recreation centres is influenced by the potential participant's existing knowledge about available programming. The theme of information as a barrier to access emerged in two ways throughout the course of the interviews: promotion and registration.

3.3.1.1.1 Promotion

The benefit of increasing knowledge about the programs for the children and families through registration and ongoing promotion of the pass was discussed widely throughout the interviews. Most respondents noted that if promotion of the pass were more widespread then more children would be excited about the opportunity and therefore more likely to register. Two of the interviewees accurately described the sentiments of the group when they stated:

> *The publicity of the program, I guess. I mean it's a great initiative and […] I think it's really under-utilized.*

And

> *It would have to be something that makes this program stand out and has the reputation that kids are waiting to get it when they turn a certain age.*

Promotion of the pass at the various facilities was viewed in a couple of different ways. There were some mixed views on whether promotion was the responsibility of the service provider facilities or whether it should come from the support agencies like the Child and Youth Network. In general, the focus was on the fact that G5AP is an excellent initiative that could see greater uptake if more people were knowledgeable about the program. In her response, one of the interviewees acknowledged the role of the facility staff in sharing program information:

> *(We have the) responsibility of not only providing access and promoting our services but letting people know about the services through the other organizations is important.*

The type of thought described above lead many other managers to agree that the promotion of G5AP is mutually beneficial; not only do the children benefit from the physical activity, but also the service providers are able to bring more patrons through their doors as a result of the pass. One of the private recreation facility managers reflected the opinion of most when he said:

> *if we could find a way to encourage more people who live within close proximity to those locations to really benefit from those programs than everyone would see [...]positive experiences.*

And

> *ACT-i-Pass literally provides you with a vehicle to market your program to grade five students for an entire school year.*

When asked if they had any suggestions for how to improve interest and use of the G5AP and recreation facilities in London, many of the service providers continued to recommend increased promotion of the program and linked those comments with difficulties in the registration process. One of the service providers elaborated:

> *Part of the initial registration process should include more detailed information about each service provider, or at least something that links the kid and their*

> *family to more information. I think registration can be a good way to get them, the families, the information they need to be involved in the program.*

Overall, the current service provider partners believe that the G5AP program has potential to be very successful and they hope that continued promotion will encourage children and families to explore recreation opportunities throughout London. The following quotation exemplifies how the service providers feel about the need to share knowledge and information:

> *I think that the program is amazing, so the real pressure is getting the information out there and encouraging kids and their friends or their family members to come and try out the facilities and really let them know the benefits of exploring the options both within their neighbourhood and outside their neighbourhood*

3.3.1.1.2 Registration

As was described above, the registration process at the start of the program presents service providers with an excellent opportunity to share information about their programs and facilities. However, most service providers thought that the registration process might have been perceived as onerous for the participants and their guardians. Many described a registration process whereby the student first registers for the G5AP program at school or online, but is then required to register at each individual organization upon arrival for their first visit. One woman reflected the opinions of the group when she said:

> *I feel like adjusting the registration process, or at least re-evaluating the registration process would A) increase the number of ACT-i-Pass users but B) make it less onerous on families to register*.

It was remarked by both the public and private recreation managers that given the current state of registration software, it would be extremely difficult to circumvent the double registration issue. In order to meet ethical standards regarding information sharing, particularly for vulnerable populations such as the 10, 11 and 12-year-olds in the program, each facility is required to maintain their own registration system. Despite the fact that registration is currently limited by individual organizational policies regarding

child protection and user safety, it was suggested that an ideal solution would be a universal registration for all programs and organizations. One of the municipal employees noted that while an adjusted registration process would be ideal, there are inherent limitations for each organization within their policies and current registration software.

> *I think that's just the availability of technology and ability to actually run that through the system[…] something centralized that everybody was doing the same, would ultimately, I think, be the best case scenario, but I realize that's not always a reality.*

Generally, the service providers were receptive to the idea of a universal registration system but none were able to provide a concrete solution for the current issues.

3.3.1.2 Economic Accessibility

Interview respondents universally agreed that the Grade 5 ACT-i-Pass program inherently helps to alleviate the financial barrier because it is free of charge for all students. Similar to the reciprocity described in the promotion discussion above; the G5AP is beneficial to both the service provider and the child participant. Service providers are filling excess capacity in their programs, and the children are given exposure to activities that were previously unattainable. A couple of respondents accurately described the opinions of the group:

> *By dropping the fees tied to this, it definitely opens up these new opportunities to children who otherwise would not have had the ability, financially, to be involved.*

And

> *It gives families an opportunity who maybe couldn't afford coming and using those services the opportunity to do so.*

Although all respondents could agree that the program is beneficial and eliminates some economic barriers, one of the municipal employees interviewed expressed concern that other financial limitations still exist in this statement:

> *ACT-i-Pass absolutely helps alleviate the financial barriers, there are other things like just equipment cost, like if it was a program where you needed to bring something on your own, yes the ACT-i-Pass program itself is free, but do you have the means to prepare yourself to participate in that activity.*

When asked if they had any suggestions for improvement, or means to overcome any associated economic strain, many participants suggested encouraging use of subsidy for future access to recreation programming. This sentiment was a particularly common response from the municipal employees who expressed familiarity with the subsidy application process and noted that participants are not always aware of what subsidy is available to them. One of the management-level employees interviewed accurately reflected the opinion of the group when she said:

> *(we need to) build better ties with organizations that subsidize participation for kids in order to allow more access to more of those neighbourhood-based opportunities.*

Another stated,

> *Parents are aware of other program supports that are out there for the whole family, […] there's a financial benefit because they have access to programs like subsidy.*

Conversely, one of the municipal recreation supervisors described that in her experience, the additional subsidy support is not always beneficial, particularly to the facility offering the program. She explained that registered users are not as committed to free programs because they do not have the literal "buy-in" for the service. She acknowledged that one of the great things about G5AP is that it (ideally) fills excess capacity in programs that otherwise exhibit low registration rates. The issue with the free programming is that a program intended for 10 participants will theoretically have 5 paid users and 5 free or subsidized users, but in many instances the free registrants are not present. When this occurs, it negatively affects the dynamic of the entire group and creates operational challenges for the instructor. She elaborated that her department is working on strategies

to combat this by sending reminders about registration or finding alternate avenues to motivate registrants to attend classes.

Despite potential for lack of commitment to low or no charge programs, service providers were also quite clear in their admission that subsidy is an excellent resource for children and their families. As a group, they firmly believe that subsidies and free programs help to improve economic access to physical activity opportunities. About half of the interviews discussed subsidy in detail and participants were unified in their opinion that moving forward, the G5AP program should provide information regarding available subsidy to all participants. The intention of this information sharing is to eliminate both the knowledge and economic barriers to access and as a result, encourage participation in affordable recreation opportunities once their pass has expired.

Overall, service providers acknowledged that the program alleviates financial strain, but were also cognizant of other barriers to use. One statement summarized this notion well:

> *it becomes kind of a balancing act so maybe the benefit of the free access doesn't necessarily outweigh the other challenges that the participants have to overcome.*

From the service provider point of view, most of the other challenges they were referring to involved geography and the influence of space on a child's ability to participate. The results from geographic accessibility discussions are described below.

3.3.1.3 Geographic Accessibility

The most salient barrier to physical activity discussed by the service providers was the concept of geographic access to programs and facilities. This particular facet of the conversation was reviewed in detail as it appears to have the most significant influence on children's access to recreation opportunities, and was identified as the barrier that they likely have least control over. The following quotation exemplifies how service providers view geographic accessibility:

> *… of course the free program is a huge benefit to many families because then the financial barrier is somewhat eliminated almost entirely, it only becomes an issue for the families that don't necessarily live within close proximity to a facility.*

The socio-ecological model illustrates how children's spatial behaviours are influenced by their own barriers and facilitators as well as more external factors. The intrapersonal, interpersonal, built environment, and policy level influences play an important role in a child's ability to access recreation programming. Although children are capable of deciding what they prefer to participate in, they are frequently limited by other factors beyond their control, particularly in regards to their independent mobility. The remaining results describe children's geographic accessibility from the service provider's perspective and follow the themes of *proximity/distance*, *transportation*, and *program distribution and variety*.

3.3.1.3.1 Proximity/Distance

Most of the comments regarding transportation could be synthesized in a discussion of proximity and distance to the recreation destinations. Service providers commonly identified that with a limited number of existing service program partners, some areas of the city remain inaccessible for G5AP use. Children's independent mobility was a strong undertone of these discussions and highlighted concerns about how G5AP users gain access to programs that are outside of their home neighbourhood. All interviewees frequently mentioned the need for neighbourhood-based programming, and the entire group would recommend adding programs in as many facilities as possible to serve a larger population and cover more areas of the city. One service provider reflected the consensus when she stated:

> *increasing both the variety of activities and the number of locations that are providing access. I think the more geographically accessible the program opportunities are, the more likely they are to be accessed.*

Service providers also mentioned that many of their registered (non-G5AP) users live in close proximity to their facility, and that the G5AP should aim to increase the density and

distribution of program offerings so there are more opportunities available within neighbourhoods, particularly within walkable distances. The majority of service provider comments discussed the notion that the facilities should be more evenly distributed and widely available to the public. The ensuing comments capture these suggestions from the group:

> *Providing programs that are available within their neighborhoods (and) that are within walking distance, I think is important.*

And,

> *Trying to spread all of our programs all throughout the community so that most children would have access.*

Unlike their municipal facility counterparts, the private recreation facility management recognized that distance influenced participation at their facilities because there are fewer private sites distributed across the city. This is particularly true of the Boys and Girls Club where all programming is offered at one central location. In regards to these facility distribution concerns, all interview participants agreed that G5AP program organizers should continue to build relationships and collaborate with other service providers throughout London to provide a greater variety of programs at more locations.

3.3.1.3.2 Transportation

When discussing access to physical activity opportunities, many of the service providers mentioned that even though a facility might be within close proximity to a child's home or school, that particular site may not offer a program that interests them. This means that children are then required to travel to a destination venue to participate in an activity of interest to them. Respondents commonly identified transportation as a barrier that limited access to destination facilities. Interview responses suggested that many potential users do not have the vehicular means to travel outside of their home neighbourhood and as a result would be restricted in their ability to participate. One of the service providers summarized challenges with travel to and from facilities in this quote:

> *That's partly just from a sheer convenience point of view, and partly because there are additional barriers, like transportation, that can right now prohibit participation or limit participation. So the more we can cut out the financial requirements of transportation and/or just cut out the inconvenience of having to transport kids even if you can afford it, I think the higher the uptake will be. So, that's one area, increase geographical accessibility.*

Although the quote above focuses on private vehicular transportation, another response placed emphasis on how the decision to travel to a facility is not as simple as being able to pay for it. This again supports the need to increase the number of service providers and provide additional programming in more areas. The potential experience of a low-income participant was described in this comment:

> *Most people have the opportunity to walk to a, a neighbourhood school for programs. But things certainly become more difficult if a family doesn't have access to a vehicle, or a bus pass.*

One of the private service provider managers extended the discussion on transportation to focus on accessibility via public transport. She explained issues with geographic accessibility in her comment:

> *(we are a) new facility in a developing area and the public transit system hasn't really reached us yet so not only for our members but for our staff and anyone else who is trying to access the facility, if you don't live within walking distance or have access to a vehicle it's extremely challenging to get to the location.*

This notion was echoed by a municipal employee who agreed that some of the largest and theoretically most attractive venues for physical activity are often inaccessible via public transit or active transportation. He was specifically referring to a large city-owned structure that does not fall directly along a public bus route, and is relatively inaccessible from the neighbouring residential developments. He described the thought process of potential program user attempting to access their facility:

> *What is the transportation barrier within my own city? How do I overcome those? How do I learn how to navigate that system?*

One of the final thoughts shared regarding public access to recreation facilities reflects the concept of subsidy support as was described in the economic accessibility discussion. One of the male interviewees noted that even with subsidy, when all other factors are considered, something like travel to and from programs can still be limiting. He explained the experience for those families as follows:

> *… I think people have the best of intentions to show up, but based on the low-income population that a majority of the subsidy pot serves, I think in reality if having to get a bus pass to go across the city for your program is you know, five to ten dollars that could be used for food or something else that month.*

3.3.1.3.3 Program Distribution and Variety

It has been emphasized throughout the geographic accessibility results, that increased programming is critical for continued success of the program. Additional comments regarding the distribution and variety of programming options focused more on the intrapersonal sphere of the ecological model and discussed children's preferences specifically. Multiple interviewees stated that a potential barrier to access and use may be that desired programs (personal interest) are not currently offered through the G5AP in their neighbourhood, or possibly not at all. When describing how G5AP has the potential to engage children in programs they would like to try, one service provider stated:

> *they could explore their interests and find out if there are other things (they like) and it might be something that is much closer to them. So (we should be) trying to touch as many neighbourhoods as possible to make things easier for children to eliminate the barriers that they really have no control over.*

When asked if they had any suggestions for how to increase program distribution and variety, most of the service providers were supportive of collaboration with both for-profit and not-for-profit organizations within the municipality. They felt that the best way to generate additional capacity to provide opportunities to kids would be to encourage as

many recreation programs as possible to join in the G5AP initiative. One of the female respondents summarized the concept in her statement:

> *(we should be) re-evaluating where the programs are available, and […] looking for those gaps and identifying where the programs could be to […] close that (gap), and remove that barrier for some people.*

The first half of the results section focused on the information, economic, and geographic accessibility of physical activity opportunities for children in London. In order to meet the research purpose of understanding the factors that influence children's use of a free recreation access pass, service providers were also questioned about positive influences from the G5AP program.

3.3.2 Benefits of the Grade 5 ACT-i-Pass Program

Service providers were asked what they believe the benefits of the G5AP program are to the children and families who chose to participate. This question was included with the intention of better understanding children's spatial behaviours and exploring reasons why registered students decided to use (or not use) the pass. This prompted a wide-variety of responses, all congregating on the concept that the G5AP program is an initiative that not only provides opportunities to increase physical activity, but to overcome multiple barriers to access and participation.

When considering the intra and inter personal spheres of the socio-ecological model, service providers discussed multiple intrinsic benefits for the children who participate. Just by registering for the pass, every participant develops a sense of being a part of something. For many children, they are not afforded the same opportunities as others and this program helps to balance those experiences. One of the service providers described that social benefit as:

> *They have this opportunity and that's a way to normalize their experience against the experiences of other kids who may be more financially advantaged than they are.*

Although the financial benefits were at the forefront of the discussion, the interview participants also recognized that children who participate in physical activity programs would additionally experience a social benefit. One of the municipal department managers acknowledged that for whatever social-cultural reason, physical activity tends to drop off at this age, but with provision of programs such as this, children are able to develop higher self-esteem and they can build resiliency from a social interaction point of view. Another city employee described how significant the social factors are when she stated:

> *It's a great way for people to make new friendships, especially maybe with people that they didn't particularly know. (They can) spend time with friends (and their) community just in general. I think (those) are probably the big pieces of it.*

When considering the benefits of the program from a child's perspective, one of the service providers acknowledged that the program provides opportunities to build positive relationships and try new experiences.

> *There are social spin-off benefits because ACT-i-Pass provides opportunities to bring along a friend or a chaperone, you get the family element reinforced, and the friend element, the whole social thing. You build shared memories for kids who might not otherwise get to participate in certain activities.*

Many supporters for the G5AP program were quick to identify that grade 5 years are often a time when physical activity levels tend to drop off and they hope that the G5AP will help to overcome that decline. The interview responses celebrated the fact that G5AP provides an opportunity for children to step outside of their comfort zone and explore new activities to determine what they like and do not like.

Overall, service providers are passionate advocates for the benefits of the G5AP program and believe that it can help to encourage continued physical activity beyond the grade 5 year. They recognize the benefits of physical activity for children and see the positive outcomes in their everyday work. G5AP was described as a program that enhances the health and well-being of children in the community and as a result, it fosters healthy

development in all aspects of their lives. One of the municipal employees phrased it quite simply,

> *The heart of the ACT-i-Pass is just trying to build physical activity habits in kids.*

3.4 Discussion

The purpose of the current study was to review service provider's perspectives on accessibility of children's PA programs. This study sought to identify specific barriers, facilitators, and enablers for the children and families participating in the program and hoped to also acknowledge benefits of participation and suggest opportunities to improve children's access to recreation.

The findings of this analysis highlight the influence of recreation service providers on the accessibility of physical activity opportunities for children in the City of London. The results also provide insight into opportunities for improved collaboration across all involved partner organizations in this population health intervention. Although the majority of this discussion will focus on children's access to PA opportunities, it will also touch on the role of the service provider partners and the significant influence they have on population health interventions such as the G5AP. Overall themes that emerged in the results of this study are discussed in detail below.

3.4.1 Economic Accessibility

The literature review identified a number of studies noting that participation by local agencies, municipalities, or community partners would help build the impact of a program through financial and structural support (Cerin & Leslie, 2008; Giles-Corti & Donovan, 2002; Lindström, Hanson, & Ostergren, 2001; Sallis, Bauman, & Pratt, 1998). The G5AP program is fortunate to have the support of multiple organizations throughout the municipality and has certainly benefitted as a result. The grade 5 population of London has been awarded a tremendous opportunity to participate in free recreation programming for an entire academic year and this would not be possible without the generosity of the service provider facilities. Finance is commonly identified as a primary factor in an individual's ability to access recreation programming. Dahmann et al.

identified that many of their study participants were unable to afford registered recreational programs or memberships on a consistent basis (Dahmann, Wolch, Joassart-Marcelli, Reynolds, & Jerrett, 2010). Among service providers, many similarly identified that a significant portion of grade 5 students may not otherwise have access to their facilities because of financial strain. Providing free access eliminates the financial barrier of participation in recreational programs and facilities for all students registered for the G5AP.

The G5AP program provides opportunity awareness to participants because they are made aware of programs and are financially able to register, but there are a few programs included that require additional equipment to participate (skates and helmets would be required for use of municipal arenas, for example) which would therefore limit access. Safety is the utmost concern for recreation programmers and as a result, equipment is often required for many programs, such as helmets and pads for hockey players, or shin guards for soccer.

According to service providers, a more long-term economic concern for many families was the pass expiry. Service providers acknowledged that the removal of the paid registration barrier provides children and families with opportunities to access facilities and programs, but unfortunately only for the duration of their one-year pass. In light of this, multiple service providers discussed support for on-going subsidization of programs. They believe that in many instances when subsidy is available, participants may not be aware of it and that this provides an opportunity for future promotion and partnership. It was recommended that any future service providers willing to collaborate on the project should also be able to provide subsidy or low-cost programs for registration once the G5AP has expired. This is an economic barrier which has a similar influence to an informational barrier in that if participants are not aware of potential for subsidy, they cannot reap the financial benefits.

When the results of this study are shared with the G5AP partner organizations, the importance of available subsidy will be emphasized. The research team has already discussed this with many of the department managers and all agree that future G5AP

recipients should be provided a simple email or document as the end of their pass approaches to share valuable information about low or no cost programming and available subsidy options at each facility.

3.4.2 Information Accessibility

Knowledge is a barrier that can be easily remedied by providing residents with relevant information about recreation opportunities in their neighbourhood through as many mediums as possible. Previous studies have identified this as a common barrier among research participants and have noted that community engagement and delivery of information employing a variety of sources proved to be beneficial (Brown, Schebella, & Weber, 2014; King, 1998; Witten, Pearce, & Day, 2011). Specifically, in a study by King (1998), community knowledge of health and recreation was enhanced by offering information through direct education, electronic media and print.

While the G5AP was identified as an amazing initiative by all participating partners particularly because it provides free access to programs across the city, most interviewees were quick to identify that the program is under-utilized based on their expectations. It is believed that greater promotion of the program from the service providing organizations is critical to increasing knowledge and spatial awareness of not only the pass, but the other programs offered at their facilities. The G5AP was recognized as a vehicle for marketing other programs to grade 5 students and their families for an entire year, but as it currently stands most organizations are not taking full advantage of the opportunity. When asked if they had any recommendations for increasing awareness and use of the program, all participants stated that if there was more publicity about it, then the program would speak for itself. As soon as the initiative becomes something that children within the city look forward to receiving in their grade 5 year, the easier it will be to disseminate that information to others. This information sharing would need to come from a multitude of sources including, but not limited to service providers, schools, media, and most importantly – the students themselves.

The registration process was also commonly associated with discussions around how to improve the program and make it more accessible to grade 5 students. By providing each

grade 5 class in the city with an information package to take home we are giving them their initial contact with the program; it is believed that this provides an excellent opportunity to promote the program, as well as share the benefits of physical activity and opportunities within their neighbourhood. While many believed the registration process to be onerous and a deterrent to pass uptake, they were cognizant of the necessity of tracking who has registered for the pass prior to distribution. A potential recommendation to improve the registration process and experience is to utilize that interaction to build interest in the program and share valuable information with interested parties.

Most of the department managers interviewed in this study identified the registration process as an opportunity for improvement. This is an example of how program evaluation and research can contribute to the overall success of the initiative. Although we are not able to offer an immediate solution to the issues surrounding registration at multiple service provider sites, we are now aware of the concern and will be able to work cohesively to develop a universal system.

It should be noted that during the course of data collection a group-level Grade 5 ACT-i-Pass partner meeting was held which included a significant amount of discussion regarding registration for the pass moving forward. It is believed that the responses from participants who were both interviewed for this study and involved in the partnership meeting were disproportionately influenced by conversation regarding the registration process.

3.4.3 Geographic Accessibility

The resounding response from service providers was that geographic accessibility matters. Tucker and colleagues in a previous study in London, as well as Witten and colleagues in a New Zealand Study, similarly recognized that in most reviews of community health interventions, participants indicated geographic proximity to a location as a reason why passes were not used (Tucker et al., 2009; Witten et al., 2011). The primary objective of this study was to evaluate service provider perspectives on accessibility of children's PA programs. From a geographic accessibility perspective, all interview participants agreed that the G5AP programs needs to provide more mobility

options by becoming more available in terms of both program offering and geographic location.

All interviewees cited proximity to service provider facilities as a significant predictor of use. A study conducted in Germany similarly reviewed whether distance to sports facilities influenced children's sports activity and they found that a relationship existed between the two, but it was more pronounced in smaller towns and villages than in large municipalities (Steinmayr, Felfe, & Lechner, 2011). In contrast to the G5AP service provider's perceptions of barriers to participation, a study of the influence of sport infrastructure on sport participation conducted by Wicker et al. (2009) did not detect any relationship between the two for the 3 – 10-year-old age group. Findings from the G5AP interviews suggest that a relationship does exist and it was speculated that walkable distances would significantly increase use. This notion is supported by a New Zealand study that found youth to be significantly more active in areas within a walkable distance (Utter, Denny, Robinson, Ameratunga, & Watson, 2006). The same study also determined that greater distances to destination facilities was a barrier to use, which is aligned with the perspectives of G5AP service providers. These results suggest that future physical activity interventions should further examine the influence of distance to facilities on participation in those programs using empirical evaluation methods.

Transportation was also frequently discussed by the G5AP service providers as having a significant influence on use of the program. The majority of comments from interviewees encapsulated the notion of children's independent mobility and stated that they either rely on vehicular transport from an adult or must be allowed use of public transit. Hjorthol and Fyhri (2009) found that the car plays in important role in children's recreational mobility and suggested that further research evaluate travel to and from leisure facilities. Other researchers have found similar results suggesting that young people are capable of moving on their own, but require more support from policy makers and programmers (Goodman, Jones, Roberts, Steinbach, & Green, 2014; Maljak, et al., 2014). Within the context of the G5AP, service providers recommended collaboration with public transit authorities as well as school boards and private facilities to create a system to move children to and from PA programs. Parallel recommendations were offered by multiple

other researchers who believe future research should explore alternative means of transport to access recreation programs (Bjerkan & Nordtomme, 2014; Lin & Yu, 2011; Holt, et al., 2009). These ideas reflect the opinions of the interview respondents and suggest that the G5AP should consider integration of a travel plan for future program development.

The final geographic consideration of the G5AP was program distribution (breadth) and variety (depth). Every one of the service provider interviews discussed the need for increased spatial accessibility of program offerings throughout the municipality. If the breadth of service provider locations could be increased, current G5AP partners believed that more children would be involved. When considering accessibility from a service provider point of view, the majority of discussion focused on their internal operations. Contrastingly, when the discussion was focused on the users' perception of accessibility, the discussion focused slightly more on personal interest and program availability. About a quarter of the interview responses argued the need for greater depth in the programming. This was described as more programming options at existing individual locations (e.g. more swimming times at the YMCA) or new program options at additional service providers (e.g. add a bowling alley as a G5AP partner). These findings are consistent with another study conducted in the City of London, where Tucker and colleagues (Tucker, Irwin, Gilliland, & He, 2008) found that increased access to recreation facilities is key to promotion of children's physical activity. The beliefs of the G5AP service providers were reflected in two American studies that found recreational facility availability associated positively with youth PA levels (Powell, Chaloupka, Slater, Johnston, & O'Malley, 2007; Ries, Yan, & Voorhees, 2011).

As a result of these findings, recommendations for G5AP program development include collaboration among existing service providers to coordinate schedules and ensure even distribution of programs within their own offerings as well as at other facilities. Additionally, in order to reach out to children who were not previously interested in the G5AP program due to personal preferences, it is recommended that more public and private recreation facilities become program partners to offer increased variety and venues for children's physical activity opportunities.

3.4.4 Overall Benefits of the Grade 5 ACT-i-Pass Program

Overall, interview results indicated that the G5AP program has the ability to positively influence children's physical activity levels and offer recreation opportunities that are not otherwise available to many participants. According to interviewed service providers, children who participate in the program reap the benefits of improved physiological, social, emotional, and mental well-being. They believe the benefits of physical activity interventions such as the G5AP exceed the physical activity component of the program and foster development of new relationships and exploration of shared interests with peers. Service providers universally agreed that the program offers an enriching physical activity experience for all involved.

3.4.5 Influence of Service Provider Partnerships

Review of similar programs found that successful adoption of a community health intervention includes promotion and awareness from those directly involved with development and programming as well as a shared interested among community members (Mowen, Payne, Orsega-Smith, & Godbey, 2009). According to a national survey of health partnership practices involving park and recreation agencies in the United States, these programs are often criticized or are initially unsuccessful in achieving their goals of improved community health because they fail to maintain financial and operational investment from all parties (Mowen, Payne, Orsega-Smith, & Godbey, 2009). Through the interview process, it was made clear that service partners of the G5AP have at least one program champion within their organization to bolster enthusiasm. One of the keys to building a program with a lasting influence and profound effect is to keep those people engaged and continually grow with the needs of the population.

A critical facet of community-based initiatives is partnership with the local public and private organizations. Leichty et al. (2014) conducted a review of public park and recreation management experiences with health partnerships in a very similar manner to what was used in this G5AP evaluation. They found that through coordinated efforts, these partnerships provide additional opportunities for community members to seek

programs and services that they would otherwise not be able to access (Leichty, et al., 2014). All of the G5AP interview respondents agreed that this exposure was mutually beneficial, but few were able to provide advice on how to ensure the program continues to follow best practices to grow and develop. It is believed by the service providers that one of the most significant challenges with program use and promotion is waning enthusiasm from the service provider staff. G5AP is intended to function sustainably, with minimal additional strain on organization employees and resources. Service providers identified that in order to achieve success, they should commit to the program upfront and ensure that it becomes part of their everyday work on an on-going basis, rather than view G5AP as an appendage from an outside organization.

A secondary issue with service provider enthusiasm is the relatively high turnover of part-time employees within recreation facilities and the necessity of having knowledge about a sometimes-overwhelming volume of programs, policies, and procedures. Researchers who conducted a similar review of physical activity partnerships noted that everyone involved in the program should be knowledgeable about their role and the intervention overall (Mowen, Payne, Orsega-Smith, & Godbey, 2009; Leichty, et al., 2014). When each of the three primary partner organizations were asked about training, most identified that G5AP was mentioned within a larger staff training, but was still not yet a well-known part of the organization. All participants identified the benefits of the G5AP program and could agree that it was an excellent initiative, but very few were very knowledgeable of the project and certainly did not understand the full depth of the intervention. A Canadian study evaluated recreation and health partnerships in multiple cities and found that these initiatives often make large promises to the community but struggle to meet their commitments due to under-managed partnerships (Frisby, Thibault, & Kikulis, 2004). Success for continued development of the G5AP will require “buy-in” from all levels of management and front-line staff as well as a legacy component to employee training and development. The program has potential to be sustainable and a community feature for years to come but the shift has not occurred yet.

3.4.6 Limitations

The depth interviews that were conducted in this study were constrained by a few noteworthy limitations. Due to scheduling conflicts on the service providers' behalf or unwillingness to participate, interviews were only arranged with approximately half of the target group. Those who volunteered were representative of employees who strongly support the program and the resulting study population was lacking responses from managers who were not invested in program delivery.

Another factor limiting this qualitative study is the length of time of the G5AP intervention (a complete school year). Many of the service provider partners that were present at the initial planning meetings for the program were no longer in the same role within their organization, or had moved onto different employment opportunities by the end of the evaluation. Because of this relatively high staff turnover, it is critical that the G5AP project managers and backing agencies continue to provide supporting materials and documentation to the recreation facilities as each new grade 5 year begins.

3.5 Conclusions & Opportunities for Future Research

The current study provides contextual and descriptive information with potentially significant implications for city planners, policy makers, health professionals, school officials, and parents to promote and support children's recreation opportunities. The study identified that there are countless opportunities to expand recreation programming for children and youth in the City of London and that a coordinated effort among service provider organizations will provide robust results.

Three of the articles included in the literature review agreed that the most effective way to implement a successful physical activity intervention would involve the entire community (Dietz, 2005; Hughey, Weaver, Saunders, Webster, & Beets, 2014; Pouliou & Elliott, 2009). This means that the more a project can involve all parties, the more likely it is to become a beneficial intervention. Population health interventions such as the G5AP, when executed properly, have the ability to improve the mental, physical, and emotional well-being of the participants.

In a similar analysis of public park and recreation managerial experiences involving health partnerships, Liechty and colleagues (2014) identified five overall suggestions for future partnership projects:

1. Approach a wide variety of potential partner organizations;
2. Consider a wide variety of partnership initiatives;
3. Mutual benefits should be conveyed early in the partnership approach;
4. Establish partnership roles and responsibilities early; and
5. Consider involving additional partners with health expertise for project evaluation.

The G5AP population health intervention has seen a great deal of success in its initial stages and is well-positioned to continue to grow and develop in the years to come. Recommendations for the future of the G5AP program involve incorporating all parties as often as possible and ensuring that information is shared with relevant stakeholders to ensure the partnerships are maintained.

Future success will require consideration of geographic accessibility and transportation to and from physical activity opportunities, particularly for the child population. Further research on the influence of proximity and distance to recreation opportunities is warranted to determine how significant the impact of geography is on access to physical activity opportunities. A logical starting place for continued research would be in-depth exploration of this spatial influence particularly focusing on private and public transport.

More than half of the interviewees specifically discussed “neighbourhood walkability” and the concept of offering more localized programs. According to current G5AP service providers, in order for the program to flourish and see continued success, recruitment of additional partner organizations is necessary. It was theorized that if children could access programs of interest to them that were also in close proximity to their home or school, they would be more likely to engage in physical activity. An empirical study of threshold distances and program densities is recommended to estimate whether additional service partner locations would positively influence use. Although geographic access was heavily touted by service providers, a spatial examination of current locations and their

use by participants would provide concrete evidence to support the need for additional facilities and programs.

The findings suggest that modifications to the registration process, increased promotion of recreation programs (specifically G5AP), support for subsidized programming, and consideration of transportation systems are necessary to alleviate the influence of barriers to access.

The research team was able to work with the service providers throughout the course of this cohort study and we began to implement a barcode system to unify the registration and tracking. This involved determining which software programs were being used at each facility, deciding on a compatible barcode type, assigning a unique code to each registered pass user, and printing the barcodes on each physical manifestation of the pass. Although the initial barcodes were unsuccessful in scanning at all facilities and were not able to completely unify the registration system, they were a progressive step forward. The goal for the next G5AP registration year is to establish an operating protocol that is applicable to all facilities and once implemented, all G5AP users will be able to attend programs at all partner locations without multiple registrations. This process will also ideally help to eventually track pass use at each program and monitor activity levels of participants.

Another way to encourage promotion of the program is to engage in social media. Through anecdotal experience, many of the registered G5AP participants are active on social media and would be interested in this form of communication. The internet and/or mobile phone apps provide a free communication pathway to the service providers and G5AP programmers from the youths and their families. In an increasingly tech-based generation, it is important to engage with them on a media that interests them. Some recommendations to promote the program include regular posts about new programs added to G5AP, highlighting a feature facility or activity, recommending new programs to try to links to information, reminders about new program sessions, details about registration, etc.

I have also had the opportunity to be involved in collaborative meetings to consider future GIS and mapping tech opportunities to share information with G5AP users. We have discussed an interactive mapping website or application that would link service provider websites, G5AP schedules, and bus schedules to create one cohesive resource for all things G5AP. If successful, the technology could eventually be adapted to include a multitude of recreation opportunities throughout the municipality for all ages, interests, and abilities; no longer dedicated to G5AP alone.

The Grade 5 ACT-i-Pass has incredible potential and will positively influence London's children for many years to come. By obtaining the service provider perspectives on the program, this study acknowledged factors that influenced use of the pass and that information will guide recommendations for program development. Continued research should involve the children, parents, and school officials to explore their personal and group experiences and understand their collective activities. Continued research should evaluate from a socio-ecological model and attempt to understand the entire sphere of influence on children's PA participation.

3.6 Acknowledgements

We would like to thank both the Canadian Cancer Society and Canadian Institutes of Health Research– Institute for Population and Public Health for providing funding for the evaluation of the Grade 5 ACT-i-Pass program. We would also like to thank the G5AP partner organizations including London's Child and Youth Network, the City of London Recreation Department, the Boys and Girls Club of London, the YMCA of Western Ontario, Thames Valley District School Board, London District Catholic School Board, and Montessori Academy of London. I would like to personally acknowledge all of my research colleagues in the HEAL especially Christine Smith, Christine Mitchell, Dr. Danielle Tobin, Katherine Wilson, Adrian Buttazzoni, and Brenton Button as well as work-study students and volunteers for their assistance with field work and qualitative analysis. I would also like to thank Josh Archer, Sabrina Sater, Wes Kinghorn, Dr. Jeff Hopkins, and Dr. Jerry White for their assistance with G5AP program delivery and academic support for qualitative research.

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Chapter 4

4 Examining the Influence of Individual and Environmental Factors on Children's Use of a Free Recreation Access Pass

4.1 Introduction

The aim of this study is to determine what factors influenced whether or not children used the Grade 5 ACT-i-Pass (G5AP): a free recreation access pass for children in the City of London, Canada. Findings from the qualitative study in chapter three of this thesis identified three main barriers to using the pass: knowledge, economic, and geographic. Based on responses from recreation service providers, the most commonly cited barrier was geography. Interviews with service provider partners from the G5AP program indicated that transportation to and from their facilities is a major barrier to participation and use. This second study therefore will not only examine individual-level and socioeconomic factors associated with pass use among children who registered for and received a pass, but it will also examine the impact of geographic barriers to pass use, such as the proximity of pass holders to participating recreation facilities.

In recent decades, there has been a dramatic decline in child and youth physical activity levels (Tremblay, et al., 2010). Only 5% of Canadian children are currently meeting the daily recommendations for moderate-vigorous physical activity (MVPA) despite well-documented benefits of maintaining a healthy active lifestyle (Active Healthy Kids Canada, 2013). There is a demand for more research examining factors that influence children's participation in physical activity opportunities, and this thesis aims to fill that gap.

Existing research has linked this epidemic of inactivity with limited independent mobilities for children and increasing reliance on automobiles (Page, Cooper, Griew, & Jago, 2010). As a result of growing concern around children's safety, especially outside of their home neighbourhood, their opportunities to move freely and participate in activities has been severely limited (Veitch, Salmon, & Ball, 2008; Tappe, Glanz, Sallis,

Zhou, & Saelens, 2013). This means that in order for children to engage in activities outside of their home or school neighbourhood, they require accompaniment from an adult. Existing research has found that perceptions of neighbourhood safety significantly influenced children's local activity (Loebach & Gilliland, 2014). Given this knowledge and the understanding that children are afforded very little independent mobility, the objective of this study is to explore factors that influence children's use of a free recreation access pass at a variety of locations in the City of London. More specifically, the study will employ GIS and statistical analysis methods to examine the influence of geography on use of recreation service providers.

To understand the various influences on use, this analysis explores factors based on the social ecological model of health behaviours. The model includes four spheres of influence; intrapersonal (age, sex, immigrant status, etc.), interpersonal (parental and/or peer support), environmental (location of service provider facilities), and policy (school or government policies and support) (Sallis, et al., 2006; Sallis, Owen, & Fisher, 2008).

Individual factors have been identified as significant influences on children's physical activity (Sallis, Prochaska, & Taylor, 2000; Trost & Loprinzi, 2011). Regarding these socio-demographic factors, research has found that Canadian boys tends to be more active than girls (O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999; Breslin, et al., 2012), and that recent immigrants to Canada exhibit lower physical activity levels than their native Canadian counterparts (Tremblay, Bryan, Perez, Ardern, & Katzmarzyk, 2006; Dunn & Dyck, 2000). Household structure, such as presence of siblings at home, or primary residence in a single parent household, have been found to significantly influence physical activity levels (Bjerkan & Nordtomme, 2014; Connelly, 2010; Barnett, 2008). Socioeconomic factors, such as car ownership, parental education, parental employment and median household income (MHHI) have had mixed results regarding their influence on children's PA (Van der Horst, Paw, Twisk, & Van Mechelen, 2007; Stalsberg & Pendersen, 2010). However, a study examining SES influences on children's active play spaces did find significant correlations among medium and high SES children and participation in structured and skill-based activities (Ziviani, et al., 2008). The

variables as described above also reflect the perceptions of economic barriers to access as described in chapter three.

Knowledge was also identified as a barrier to access of physical activity opportunities in service provider discussions. The G5AP presents an intriguing opportunity to evaluate the influence of two different types of knowledge translation. As described in section 1.4.2 Participant Recruitment, some of the grade 5 students were recruited to participate in the G5AP program by using active recruitment methods in schools, while others were provided details about the program via passive information sharing methods. Existing reviews of physical activity interventions for children and youth have concluded that promotion of physical activity and enthusiasm from supporters positively associates with participation by youth (Pate, et al., 2000; Floriani & Kennedy, 2008). As a result, it is believed that those children who had the opportunity to engage in a discussion about the pass are more likely to participate than those who were simply provided details passively.

Children's interpersonal networks of support can also significantly influence their levels of physical activity. Research has found that parental support for PA (engaging in play, transportation and/from activities, and watching a child participate) positively influences participation (Robbins, Stommel, & Hamek, 2008; Welk, Wood, & Morss, 2003). Similarly, studies have also found that positive support from friends and peers can increase children's physical activity levels (Fitzgerald, Fitzgerald, & Aherne, 2012; Salvy, Roemmich, Bowker, Romero, & Epstein, 2009).

Results from the service provider interviews described in Chapter 3 clearly indicate a perception that geography is a significant barrier to use of recreation facilities. Previous research has identified the built environment as a significant influence on participation in physical activity (Tucker, et al., 2009; Gilliland, Holmes, Irwin, & Tucker, 2006; Powell, Chaloupka, Slater, Johnston, & O'Malley, 2007; Mitchell, Clark, & Gilliland, 2016). A large volume of academic research has found an inverse relationship between distance and participation in physical activity at destination service providers (such as swimming pools, arenas, and private recreation or sport clubs) (Sallis, et al., 1990; Steinmayr, Felfe, & Lechner, 2011; Maddison, et al., 2010; Reimers, et al., 2014; Moore, et al., 2010). This

relationship is described as a “distance-decay” wherein the distance traveled to reach a destination is directly related to the costs of spatial interaction (Gregory, Johnson, Pratt, Watts, & Whatmore, 2009).

Researchers often use logistic regression in attempts to determine if a significant relationship exists between distance to PA locations and physical activity. The PEACH project in the UK used logistic regression in their exploration of children’s independent mobilities and their perceptions of built environment opportunities for physical activity (Page, Cooper, Griew, & Jago, 2010). Results from the PEACH project analysis found that gender significantly influenced perception of PA opportunities and noted that children were afforded more independent mobility to visit local destinations (Page, Cooper, Griew, & Jago, 2010). Other studies that employed logistic regression as the primary means of statistical analysis commonly found that greater distance to recreation facilities was associated with lower levels of PA (Reimers, et al., 2014; Potwarka, Kaczynski, & Flack, 2008; Alexander, Brunner Huber, Piper, & Tanner, 2013). Because the outcome variable (use of the G5AP) is binary, this study will also employ logistic regression in statistical analysis.

Existing studies have demonstrated the need for continued research on the influence of geography on the decision to participate in (free) recreation programming (Moore, et al., 2010; Maddison, et al., 2010; Steinmayr, Felfe, & Lechner, 2011). The overall purpose of this thesis research is to use the Grade 5 ACT-i-Pass as a case study to examine factors influencing use of a free recreation pass, and more specifically, explore the significance of geography as a barrier to participation.

4.1.1 The Grade 5 ACT-i-Pass Program

This thesis is a case study analysis of London’s Grade 5 ACT-i-Pass (G5AP) program. The G5AP is a free recreation access pass distributed to all grade 5 students residing or attending school within London’s municipal boundary. The pass provides any registered user (plus one guest) admission to scheduled programs at recreation service provider partners. The full ACT-i-Pass program research protocol was developed by researchers at the Human Environments Analysis Laboratory (HEAL) at Western University and has

been published by Gilliland et al. (2015). Chapter 1 (Section 1.4) of this thesis provides a thorough description of the G5AP as it applies to this research.

The overall aim of this thesis is to explore factors that influence children's use of a free recreation access pass. This chapter focuses on the spatial behaviour of participation in PA programs and the influence of individual, household, socioeconomic, and environmental factors. Based on service provider perspectives of the Grade 5 ACT-i-Pass program, it is expected that the most salient barrier to participation is geography. This study employs both spatial and non-spatial analyses to examine how socio-ecological factors and distance to service provider facilities influenced use of the G5AP.

4.2 Methods

This study explores the influence of environmental factors on use of the G5AP. Specifically, this analysis seeks to determine whether any relationship exists between distances to the nearest recreation facility and use of the G5AP that facility. It is acknowledged that multiple other factors influence use of facilities, but to examine the spatial behaviour of participation in PA opportunities, this study begins with a geographic analysis. For the purpose of this evaluation, data on facility use (the dependent variable) was extracted from self-reported information provided on the youth surveys completed in the spring season (May/June) of grade 5, after children had access to the G5AP for the entire school year (time 3 in overall study timeline).

Based on the review of previous studies (Chapter 2), it was determined that cluster and least-cost (shortest distance) analysis would provide spatial context to help answer the research question and that logistic regression would integrate the results of the spatial analysis with demographic factors of influence accounted for in the socio-ecological model.

4.2.1 Measures

For a student to be included in this analysis they were required to have registered for the G5AP and complete child surveys throughout the cohort period. The 881 participants

included in this study completed the surveys and provided information on their use of the G5AP.

4.2.1.1 Independent Variables

In consideration of the socio-ecological model of health, this analysis includes multiple levels of independent variables: intrapersonal, interpersonal, and the built environment. All variables included in the final logistic regression model were selected as a result of univariate analysis outcomes and support from academic literature.

Intrapersonal variables were included in the analysis to account for individual-level factors that may influence participation in physical activity opportunities. Other researchers have found that children's physical activity levels are significantly influenced by these individual influences (Van der Horst, Paw, Twisk, & Van Mechelen, 2007; Sallis, Prochaska, & Taylor, 2000; O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999). This knowledge justifies inclusion of the following variables: sex, immigrant status, visible minority, lone parent household, presence of siblings, family car ownership, individual bus pass use, parental employment, and parental education.

The **interpersonal variables** such as socio-economic status and support for physical activity have also been proven to influence PA levels in children (Tandon, et al., 2012; O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999). The interpersonal variables that were measured in this study included dissemination area (DA) level median household income (MHHI) measures. Child perceptions of peer and parental support for physical activity were also included as interpersonal factors. These variables were calculated using survey data (time 3) collected from the child in grade 5 (after having had the G5AP for a full school year).

Built environment (BE) variables have been found to significantly influence children's PA, specifically the density of recreation facilities and availability of PA programs (Sallis, Prochaska, & Taylor, 2000; Van der Horst, Paw, Twisk, & Van Mechelen, 2007). The neighbourhood BE variables in this study were objectively measured using ArcGIS

10 software (ESRI, 2014). Distances were calculated using self-reported addresses (home postal code) for participants and publically listed addresses for service provider locations.

4.2.2 Spatial Analysis Methodology

The initial phase of data analysis involved cleaning and combination of the final (time 3) child surveys completed by the participating students at the end of the intervention during the grade 5 year and the demographic information collected from surveys completed by their parents. The data cleaning process involved researcher review of the submitted responses to ensure there were no inputting errors and verification of congruence between the demographic information and data collected on the survey.

The next stage of data analysis for the G5AP intervention study began with an overall analysis of the influence of distance on participation in programs at participating service provider locations. This analysis was completed using ArcGIS software (ESRI, 2014) and involved geocoding of all service provider locations, participating elementary schools, and participant addresses (using self-reported postal codes). The network analyst tool was used to generate an origin-destination matrix. The purpose of utilizing the matrix is to calculate the least-cost (shortest distance) path along the road network from multiple origin locations (participants' home postal codes) to multiple destinations (service provider facilities).

The second phase of spatial examination involved the use of the ArcGIS "Hot Spot Analysis" tool. This model identifies statistically significant clustering of hot spots (high values) and cold spots (low values). Known as the Getis-Ord Gi* statistic, this output describes z-scores and p-values ($p<0.1$) to measure statistical significance of the clustering of input variables. Essentially, the values describe whether the distribution of the clusters is normal or significantly more pronounced than a random distribution would indicate.

In order to account for the fact that multiple G5AP users may reside within the same postal code, a rate field was calculated by summarizing the number of registered G5AP participants and dividing that number by the total number of participants who used the

pass within that same zone. This “usage rate” creates an average per postal code balanced by the number of participants within each. These rates were then joined to dissemination area (DA) polygons to visually illustrate the hot and cold spots upon completion of the analysis. In order to limit the influence of facilities outside of specific areas, a distance band tolerance was calculated using Euclidean distances. For this study that distance was set to 1600m because that is the commonly reported distance implemented by school boards as the cut-off for providing bussing service (Larsen, et al., 2009; Healy & Gilliland, 2012) and is the current distance used by the Thames Valley District School Board (TVDSB, 2017). Once all of the data was properly calculated and inputted into the ArcGIS model, the resultant analysis layer was exported to visualize the significant clustering as will be described in the results and discussion sections of this chapter.

The final phase of data analysis was completed using the origin-destination (O-D) cost matrix results in combination with the survey and demographic responses. The resultant data from all prior levels of analysis were combined and analyzed using a logistic regression to evaluate the influence of distance to recreation facilities on use of those facilities within the confines of the G5AP programming.

4.2.3 Statistical Analyses Methodology

Data collection and cleaning were performed using IBM Statistical Package for Social Science (SPSS) 22 software (IBM Corp, 2013) and subsequent statistical analyses were performed using STATA SE 13 (StataCorp, 2015). Logistic regression models with robust standard errors (cluster) were used to assess the presence of a relationship between distance to the nearest service provider facility and use of the G5AP. The cluster option was selected to account for observations potentially clustered into groups correlated with elementary schools.

The population was examined based on the locations of specific recreation facilities and whether registered participants attended programs at those facilities using their G5AP. Initially the data was examined on a global level to explore whether access to any type of service provider influenced general use of the pass. The second and more in-depth phase of this analysis involved looking at specific recreation types/service provider facilities to

examine if, for example, distance to the nearest City of London indoor pool influenced use of the pass for swimming as physical activity. In addition to basic examination of distance and use, other demographic factors were included in the model to test for significance of other socio-ecological intrapersonal and interpersonal factors such as sex, ethnicity, socio-economic status, car ownership, etc. A detailed list of the demographic factors included in the model is specified in Table 4.1.

Table 4.1 Variables Included in Logistic Regression

Intrapersonal	Sex, Immigrant Status, Visible Minority, Lone Parent primary Household, Presence of Siblings, Vehicle Ownership, Bus Pass Ownership, Parental Education, Parental Employment, Recruitment Type*
Interpersonal	Parental Support, Peer Support, Median Household Income
Built Environment	Shortest Distance to Any Facility, Nearest Municipal Indoor Pool, Nearest Municipal Arena, Nearest Boys and Girls Club of London (BGCL), Nearest YMCA of Western Ontario (YMCA)
Policy	Recruitment Type*

A logistic regression model was employed to evaluate the influence of these factors on use of the G5AP. Logistic regression is the appropriate procedure for multivariate analysis because the research question involves analysis of one binary dependent variable (pass use: yes/no) and multiple independent variables. The logistic regression is a non-linear model with the form:

$$Y = 1/\left\{1 + \exp\left[-\left(b_0 + b_1X_1 + b_2X_2 + \cdots + b_pX_p\right)\right]\right\}$$

In the case of the G5AP research study, *Y* is interpreted as the probability of the binary event, pass use. The null hypothesis states that the independent variables have no influence on pass use whereas the alternate hypothesis states that one or more of the independent variables will increase the probability that a child will use the G5AP.

4.3 Results

4.3.1 Descriptive Statistics

The final sample of students from the G5AP initiative who completed surveys up to time 3 (May/June grade 5 year) included 881 participants. Descriptive statistics about the population are described in Tables 4.2, 4.3 and 4.4. All participants were registered grade 5 students at the time of final data collection and were between 10 and 12 years old. The participant population had an even distribution of boys (44.7%) and girls (45.5%) (Note: 9.8% did not report or reported as other). Almost one-third (32.9%) of the students identified as a visible minority and one out of ten (10.2%) stated they were recent immigrants (in Canada less than 10 years). Most participants had sibling(s) at home (84.1%) and only 15.1% were from lone parent households. Only 13.8% of participants reported a family member owning a bus pass, while 25.9% own one car and 55.1% own two or more vehicles. The majority of parents had attended some university or college (72.6% mothers, 63.2% fathers), and 69.1% of fathers were listed as employed full time while only 47.0% of mothers were reported the same. Researchers at UWO recruited 608 participants (from 50 schools) in an active manner (i.e., classroom presentations explaining the G5AP), while the remaining 273 participants (from 49 schools) were recruited passively (materials distributed without presentations) by the Child and Youth Network. Specific details regarding the recruitment process are available in section 1.4.2.

Table 4.2 Descriptive statistics about the sample (n=881)

Variable		n	%
Sex			
	Boy	394	44.7
	Girl	401	45.5
Recent Immigrant			
	Yes	90	10.2
	No	772	87.6
Lone Parent Household			
	Yes	133	15.1
	No	592	67.2
Siblings at Primary Home			
	Yes	741	84.1
	No	49	5.6
Vehicle Ownership			
	None	44	5.0
	1	228	25.9
	2 or more	485	55.1
Bus Pass Ownership			
	Yes	122	13.8
	No	602	68.3
Mother Education			
	Highschool or Less	136	15.4
	Some University/College	640	72.6
Father Education			
	Highschool or Less	186	21.1
	Some University/College	557	63.2
Mother FTE			
	Yes	414	47.0
	No	345	39.2
Father FTE			
	Yes	609	69.1
	No	99	11.2
Recruitment Type			
	Active - UWO	608	69.0
	Passive - CYN	273	31.0

Note: numbers may not add to full sample sizes due to missing values

Table 4.3 Child reported statistics for overall use of Grade 5 ACT-i-Pass at all facilities

ACT-i-Pass Use	n	%
Never	469	53.2
Monthly	162	18.4
2-3 times per Month	83	9.4
2-3 times per Week	57	6.5
Weekly	73	8.3
Daily	16	1.8

Table 4.4 Child reported Grade 5 ACT-i-Pass usage statistics per individual facility

Use per	Yes		No	
Facility	n	%	n	%
Spectrum	125	14.2	756	85.8
Arenas	197	22.4	684	77.6
Pools	336	38.1	545	61.9
BGCL	159	82.0	722	82.0
YMCAWO	130	14.8	751	85.2
Overall	394	44.7	487	55.3

4.3.2 GIS Model Results

4.3.2.1 Origin-Destination Cost Matrix

Table 4.5 shows the results of the cost matrix including the number of each facility type, the average route distance in kilometers to each service provider type, and the standard deviation of each. The average distance from a home postal code to any service provider facility was 2.54km. The service provider type with the greatest geographic access (shortest average distance to pass users) was the municipal arenas (n = 11) with an average shortest distance of only 3.03km. Contrastingly, the least accessible service provider was the Boys and Girls Club of London with only one available facility at an average distance of 6.95km away from registered users.

Table 4.5 Results of the origin-destination cost matrix

Number of facilities per service provider and average shortest distance to nearest facility		
	n	Distance to Nearest (M±SD)
Arenas	11	3.03 ± 2.80
Pools	3	4.93 ± 3.18
BGCL	1	6.95 ± 3.35
YMCAWO	3	5.68 ± 3.46
All	18	2.54 ± 2.65
Average	4.5	5.15 ± 2.79

Figure 4.1 visually represents the registered pass postal code with the least-distance geographic accessibility on the left hand side, and the registered pass postal code with the greatest-distance geographic accessibility on the right hand side. Blue routes illustrate the shortest distance to the nearest municipal indoor pool, green routes show the path to the nearest municipal arena, and the red routes visualize the shortest distance to the nearest private recreation service provider (YMCA or BGCL). The pass postal code with the least-distance geographic accessibility would only be required to travel a total of 5.13km to reach all recreation types while the user with the greatest-distance geographic accessibility would need to travel a cumulative 26.25km to visit all three.

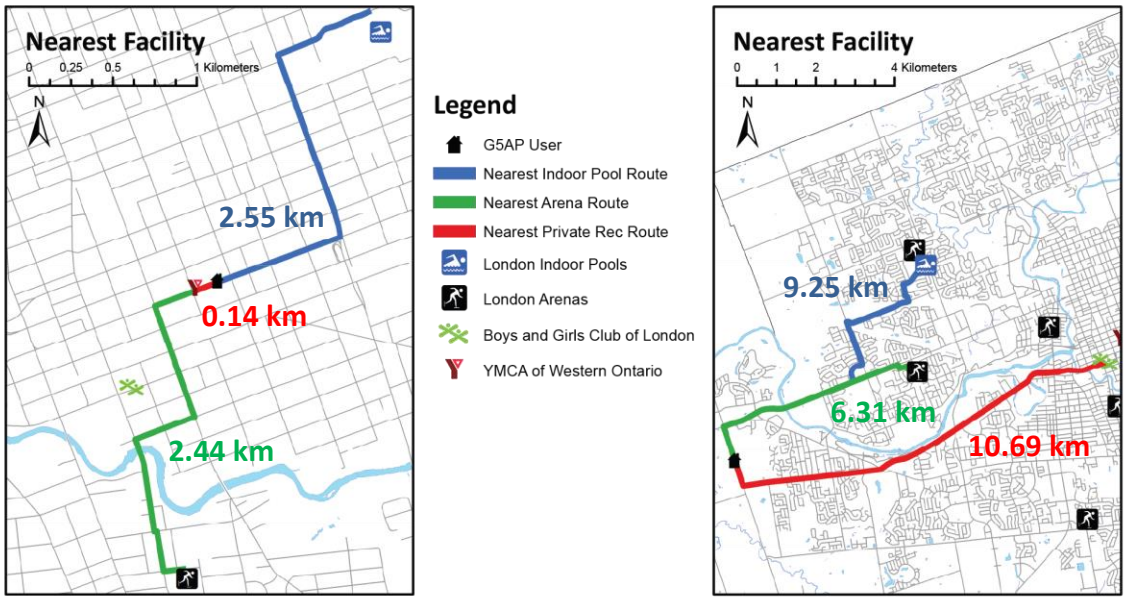

Figure 4.1 Shortest Distance to Nearest Service Provider Facility Comparison

4.3.2.2 Getis-Ord Gi* Hot Spot Analysis

Results of the Hot Spot Analysis are seen in Figure 4.2 below. The function of this analysis is to illustrate significant clustering of data either as “hot spots” (close to a recreation facility and high occurrence of pass use) or “cold spots” (far from a recreation facility and low occurrence of pass use). The results of the spatial analysis found significant (>90% confidence) clustering of hot spots in the downtown core, south-central, southeast, and northwest. Contrastingly, cold spots were located around the periphery of the city in the far southwest.

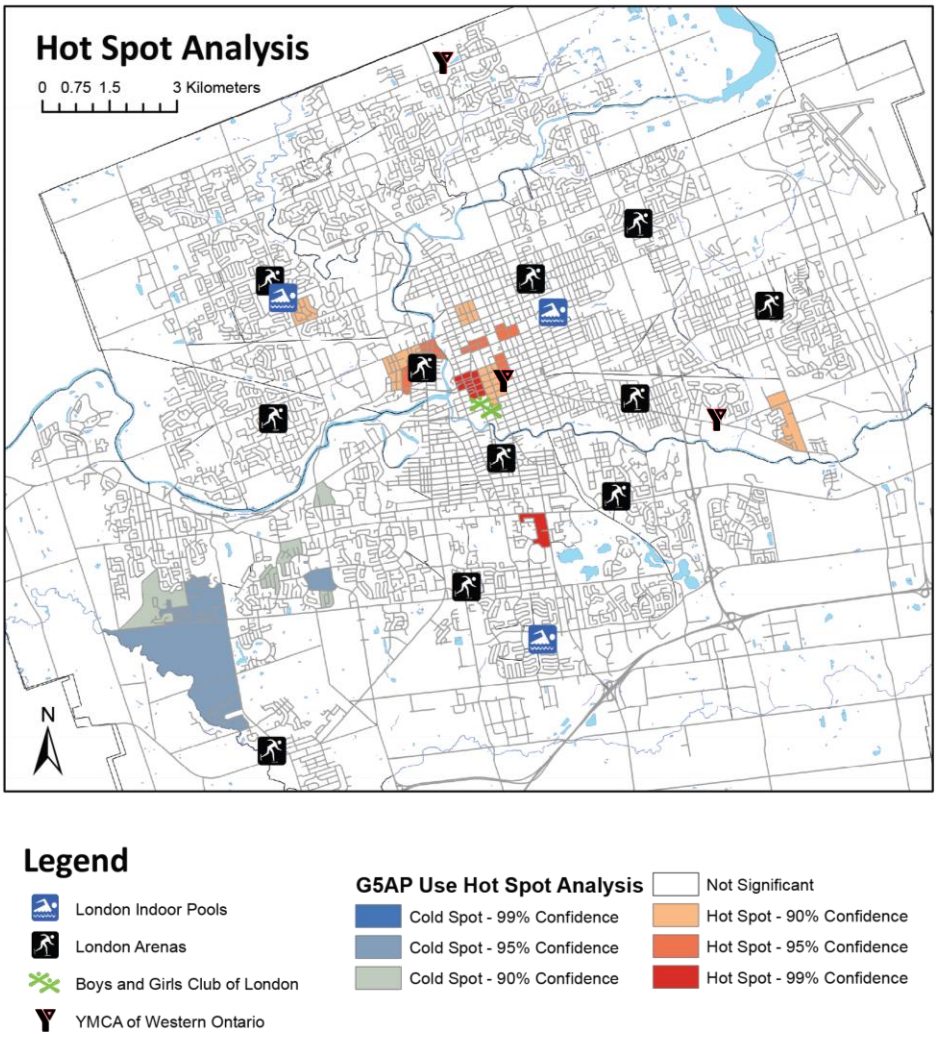

Figure 4.2 Results of Getis-Ord Gi* Hot Spot Analysis

4.3.3 Statistical Model Specification

Spearman's correlation was conducted with the outcome variable (pass use) and each of the independent variables individually to establish whether a significant relationship exists without the influence of other factors. Table 4.1 shows a full list of all variables included in the univariate analysis. Results of the univariate test are outlined in Table 4.6 and shows significant relationships with six of the included variables. Recruitment type and median household income exhibit a significant influence on pass use as well as support for physical activity from parents and peers. The distance to the nearest indoor pool was also found to have a significant influence on pass use when isolated. Distance to the Boys and Girls Club was found to have a significant influence on use of the Boys and Girls Club alone.

All remaining independent variables were included in the resultant logistic regression model despite null findings in the univariate analysis as they are theoretically relevant based on previous literature. Section 4.2.1.1 Independent Variables describes all variables included in the full model and justification for each.

The predictor variables of interest are the distance to the nearest recreation facility of any kind, distance to the nearest activity-specific facility, and average distance to any facility.

Table 4.6 Results of Spearman's Correlation

	Overall Use - Binary	
	p	r_s
Sex	0.054	-0.065
Recent Immigrant	0.573	-0.019
Lone Parent Household	0.386	0.029
Presence of Siblings	0.142	-0.050
Car Ownership	0.416	-0.027
Bus Pass	0.973	0.001
Mother Education	0.901	-0.004
Father Education	0.243	-0.039
Mother Employment	0.810	-0.008
Father Employment	0.339	0.032
Recruitment Type	**0.012**	**0.084**
MHHI	**0.045**	**-0.068**
Parental Support	**0.001**	**0.113**
Peer Support	**0.049**	**0.067**
Nearest Arena	0.123	-0.052
Nearest Pool	**0.009**	**-0.089**
Nearest YMCA	0.519	-0.022
Nearest BGCL	0.187	-0.045
Nearest Any Facility	0.121	-0.052
Arena 1600m	0.364	0.031
Pool 1600m	0.205	0.043
YMCA 1600m	0.748	0.011
BGCL 1600m	0.632	0.016
Any Facility 1600m	0.484	0.024
	Arena Use	
Nearest Arena	0.983	-0.001
	Pool Use	
Nearest Pool	0.773	0.010
	YMCA Use	
Nearest YMCA	0.663	-0.015
	BGCL - Use	
Nearest BGCL	**0.000**	**-0.118**

4.3.3.1 Intrapersonal Variable Models

Results from all logistic regression model applications are described in terms of the odds ratio (OR). Odds ratios measure the association between exposure to a variable and a resultant outcome. An odds ratio greater than one (OR>1) indicates exposure is associated with higher odds of outcome whereas an odds ratio less than one (OR<1) indicates expose is associated with lower odds of outcome, and an odds ratio equal to one (OR=1) indicates that exposure has no effect on the odds outcome (Szumilas, 2010). The model begins with inclusion of all individual level factors to determine if the

intrapersonal sphere of the ecological model exhibits a significant influence on use of the pass. Table 4.7 shows the results of the first three intrapersonal models.

In Model 1, all individual-level demographic variables were included to determine whether those factors significantly influenced pass use. The odds of using the pass are lower for males when compared to females, and none of the other variables demonstrated a significant influence.

The second edition of the intrapersonal-level logistic regression includes an additional individual variable, recruitment method. As was described in section 1.4.2, some of the students were provided G5AP information through active knowledge transmission; HEAL researchers visited their school and presented information on the program, assisted with registration, and were available to answer any questions. Contrastingly, some of the students were only provided information about the G5AP through passive distribution of hard-copy materials to the school via school board inter-office mail. The recruitment method is both a policy and individual level factor because the students had no control over the way their school opted to inform them of the pass (policy), but their choice to use the pass after receiving the information was a personal one (intrapersonal). When the recruitment method was added to the model, girls remained more likely to use the pass than boys, and children who learned about the pass through active recruitment were more likely to use the pass than those who received the information passively.

The third model included median household income (MHHI). This variable was calculated using census data for the dissemination area in which the users' primary home is located. When MHHI was added to the model, sex and recruitment type remained significant with odds of only 2 in 10 boys using the pass and students 1.7 times more likely to use the pass if they were informed via active recruitment.

Table 4.7 Results from logistic regression analysis including individual, household, and socioeconomic variables

Outcome - Overall Use Binary		Model 1 - Intrapersonal Individual Level			Model 2 - Intrapersonal Individual + Recruitment Type			Model 3 - Intrapersonal Individual + Recruitment Type + MHHI		
Variables	**(Reference)**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**
Sex	(ref: Girl)									
	Boy	**0.030**	0.735	(0.557 ; 0.970)	**0.018**	0.713	(0.538 ; 0.944)	**0.017**	0.213	(0.540 ; 0.942)
Recent Immigrant	(ref: No)									
	Yes	0.742	0.923	(0.574 ; 1.485)	0.746	0.924	(0.574 ; 1.488)	0.665	0.899	(0.554 ; 1.458)
Lone Parent Family	(ref: No)									
	Yes	0.410	1.201	(0.776 ; 1.861)	0.470	1.178	(0.756 ; 1.836)	0.550	1.144	(0.736 ; 1.780)
Presence of Siblings	(ref: No)									
	Yes	0.063	0.545	(0.287 ; 1.032)	0.121	0.595	(0.308 ; 1.146)	0.129	0.595	(0.304 ; 1.163)
Car Ownership	(ref: None)									
	1	0.448	1.299	(0.661 ; 2.555)	0.465	1.300	(0.643 ; 2.630)	0.417	1.343	(0.659 ; 2.737)
	2+	0.570	1.189	(0.655 ; 2.157)	0.680	1.410	(0.609 ; 2.140)	0.506	1.244	(0.654 ; 2.368)
Bus Pass	(ref: Yes)									
	No	0.597	1.100	(0.774 ; 1.562)	0.511	1.132	(0.782 ; 1.640)	0.382	1.182	(0.812 ; 1.721)
Mother Education	(ref: HS or Less)									
	College/University	0.369	1.267	(0.756 ; 2.124)	0.336	1.288	(0.770 ; 2.154)	0.265	1.339	(0.802 ; 2.236)
	Graduate School	0.607	1.193	(0.609 ; 2.339)	0.682	1.155	(0.579 ; 2.303)	0.608	1.194	(0.606 ; 2.355)
Father Education	(ref: HS or Less)									
	College/University	0.259	0.816	(0.572 ; 1.162)	0.249	0.814	(0.574 ; 1.155)	0.362	0.848	(0.596 ; 1.208)
	Graduate School	0.381	0.788	(0.464 ; 1.341)	0.282	0.744	(0.435 ; 1.275)	0.492	0.818	(0.463 ; 1.449)
Mother FTE	(ref: No)									
	Yes	0.897	1.022	(0.731 ; 1.430)	0.933	1.014	(0.730 ; 1.410)	0.934	1.013	(0.729 ; 1.410)
Father FTE	(ref: No)									
	Yes	0.884	1.037	(0.637 ; 1.688)	0.837	1.053	(0.645 ; 1.718)	0.654	1.120	(0.682 ; 1.842)
Recruitment Type	(ref: Passive)									
	Active				**0.007**	1.723	(1.164 ; 2.550)	**0.005**	1.748	(1.183 ; 2.583)
MHHI								0.101	0.945	(0.883 ; 1.011)
Constant		0.812	1.123	(0.431 ; 2.926)	0.480	0.677	(0.229 ; 1.997)	0.675	0.789	(0.261 ; 2.389)

Note: Odds ratio; Model 1 pseudo R^2 = .016; Model 2 pseudo R^2 = .023; Model 3 pseudo R^2 = .026

4.3.3.2 Interpersonal Variable Models

Subsequent models were developed to examine the interpersonal sphere of influence. The fourth iteration of the model (Table 4.8) used child reported perceptions of peer and parental support for physical activity as determining variables. When these support structures were added to the model, girls continued to be more likely to use the pass as well as those who were actively recruited. When parental and peer support systems were added, MHHI became a significant influence on pass use, with those of lower income slightly more likely to use the pass. Parental support for physical activity was significantly associated with pass use.

Table 4.8 Results from logistic regression analysis including parental and peer support for physical activity variables

Outcome - Overall Use Binary		**Model 4 - Interpersonal**		
		Intrapersonal + Parent & Peer Support		
Variables	**(Reference)**	**p**	**OR**	**95% CI**
Sex	(ref: Girl)			
	Boy	**0.007**	0.681	(0.516 ; 0.899)
Recent Immigrant	(ref: No)			
	Yes	0.779	0.931	(0.568 ; 1.527)
Lone Parent Family	(ref: No)			
	Yes	0.542	1.149	(0.735 ; 1.794)
Presence of Siblings	(ref: No)			
	Yes	0.183	0.619	(0.306 ; 1.253)
Car Ownership	(ref: None)			
	1	0.412	1.368	(0.648 ; 2.890)
	2+	0.602	1.193	(0.615 ; 2.312)
Bus Pass	(ref: Yes)			
	No	0.324	1.214	(0.826 ; 1.783)
Mother Education	(ref: HS or Less)			
	College/University	0.414	1.252	(0.730 ; 2.146)
	Graduate School	0.725	1.132	(0.566 ; 2.263)
Father Education	(ref: HS or Less)			
	College/University	0.238	0.806	(0.562 ; 1.153)
	Graduate School	0.477	0.809	(0.451 ; 1.451)
Mother FTE	(ref: No)			
	Yes	0.804	1.043	(0.749 ; 1.452)
Father FTE	(ref: No)			
	Yes	0.595	1.149	(0.689 ; 1.913)
Recruiment Type	(ref: Passive)			
	Active	**0.005**	1.764	(1.186 ; 2.623)
MHHI		**0.044**	0.933	(0.872 ; 0.998)
Parent Support		**0.002**	1.156	(1.057 ; 1.264)
Peer Support		0.802	0.986	(0.880 ; 1.104)
Constant		0.311	0.554	(0.176 ; 1.739)

Note: Odds ratio; Model 4 pseudo R^2 = .040

4.3.3.3 Built Environment Variable Models

The final phase of logistic regression analysis examined the influence of built environment factors on pass use (see Models 5 through 10). This evaluation was conducted through multiple lenses, each becoming progressively more focused on specific service provider locations and related activities.

Table 4.9 shows the results of Model 5 and adds the shortest distances to each of the service provider facilities as determining variables. When these path distances were added, none of the built environment features significantly influenced pass use. However, previous results remained constant with girls more likely to use the pass than boys and children of lower socio-economic status also more likely to use the pass. Recruitment method also remained a positive influence on pass use.

Model 6 is shown in Table 4.10 and differs from Model 5 in that it uses a binary distance measure, rather than shortest distance to a service provider facility. In this version, the distance to nearest facility was transformed into a binary threshold of 1600m (1 = service provider within threshold, 0 = outside of threshold distance). This distance was chosen for analysis in the statistical model for the same reason as it was selected in the spatial analysis, that the local school boards (London District Catholic School Board and the Thames Valley Distract School Board) established 1600m as the cut-off distance for bussing eligibility (TVDSB, 2017). When these threshold variables were added into the model there was no significant change in the results from previous iterations. Girls remained more likely to use the pass than boys and active recruitment significantly increased the odds of using the pass. Parental support for physical activity was also still identified as a significant influence on pass use.

Model results assessing associations between the built environment and use of the G5AP are found in Table 4.11. Models 7 through 10 explore relationships between specific service providers and the distance to the nearest one of their facilities. For example, is distance to the nearest municipal arena a significant influence on use of the G5AP for

skating? These variables were added to consider whether the specific type of activity or facility had any significant influence of children's use of the G5AP.

Model 7 examined distance to the nearest municipal arena with use of arenas for skating in addition to the other intrapersonal and interpersonal factors was were established in previous models. In this examination of the built environment influence, it was found that parental support for physical activity was the sole significant influence on pass use. For the first time in this analysis, the other commonly significant factors (sex, recruitment type, MHHI) were not significant.

A similar analysis was conducted in Model 8, which examined the relationship between distance to nearest municipal indoor pool and use of the G5AP for swimming. The results in Table 4.11 show that girls were once again more likely to use the pass than boys and those children whose father was employed full-time were more likely to use the pass than those whose fathers were not.

The YMCA was the focus of Model 9 and results show that families who owned one or more cars were more likely to use the G5AP for YMCA programming than families who did not have a car. In the case of the YMCA none of the other variables were significantly associated with pass use.

The final statistical model reviewed distance to the Boys and Girls Club and use of the G5AP at the facility. Model 10 illustrates significant relationships with active recruitment and low SES, as has been seen in five of the previous models. Children whose fathers had completed some university or college level education were significantly more likely to use the pass than children whose fathers had obtained high school level education or less.

Table 4.9 Results from logistic regression analysis including environmental variables: shortest distance to the nearest facility for each type of venue.

Outcome - Overall Use Binary		Model 5 - Built Environment		
		Intra & Interpersonal + Nearest Facility		
Variables	**(Reference)**	**p**	**OR**	**95% CI**
Sex	(ref: Girl)			
	Boy	**0.007**	0.681	(0.516 ; 0.900)
Recent Immigrant	(ref: No)			
	Yes	0.654	0.895	(0.553 ; 1.451)
Lone Parent Family	(ref: No)			
	Yes	0.568	1.140	(0.727 ; 1.788)
Presence of Siblings	(ref: No)			
	Yes	0.193	0.634	(0.320 ; 1.259)
Car Ownership	(ref: None)			
	1	0.391	1.388	(0.656 ; 2.936)
	2+	0.493	1.258	(0.652 ; 2.428)
Bus Pass	(ref: Yes)			
	No	0.279	1.236	(0.842 ; 1.814)
Mother Education	(ref: HS or Less)			
	College/University	0.351	1.294	(0.753 ; 2.225)
	Graduate School	0.716	1.138	(0.568 ; 2.281)
Father Education	(ref: HS or Less)			
	College/University	0.196	0.787	(0.547 ; 1.132)
	Graduate School	0.440	0.786	(0.427 ; 1.448)
Mother FTE	(ref: No)			
	Yes	0.793	1.045	(0.754 ; 1.448)
Father FTE	(ref: No)			
	Yes	0.646	1.129	(0.673 ; 1.894)
Recruiment Type	(ref: Passive)			
	Active	**0.004**	1.939	(1.121 ; 3.051)
MHHI		0.097	0.936	(0.866 ; 1.012)
Parent Support		**0.001**	1.163	(1.065 ; 1.269)
Peer Support		0.747	0.982	(0.878 ; 1.098)
Nearest BGCL		0.293	1.071	(0.943 ; 1.216)
Nearest YMCA		0.295	0.962	(0.893 ; 1.035)
Nearest Pool		0.143	0.939	(0.863 ; 1.022)
Nearest Arena		0.664	0.976	(0.875 ; 1.089)
Constant		0.317	0.537	(0.159 ; 1.814)

Note: Odds ratio; Model 5 pseudo R^2 = .045

Table 4.10 Results from logistic regression analysis including environmental variables: binary pass use within a threshold distance of 1600m.

Outcome - Overall Use Binary		Model 6 - Built Environment		
		Intra & Interpersonal + 1600m Threshold		
Variables	**(Reference)**	**p**	**OR**	**95% CI**
Sex	(ref: Girl)			
	Boy	**0.005**	0.670	(0.505 ; 0.888)
Recent Immigrant	(ref: No)			
	Yes	0.751	0.925	(0.572 ; 1.495)
Lone Parent Family	(ref: No)			
	Yes	0.541	1.149	(0.737 ; 1.789)
Presence of Siblings	(ref: No)			
	Yes	0.186	0.609	(0.292 ; 1.270)
Car Ownership	(ref: None)			
	1	0.353	1.439	(0.667 ; 3.104)
	2+	0.491	1.265	(0.648 ; 2.472)
Bus Pass	(ref: Yes)			
	No	0.285	1.233	(0.839 ; 1.811)
Mother Education	(ref: HS or Less)			
	College/University	0.405	1.257	(0.734 ; 2.151)
	Graduate School	0.751	1.118	(0.560 ; 2.232)
Father Education	(ref: HS or Less)			
	College/University	0.218	0.799	(0.558 ; 1.142)
	Graduate School	0.472	0.803	(0.442 ; 1.459)
Mother FTE	(ref: No)			
	Yes	0.753	1.054	(0.760 ; 1.462)
Father FTE	(ref: No)			
	Yes	0.573	1.158	(0.696 ; 1.926)
Recruiment Type	(ref: Passive)			
	Active	**0.005**	1.880	(1.214 ; 2.912)
MHHI		0.097	0.940	(0.874 ; 1.011)
Parent Support		**0.001**	1.161	(1.063 ; 1.267)
Peer Support		0.706	0.979	(0.875 ; 1.095)
BGCL 1600m		0.349	0.671	(0.292 ; 1.545)
YMCA 1600m		0.341	1.371	(0.716 ; 2.622)
Pools 1600m		0.338	1.302	(0.758 ; 2.236)
Arenas 1600m		0.335	1.183	(0.841 ; 1.665)
Constant		0.194	0.451	(0.135 ; 1.502)

Note: Odds ratio; Model 6 pseudo R^2 = .042

Table 4.11 Results from logistic regression analysis including environmental variables: shortest distance to each specific type of facility with use of the G5AP at that facility

Outcome - Use at Facility with Specific Programming		Model 7 - Built Environment Intra & Interpersonal + Nearest Arena & Use			Model 8 - Built Environment Intra & Interpersonal + Nearest Pool & Use			Model 9 - Built Environment Intra & Interpersonal + Nearest YMCA & Use			Model 10 - Built Environment Intra & Interpersonal + Nearest BGCL & Use		
Variables	**(Reference)**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**	**p**	**OR**	**95% CI**
Sex	(ref: Girl)												
	Boy	0.102	1.444	(0.930 ; 2.243)	**0.009**	0.661	(0.485 ; 0.901)	0.526	0.881	(0.596 ; 1.302)	0.815	0.957	(0.660 ; 1.387)
Recent Immigrant	(ref: No)												
	Yes	0.144	0.638	(0.348 ; 1.166)	0.852	0.954	(0.578 ; 1.574)	0.162	1.515	(0.847 ; 2.709)	0.206	1.351	(0.848 ; 2.152)
Lone Parent Family	(ref: No)												
	Yes	0.319	1.326	(0.761 ; 2.310)	0.055	1.522	(0.991 ; 2.336)	0.078	0.472	(0.205 ; 1.089)	0.808	1.069	(0.625 ; 1.827)
Presence of Siblings	(ref: No)												
	Yes	0.250	0.693	(0.371 ; 1.295)	0.216	0.644	(0.320 ; 1.294)	0.160	0.581	(0.272 ; 1.239)	0.564	1.331	(0.503 ; 3.521)
Car Ownership	(ref: None)												
	1	0.323	1.633	(0.618 ; 4.316)	0.919	1.049	(0.416 ; 2.645)	**0.024**	0.411	(0.190 ; 0.888)	0.123	0.596	(0.309 ; 1.150)
	2+	0.103	2.274	(0.847 ; 6.103)	0.782	1.154	(0.418 ; 3.183)	**0.004**	0.257	(0.103 ; 0.644)	0.154	0.580	(0.274 ; 1.227)
Bus Pass	(ref: Yes)												
	No	0.895	1.037	(0.606 ; 1.773)	0.783	0.937	(0.589 ; 1.490)	0.877	0.963	(0.597 ; 1.553)	0.653	1.129	(0.666 ; 1.913)
Mother Education	(ref: HS or Less)												
	College/University	0.107	1.569	(0.907 ; 2.714)	0.105	0.721	(0.485 ; 1.071)	0.712	0.885	(0.463 ; 1.693)	0.100	1.491	(0.927 ; 2.400)
	Graduate School	0.064	1.859	(0.965 ; 3.582)	0.859	1.050	(0.615 ; 1.792)	0.218	1.680	(0.735 ; 3.839)	0.618	1.226	(0.550 ; 2.735)
Father Education	(ref: HS or Less)												
	College/University	0.329	1.121	(0.705 ; 1.781)	0.306	1.214	(0.837 ; 1.762)	0.463	0.845	(0.538 ; 1.326)	**0.000**	0.430	(0.269 ; 0.687)
	Graduate School	0.792	0.915	(0.475 ; 1.765)	0.827	1.054	(0.659 ; 1.686)	0.469	0.764	(0.369 ; 1.583)	0.064	0.539	(0.280 ; 1.036)
Mother FTE	(ref: No)												
	Yes	0.733	0.937	(0.645 ; 1.362)	0.914	1.016	(0.765 ; 1.349)	0.548	0.880	(0.579 ; 1.337)	0.138	0.703	(0.441 ; 1.120)
Father FTE	(ref: No)												
	Yes	0.336	0.746	(0.450 ; 1.356)	**0.025**	1.799	(1.075 ; 3.010)	0.447	1.329	(0.638 ; 2.771)	0.591	1.175	(0.651 ; 2.113)
Recruiment Type	(ref: Passive)												
	Active	0.337	1.224	(0.811 ; 1.847)	0.197	1.292	(0.876 ; 1.905)	0.298	1.482	(0.706 ; 3.110)	0.158	1.579	(0.837 ; 2.980)
MHHI		0.856	1.008	(0.926 ; 1.097)	0.921	1.003	(0.937 ; 1.074)	0.584	0.973	(0.881 ; 1.074)	**0.012**	0.891	(0.814 ; 0.975)
Parent Support		**0.016**	1.121	(1.021 ; 1.230)	0.579	1.024	(0.943 ; 1.111)	0.359	1.046	(0.950 ; 1.152)	**0.015**	0.888	(0.806 ; 0.977)
Peer Support		0.353	0.951	(0.855 ; 1.057)	0.824	1.012	(0.913 ; 1.122)	0.190	1.087	(0.959 ; 1.231)	0.076	1.149	(0.985 ; 1.340)
Nearest Arena		0.524	1.023	(0.954 ; 1.097)									
Nearest Pool					0.516	1.015	(0.971 ; 1.060)						
Nearest YMCA								0.921	0.997	(0.931 ; 1.067)			
Nearest BGCL											0.157	0.954	(0.895 ; 1.018)
Constant		**0.000**	0.080	(0.020 ; 0.315)	0.174	0.426	(0.124 ; 1.458)	0.324	0.558	(0.175 ; 1.777)	0.456	0.55	(0.114 ; 2.646)

Note: Odds ratio; Model 7 pseudo R^2 = .082; Model 8 pseudo R^2 = .037; Model 9 pseudo R^2 = .054; Model 10 pseudo R^2 = .034

4.4 Discussion and Conclusion

This study examined whether socio-ecological factors predicted use of the Grade 5 ACT-i-Pass. The factors included intrapersonal, interpersonal, and built environment influences such as distance to the nearest service provider facility. Results of the spatial analyses revealed significant hot spot clustering reported use among registrants living around service provider facilities and cold spots in areas with lower service provider densities. Results of the analyses using logistic regression revealed associations between pass use and the following variables: sex, method of recruitment, median household income, and parental support for physical activity.

4.4.1 Geographic Accessibility & Use of the Grade 5 ACT-i-Pass

The initial phase of spatial examination, the hot spot analysis, builds on a growing body of research regarding the influence of geography on children's participation in physical activity opportunities. Findings from this study are consistent with existing research, which states that use of recreation facilities is inversely associated with distance to the facility (Reimers, et al., 2014; Skelton, 2012; Tucker, et al., 2009). Results of this analysis show that areas of greater recreation facility density exhibited higher instances of registered pass use. These findings support research recommending equitable geographic distribution of recreation spaces, especially those that are publically funded (Gilliland, Holmes, Irwin, & Tucker, 2006).

4.4.2 Intrapersonal & Neighbourhood SES Influences

Results from multiple executions of a logistic regression model examine the influence of socio-ecological factors on use of the Grade 5 ACT-i-Pass. The examination began with intrapersonal factors, followed by the addition of interpersonal, and finally evaluated the influence of built environment factors on use.

The first intrapersonal model results are consistent with past research identifying differences in physical activity levels within the context of sex (Sallis, Prochaska, & Taylor, 2000; Van der Horst, Paw, Twisk, & Van Mechelen, 2007). Findings from this study identify that girls were significantly more likely to use the pass than boys. This may

be explained by the fact that research shows Canadian boys to be generally more active than girls (Breslin, et al., 2012; O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999) so provision of a free recreation access pass may encourage female students to increase participation in PA.

Method of recruitment for the program was added in Model 2. Results of the logistic regression analysis found that children who were provided with active recruitment for the program were 1.7 times more likely to use the pass than those who found out through passive information sharing. Previous research by our team also showed how active recruitment was a significant predictor of whether or not a child registered for a pass (Clark et al., forthcoming). An evaluation of youth health interventions similarly found that mass promotion of physical activity and enthusiasm from staff and support agencies are critical to encouraging children's PA (Pate, et al., 2000). Future interventions should prioritize knowledge transmission and promotion of physical activity opportunities to support interest and use of available programs.

The third model included area-level socioeconomic status (SES) as represented by median household income (MHHI). When family income was included in the equation the two previously significant factors, sex and recruitment type, remained significant. These findings are similar to research conducted by others that found no relationship between SES and physical activity levels (Stalsberg & Pendersen, 2010; Van der Horst, Paw, Twisk, & Van Mechelen, 2007). It is possible that socio-economic status was not a significant predictor of use of the G5AP because the pass itself was free of charge and available universally.

4.4.3 Interpersonal Influences

When the influence of children's interpersonal networks (support from parents and peers) was included in model four, parental support for physical activity was found to have a significant relationship with G5AP use. Existing research has also found that support for physical activity from parents and has a positive influence on children's PA levels (Robbins, Stommel, & Hamek, 2008; Trost & Loprinzi, 2011). These results suggest that parents, who engage in active play with their children, watch them participate in

physically active programs, or provide transportation to PA opportunities, are encouraging participation in physical activity opportunities.

4.4.4 Built Environment Influences

Models 5 and 6 begin to examine the influence of the built environment on use of the Grade 5 ACT-i-Pass. In both analyses sex, recruitment type, and parental support remained the only significant influences on use. It was surprising to find that when distance to recreation facilities was included in the regression analysis it did not produce a significant result. Null findings are contrary to academic research that found proximity to recreation facilities to be a significantly associated with children's physical activity levels (Tucker, et al., 2009; Ding, Sallis, Kerr, Lee, & Rosenberg, 2011). Further research should explore specific modes of transportation to and from these destination recreation centres. Planners and policymakers should consider children's independent mobilities when planning recreation spaces and be mindful that they often rely on parental support to travel to a specific program or location.

Models 7 through 10 begin to tell a different story regarding factors that influence use because they explore specific facilities and use of programs specific to those facilities. The influence of distance to nearest municipal arena with use of those facilities for skating is examined in Model 7. Results of that analysis found parent support for physical activity to be the only variable of significant influence. When reviewing location of the nearest municipal indoor pool and use of the G5AP for swimming in model 8, sex and father's full time employment were the only significant variables. This result suggests that female children of higher socioeconomic status are more likely to participate in aquatic activities using their pass. These findings are consistent with previous research which found that distance to sports facilities for specific activities (such as skating and swimming) was not significant in larger cities but did vary depending on PA type (Steinmayr, Felfe, & Lechner, 2011; McCormack, Giles-Corti, Bulsara, & Pikora, Correlates of distances traveled to use recreational facilities for physical activity behaviors, 2006). Similar studies have also concluded that parental support for PA, sex, and SES can significantly influence children's participation in physical activity (Eriksson, Nordqvist, & Rasmussen, 2008; Van der Horst, Paw, Twisk, & Van Mechelen,

2007). Continued research on children's physical activity levels should examine the impact of specific activities to understand the influence of these sport-specific venues.

Model 9 found that family ownership of one or more vehicles was a significant influence on use of the YMCA of Western Ontario for recreation programming. This result is consistent with past research that found children of higher socioeconomic status are more likely to participate in physical activity opportunities at private facilities than those from lower SES neighbourhoods (Ries, Yan, & Voorhees, 2011; Ziviani, et al., 2008). It is important to note that the YMCA only offers health, fitness, and aquatics programming at three locations in London so these private facilities are not easily accessed via active transportation or public transit for a large proportion of the population. As a result, future development of recreational facilities should focus on provision of public facilities to increase accessibility. Because vehicle ownership was a significant predictor of use, the YMCA might consider future implementation of a shuttle service similar to the one offered by the Boys and Girls Club of London, so that children with limited transportation options can use their facilities.

The final iteration of the model evaluates proximity to the Boys and Girls Club of London and use of the G5AP at that facility. Contrary to prior inconclusive findings regarding the influence of socio-economic status and use, these results do support past research that found a relationship between parent income and education levels on children's participation in structured physical activities (O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999; Estabrooks, Lee, & Gyurcsik, 2003). Results show that father's education (some college or university), MHHI, and parent support for physical activity all significantly influenced use of the pass. These results suggest that affluent children are more likely to participate in physical activity programs when their fathers are highly educated and parents demonstrate support for PA. Existing research has similarly found that family plays an important role in children's physical activity (Eriksson, Nordqvist, & Rasmussen, 2008). Future children's physical activity interventions should focus on targeted support from parents to disseminate information and encourage participation.

4.4.5 Overall Findings

Results of this statistical analysis are mixed in that the spatial findings indicate a potential for hot spot and cold spot clustering of use, while examination of factors influencing pass use from statistical modeling rarely found distance to be a significant factor influencing use. The factors that consistently demonstrated a significant relationship with use of the G5AP at partner facilities were sex, recruitment method, and parental support of physical activity. These findings support existing knowledge that Canadian boys tend to be more active than girls (Breslin, et al., 2012; O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999). If boys were already highly active, they would not require provision of a free pass to engage in PA – whereas giving girls a free pass might make them more likely to participate in an organized program or activity (Biddle, Whitehead, O'Donovan, & Nevill, 2005). Results also support the need for continued promotion and support for child and youth physical activity programs. Both interpersonal (parental support) and policy (recruitment method) factors were proven to significantly increase the odds of a child using their pass.

4.4.6 Strengths & Limitations

It is recommended that further research on the G5AP program focus on children's personal experiences with the pass using qualitative methods. As the socio-ecological model describes, the decision to participate in physical activity is influenced by multiple realms within a child's life. This study was limited in its exclusion of children's personal beliefs, opinions, attitudes, and interests surrounding physical activity. It is possible that an eligible child may have the economic means, knowledge, and geographic access to participate in programming but simply chooses not to attend for any of a multitude of possible reasons. Among the reasons, children may decide not to participate is because they are more interested in other activities, they do not feel skilled or confident enough to participate, their friends are not interested in the activity, or they might to be afraid to try something new.

London's Grade 5 ACT-i-Pass program provides a unique experience of engaging an entire age-group population using a variety of recruitment methods and analyses. This

study was strengthened by support from partner agencies such as London's Child and Youth Network, the HEHPA priority, and the HEAL at Western University.

Some of the schools involved in the program benefitted from active recruitment methods and were able to learn more and engage in discussion about physical activity. An ideal protocol to follow for future PA programs would involve regular interaction with potential participants to remind them of the benefits of PA, as well as to encourage them to try new activities or explore new spaces.

Data collection for this study was limited by the inconsistent user tracking efforts of the service provider organizations. Each of the three major service partner organizations (City of London, the YMCA of Western Ontario, and the Boys and Girls Club of London) used different registration software at their facilities. It proved incredibly difficult to coordinate a common method to objectively monitor which children used their G5AP and at which facility due to the varying demands of each venue. The research team was able to meet with departmental managers and technology staff at each service provider at the end of the inaugural year to discuss options for improved tracking in the future. Research on registration software and discussions with staff elicited a solution involving the addition of unique barcodes for each registered pass. Theoretically, the barcode would be universal and grant a registered G5AP holder entrance into any partner facility. The barcode system was introduced and added to the cards in the second pass year, but due to technological complications, tracking remained inconsistent. It is hoped that a continued coordination of effort from all relevant parties will eventually provide accurate use data to evaluate the success of the program.

The use of centroids in spatial analysis posed another data limitation. Centroids were calculated for each participant's home postal code, rather than precise address to avoid unique identifiers for study subjects. Healy & Gilliland (2012) examined the use of postal codes as proxies in spatial epidemiology and found that in urban centres there is potential for positional discrepancies represented by median errors of up to 109 m.

A similar limitation comes from the structure of programming at the private partner organizations such as the YMCA and BGCL. The data collected for this thesis was

unable to ascertain whether a G5AP user may have held an existing membership to one of the partner organizations, which would also skew use data. A future direction for program improvement would involve linking the G5AP to existing accounts to eliminate the need for multiple registrations. Information regarding prior membership or registration in physical activity programs would have provided insight into potential barriers to use of the G5AP.

4.4.7 Opportunities for Future Research & Program Development

To further examine the personal experiences of those involved with the G5AP program, a recommended next step would be to conduct focus groups with child participants and interviews with parents to understand the family dynamic and social realm of physical activity participation. These sessions would employ questions to target group and individual interactions with the program to ascertain other factors influencing use.

The Boys and Girls Club was an especially interesting service provider for two reasons; it only houses recreational programming at one location, and offers a low cost, staffed, bus service to after school programs (BGCL, 2017). Future research on accessibility should explore the situation of the London Boys and Girls Club, specifically to examine the influence of supervised mass transit opportunities for children.

It was recognized that public transportation or ride sharing may not be feasible in the short term, so the research team at the HEAL has begun discussions to develop an integrated mapping tool to help G5AP users navigate available programming and transportation options. The web-based application would be designed as an instrument for planning use of the G5AP. A website and coordinating smartphone app would provide a breakdown of the available program options, the facility locations and operating hours, as well as incorporate the London Transit bus schedules to encourage use of public transportation where available. The idea of the mapping-tool emerged as a result of initial consultation with G5AP community stakeholders and the identification of information and geographic accessibility barriers. It is hoped that if a simple web-based solution can be provided, the registered pass users will be knowledgeable about the programs available and aware of their locations.

4.4.8 Conclusion

The results from this study contribute to the literature on factors influencing children's physical activity. Despite a consensus from the literature review that distance plays a significant role in children's engagement in physical activity, this study found null results in the examination of built environment factors. The findings reported here indicated a stronger influence from social variables than geographic ones. The examination of socio-ecological influences was strengthened by our relatively large sample population of participants (n = 881).

This study offers an opportunity to share results through a clear knowledge translation exchange with local stakeholders to identify factors influencing use. Results from this thesis can help inform policymakers, urban planners, and health professionals when deciding on public recreation investment. Their use of planning tools such as zoning, municipal by-laws, and municipal plans can encourage development focused on creating activing living environments and supporting physical activity for children of all ages.

4.5 Acknowledgements

We would like to thank both the Canadian Cancer Society and Canadian Institutes of Health Research– Institute for Population and Public Health for providing funding for the evaluation of the Grade 5 ACT-i-Pass program. We would also like to thank the G5AP partner organizations including London's Child and Youth Network, the City of London Recreation Department, the Boys and Girls Club of London, the YMCA of Western Ontario, Thames Valley District School Board, London District Catholic School Board, and Montessori Academy of London. I would like to personally acknowledge all of my research colleagues in the HEAL especially Christine Smith, Christine Mitchell, Dr. Danielle Tobin, and Brenton Button as well as work-study students and volunteers for their assistance with field work and quantitative analysis. I would also like to thank Josh Archer, Sabrina Sater, Martin Healy, Dr. Jeff Hopkins, Dr. Piotr Wilk, and Dr. Andrew Clark for their assistance with G5AP program delivery and academic support for statistical and spatial research.

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Chapter 5

5 Synthesis

5.1 Summary of Studies

The overall aim of this thesis research was to explore factors influencing children's use of a free recreation access pass. The Grade 5 ACT-i-Pass program in London, Canada was used a case study. Specific research objectives were investigated using mixed methods in two different but complimentary studies. The objective of study 1 was to evaluate service provider perspectives on accessibility of children's physical activity (PA) programs. Study 2 uses spatial and statistical analyses to meet the research objective of exploring individual, household, socioeconomic, and environmental factors influencing pass use.

The first study (Chapter 3) employed qualitative research methods and used in-depth interviews to gain valuable experiential insight from the G5AP service providers. The interviews focused on the current level of knowledge about the pass, how the pass functions at each facility, benefits of the program, opportunities for improvement, and barriers to recreation access. These concepts helped to frame a discussion around child access to recreation opportunities specifically focusing on the Grade 5 ACT-i-Pass program. Findings from the data exploration described three overarching themes regarding barriers and facilitators to children's PA accessibility: economic, information, and geographic. In describing their personal experiences, service providers stated that many children are not able to participate because of either financial strain, lack of program or facility awareness, proximity/transportation to facilities, or a combination of the above. While the G5AP certainly alleviates the influence of some of these factors, it is not able to mitigate all and therefore leaves opportunity for improvement.

This study also asked the service providers to recommend opportunities for development of the G5AP program. Common themes that emerged from the discussion with department managers at the various organizations included universal registration, recruitment of additional service partners, coordination of schedules and program offerings, and continued promotion of the program by supporting agencies. These

findings highlight the importance of project evaluation and offer an opportunity to share the results with various stakeholders within the community.

The second study (Chapter 4) focused on quantitative measures of accessibility and use of G5AP. Initial spatial analysis explored clustering of pass use based on home and service provider locations. Statistical analysis used logistic regression to explore individual, household, socioeconomic, and environmental factors that influenced use of the G5AP.

One of the most salient findings from the interviews with service partners was the concept of distance being a major barrier to participation. This study uses spatial analysis to examine the influence of proximity on use. The function of this analysis is to illustrate significant clustering of data either as "hot spots" (high occurrence of pass use) or "cold spots" (low occurrence of pass use). The results of the spatial analysis found that there was significant ($p<0.1$) clustering of hot spots in the downtown core, south, and northwest. Contrastingly, cold spots were located around the periphery of the city. It is believed that hot spot clustering occurred in areas of London with higher population density and a similarly increased density of partner service provider facilities making the area more accessible to registered pass holders. The reverse is believed of the cold spots; that they occurred in areas where registered pass users were located in a low density of recreation facilities and were a significant distance away from other PA opportunities.

The data used for the second half of this quantitative analysis was gathered from a combination of the G5AP parent surveys (demographic data) and the survey results from spring of the student's grade 5 year. The demographic data was used to explore the relationships between the independent variables (individual, household, socioeconomic, and environment) and the dependent variable (pass use). The second phase of quantitative data analysis was the development of a logistic regression model including the variables noted above. Overall results from statistical analysis found that being a girl, being actively recruited, and having higher parental support for physical activity significantly increased the likelihood of a child using the G5AP.

Results from study 2 found that while distance did not have a significant influence on pass use for the overall population of registered G5AP users, it did have some impact when specific service provider programs and locations were considered. Examination of pass use at municipal facilities (arenas and indoor pools) found that parental support for PA significantly increased the likelihood that the pass was used for skating, while female participants whose fathers are not employed full time were more likely to use the pass for swimming. Examination of pass use at private service providers found that household vehicle ownership significantly increased use of the G5AP at YMCA locations and also found that father's education, median household income, and parental support for PA significantly increased the likelihood that the pass was used at the BGCL. These results highlight the multiple factors that influence children's use a free recreation access pass and underscore the importance of considering the entire realm of influence on a child's ability to access PA opportunities.

5.2 Research Contributions

Results from both studies included in this thesis align with previous research regarding factors influencing children's use of recreation centres for physical activity. In both cases multiple factors were found to significantly influence use of the G5AP, highlighting the benefits of using a socio-ecological model to examine participation in PA as a spatial behaviour.

The importance of considering individual level factors was revealed in both study 1 and study 2. Service provider discussions noted that personal preference or confidence levels would influence a child's decision to participate while logistic regression analysis found that girls were more likely to use the pass than were boys. These results are supported by existing knowledge that Canadian boys are generally more active than girls are (Breslin, et al., 2012; O'Loughlin, Paradis, Kishchuck, Barnett, & Renaud, 1999).

Support from interpersonal social networks, particularly parents and peers, were also found to significantly influence use of the G5AP. Study 1 discussions emphasized the importance of parental support for activity particularly regarding travel to and from destination recreation facilities. Service providers also recognized that children in this age

group are often influenced by their peers and may choose to participate (or not) based on the decisions of others. Similarly, statistical analysis found parental support for PA was a significant predictor of use. These results support existing research that also found positive support for PA from relationships with parents and peers had a positive influence on participation in PA opportunities (Trost & Loprinzi, 2011; Robbins, Stommel, & Hamek, 2008). These results emphasize the importance of encouraging and supporting children and youth in their PA endeavors.

Increasing informational accessibility, through promotion of physical activity programs and active recruitment of study participants, were found to be important in both studies. Service providers thoroughly discussed the value of supporting G5AP through multiple mediums to overcome knowledge as a barrier to use. They suggested that children would be more likely to register for and use the pass if they were more aware of the program and received consistent reminders about the offerings. Similarly, statistical analysis in study 2 found that active recruitment for the G5AP program significantly increased children's use of the pass. These results support work by the HEAL research team that found active recruitment also significantly predicted whether a child would register for the pass or not (Clark et al., forthcoming). As results from both studies in this thesis show, promotion of the benefits of physical activity programming and support for active lifestyles are instrumental in engaging children in PA.

The two studies exhibited mixed findings regarding the influence of geography on children's use of the G5AP. The service providers interviewed in study 1 believed that geography was a significant factor in children's access to their programs. They discussed the availability of neighbourhood recreation opportunities, congruence of schedules and program offerings, and transportation to and from facilities as barriers to access from a geographic perspective. Their opinions are supported by existing scholarly work that found an inverse relationship between distance to recreation spaces and participation in PA programs (Reimers, et al., 2014; Skelton, 2012; Tucker, et al., 2009). Results from study 2 found geography to be a significant influence on use when examined through the Getis-Ord Gi* hot spot analysis. The spatial output layer illustrated significant clustering of high and low pass use based on recreation facility locations. Conversely, results of

logistic regression analysis did not find direct associations between distance to service provider locations and use of the G5AP at those sites. These mixed results suggest that further examination of the geographic influence on use is needed to clarify the spatial component of this PA behaviour.

Study 1 specifically explores service provider perspectives on accessibility of children's PA opportunities. This thesis helps to fill the knowledge gap in the service provider influence on parks and recreation opportunities. A review of health partnerships conducted by Leichty and colleagues (2014) similarly concluded that few evaluations of health partnerships share the voice of recreation administrators despite their increasing representation in these initiatives. Additionally, the ParticipACTION report card (2016) recommended that further research on children's health should "encourage program providers to develop strategies to counter the dropout rate in organized sport and physical activities among youth". We need to engage service providers in the future to share our findings with them so they are able to increase their program offerings to suit the needs and desires of their participants.

Study 2 builds on a growing body of literature incorporating the use of socio-ecological models to understand children's decisions to participate in PA. Statistical analysis in this thesis found the most salient factors influencing use of the G5AP to be sex, recruitment method, and parental support for PA. These results have been commonly found among other children's health researchers (Stokols, 1996; Sallis, et al., 1992).Welk (1999) developed a Youth Physical Activity Promotion Model that focuses much more on the unique psychological, behavioural, and developmental characteristics of children. While this thesis employs on an overall socio-ecological model of children's PA behaviour, future development of theoretical models should place greater emphasis on the distinctive traits of child populations.

These findings will be shared through the G5AP knowledge translation and exchange (KTE) plan and will support future development with a focus on children's physical activity. HEAL researchers will share these findings through workshops, conferences, publications, and presentations. Study results suggest that policymakers and service

providers should focus development of future interventions on promotion and support for physical activity from parents and professionals, especially programs appropriate for young girls.

This thesis provides meaningful results regarding factors that influence the current declines in PA levels among Canadian children. The Report Card on Physical Activity for Children and Youth as published annually by ParticipACTION supports development of interventions that seek to increase the operational capacity to improve delivery of physical activity programs to children and youth in Canadian municipalities (ParticipACTION, 2016). The Grade 5 ACT-i-Pass project in London is one such intervention and it will require further evaluation and follow-up to ensure support from participating agencies. Results from both studies begin to expose factors that influence children's use of PA programs and emphasize the need to identify what is causing children to remain inactive.

5.3 Limitations

An elementary school board strike in fall of 2015 was detrimental to data collection for the G5AP project evaluation. Ontario school board teachers went on strike as the school year commenced in September 2015 and this caused significant difficulties when scheduling classroom visits and ensuring that HEAL lab researchers followed appropriate protocol during the strike action. This union strike was something that could not have been foreseen when planning the timeline for the G5AP program, but certainly restricted the data collection for that period.

Similarly, even when all teachers and support staff were working within their full ability, there are inherent challenges in working with schools, particularly a longitudinal cohort study design. It is challenging to schedule an ideal time for an outside group of researchers to come into a school and complete presentations to support the initiative or administer follow-up surveys. There were many limitations regarding scheduling and data collection including, but not limited to: student absenteeism, student transfer to other schools, conflicts with other programs or school events, fire drills, and the presence of substitute teachers who were not informed of the scheduled visit.

The G5AP registration forms and surveys were completed through a variety of methods including hand-written submission by either the parent or child through the child's school, courier delivery through letter mail, or online using the ACT-i-Pass website. As a result of these multiple submission options, there was ample opportunity for human error in inputting or interpretation. Data cleaning revealed errors with street addresses, postal codes, and birthdates, to name a few.

These issues associated with the registration and data inputting created further limitations with the geocoding of participant home locations. If there was a missing or incorrect postal code in the database, it could not be included in the spatial evaluation. Most of the errors were easily resolved by searching the Canada Post public listing to determine the appropriate code, but a few of the final data points remain unmatched because they could not be identified.

Study 1 recruited very high-level employees from each service provider organization. While these departmental managers and G5AP champions may know how the pass should function in theory, there may be a large discrepancy in how the pass functions in actuality. It is possible that the management-level employees did not experience the day-to-day pass usage and the program evaluation may have benefitted from also interviewing front-line staff at each organization. For this reason, although they provide an excellent way to explore hypotheses, interviews are limited in their ability to generalize findings to an entire population.

An additional challenge faced by service providers was the knowledge translation from management employees to part-time front line staff about the program registration and delivery. Part time youth employees (present at the majority of G5AP service partner facilities) often exhibit high rate of turnover and it is difficult manage the partnership to ensure all members of the staff team are equipped with the same information (Frisby, Thibault, & Kikulis, 2004). This may have caused potential irregularities in pass registration, tracking, and program delivery from the front line staff that interacted most frequently with the G5AP registrants.

Service providers were limited in their ability to accurately monitor pass registration and use at each location. Very strict child protection policies and procedures at each organization required G5AP users to "re-register" every time they attempted to enter a facility they had never visited before, which added to the complexity of the program. Data from the service providers tracking access and use was incomplete and unreliable because of multiple registration requirements and a variety of participant scanning and documentation protocols.

Study 2 uses data from the end of the cohort group's period with an active pass. This means that the survey used in this analysis was completed in the spring (May/June) of 2015, after having held a valid pass for their entire grade 5 academic year and the summer prior. Potential issues with this follow-up period are student recall and basic comprehension of the survey questions. Many of the questions ask about which programs were used in the last seven days whereas some of the others ask about how frequently programs were used in the past year. Depending on the season, there is a possibility that an 11 or 12-year-old child may have forgotten which service providers they did or did not use throughout the entire year-long course of the G5AP program. Along the same vein, it should also be noted that seasonality influences physical activity levels. In a systematic review published by Tucker & Gilliland (2007) they found that PA levels vary by season and this could have limited the responses given by the study participants in spring, as they may have been different from the other three seasons.

Along the same vein, data validity may have been affected by children's perceptions of their experiences. For example, a child may not be aware of whether their family purchased a membership to the YMCA or BGCL prior to receiving their Grade 5 ACT-i-Pass. Therefore, it is possible that when a child survey response indicated use of the G5AP for swimming, their parents may have actually registered them for the program through a different forum. This inconsistency could be remedied in future data collection by ensuring surveys include specific questions about existing program registrations and memberships, or combining parent and child responses to establish congruency.

5.4 Implications for Policy and Practice

The results of this thesis allow for development of an important set of recommendations for multiple stakeholders with the goal of improving child and youth physical activity levels in the City of London. These recommendations are transferrable to other community health interventions, particularly those involving public and private agency supports for programming. The findings of the studies described herein generate potential implications for all associated parties: youth and their families, school administration and staff, community support organizations (such as the Child & Youth Network), planners, health professionals, researchers, policymakers, and recreation service providers.

This research supports policy that emphasizes the importance of equitable distribution of recreation facilities throughout a municipality, regardless of socioeconomic status, whenever possible. The discussions held with recreation managers revealed opportunities to improve access to programs by ensuring that programs are available at multiple locations, on a variety of days, and offering a multitude of opportunities. If recreation opportunities can continue to expand to meet the preferences of children, then their activity levels will increase proportionately.

The 2016 ParticipACTION report card recommended that funding contributions should be maintained or increased by private and not-for-profit agencies as well as government organizations to further promote physical activity opportunities for children, youth, and their families (ParticipACTION, 2016). Evaluation and development of the G5AP program can encourage the development of new partnerships and continued recruitment of service providers to support children health initiatives and provide access to programs and facilities throughout London.

5.5 Future Research

While this thesis provides some explanation of the current decline in Canadian children's PA levels, more research is required. Future research should aim to evaluate the impact of population health interventions such as the Grade 5 ACT-i-Pass and identify whether they are successful in increasing child and youth activity levels. This research should include

analysis of who registered for the pass (Clark et al., forthcoming), who chose to use the pass and at which facilities, and finally whether overall PA levels increased as a result of the exposure to additional opportunities. Additionally, continued research should attempt to develop a universal registration system so that pass use can be tracked to identify which programs were attended, at what frequency, and at which locations. A better understanding of how the program currently functions will allow for purposeful growth and development of new service provider partnerships.

Findings from study 1 provide the basis for an on-going narrative on how to overcome barriers to participation in physical activity. The in-depth discussions with department managers exposed the current level of accessibility and demands further examination of youth recreation access. It is recommended that future research should engage other stakeholders such as the parents/guardians, teachers and school board officials, and the students themselves in discussions about their recreation experience. The most effective way to obtain a better understanding of what factors influence use of a free recreation access pass is to ask the children themselves, as well as those who directly influence their ability to participate.

The results of study 2 illustrate how an even spatial distribution of recreation service providers throughout the municipality could help to increase participation in physical activity opportunities. The areas of hot and cold spots surrounding service providers in targeted areas of the city identifies opportunities to expand the program and provide more recreation locations to children in London. Future research should explore how improved geographic accessibility to PA opportunities has an impact on pass use, whether through the addition of new recreation facilities offering PA programs to G5AP holders or through the expansion of shuttlebus services between neighbourhoods and facilities. Future research should also explore the nuanced reasons why children and youth choose to participate in recreation opportunities and identify barriers to use so that they can be removed for future generations of active children.

The decision for children to participate in PA is a complex behavior, so it is critical to evaluate as many influences as possible to understand motivation for use. There are

countless reasons why children choose to participate in physical activity opportunities and this study is only able to evaluate a select few. Continued evaluation of the G5AP program should seek to further understand the impact of the interpersonal relationships such as those with peers, teachers, parents/guardians, siblings. This can be achieved through continued recruitment of influential people. Results from this thesis found that on-going support and encouragement from social networks is critical for increased child participation. Replicating the study with another cohort after the program has had a few years to gain some traction and establish itself would be an interesting comparison. The first two years of G5AP saw tremendous success and it is hypothesized that as the program continues to grow and develop, child participation and PA will improve as well.

Although the individual, household, socioeconomic and geographic factors provide an overall view of factors influencing the decision to be active, they do not illustrate the full realm of influence. This study also touched on the influences of individual preference and social interaction for child participation, but was not able to expand on their personal experiences. Continued research should recruit the participating students (both those who used and did not use the pass) to elaborate on their decision to participate in physical activity opportunities. Researchers have conducted focus groups with children and youth in the past and found that social forces were a significant influence on the choice to participate in programming (Utter, Denny, Robinson, Ameratunga, & Watson, 2006).

In addition to focus groups with children, it would be useful to engage parents/guardians in the discussion to discover other factors that may influence participation. Many families, particularly those of higher socio-economic status, are already registered in paid programs and therefore those take priority over a free pass. Similarly, families are often incredibly busy with other activities and are trying to coordinate the schedules of multiple children, so provision of a free pass that only permits access for one or two children, would not be of high importance. Opening a discourse with the adults responsible for scheduling and transporting the grade 5 students would provide a great deal of insight into opportunities for success in the future. This proposed research would meet another recommendation from the ParticipACTION Report Card that states, “Research is needed

to understand why families are not using local spaces and programs for physical activity despite good availability" (ParticipACTION, 2016).

Finally, the teachers and school administrative staff should be included in future program evaluation to gather details on how information is transmitted through the schools to the students and staff. Information sharing is largely dependent on them and their championship of the program is required for success and growth. Most of the service providers interviewed in this study noted that in order for the program to thrive, more publicity and community engagement is required. One of the greatest assets of the G5AP initiative is the ability to communicate through the schools so it should be accentuated in the future.

5.6 Conclusion

The purpose of this thesis was to examine factors that influence use of a free recreation access pass, including the impact of geographic variables. Results from this thesis found that multiple factors significantly influenced pass use. The combination of learnings from both analyses helps to obtain a better understanding of children's spatial behaviours and factors influencing their use of a free recreation access pass. Both studies emphasize the need for continued development, re-evaluation, and support for the program to provide better opportunities for the future and overcome existing barriers to access. It is recommended that future interventions focus on programming suitable for boys and girls, provision of continual support for children's PA from parents, peers, and the community, and equitable distribution of recreation program opportunities. These findings are essential as policymakers, service providers, parents, children, and their families are continually exposed to new opportunities and being well informed on what is available will help them make the decision to participate.

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Appendices

Appendix A Research Ethics Approval Form for Use of Human Participants (Redacted)

Western Research

Research Ethics

Use of Human Participants - Revision Ethics Approval Notice

Principal Investigator: Jason Gilliland
File Number:103954
Review Level: Delegated
Protocol Title: Evaluation of a Physical Activity Intervention for Elementary School Children in London, Ontario
Department & Institution: Social Science\Geography,
Sponsor:
Ethics Approval Date: May 07, 2014 **Expiry Date:**December 31, 2016
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised Western University Protocol	Western NM REB Protocol	
Instruments	Parent Survey	
Instruments	Youth Survey	
Revised Letter of Information & Consent	Parental LOI/Consent	
Assent	Child Assent	
Other	Registration Form	

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

[redacted] who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is [redacted] HSREB is registered with the U.S. Department of Health & Human Services under the IRB [redacted]

[redacted]

[redacted] for Further Information

[redacted]

This is an official document. Please retain the original in your files.

Western University, Research [redacted]

Appendix B Grade 5 ACT-i-Pass Registration Package: cover letter, parental consent, registration demographics, and current activity levels form

Dear Grade 4 Parents/Guardians,

You and your grade 4 child are invited to participate in the Child and Youth Network's ***ACT-i-Pass Program***. The ACT-i-Pass is a card that grants your child (plus one friend, family member, or chaperone) ***FREE*** access for many of London's recreation centres and programs from July 2015 until June 2016.

The purpose of the program is to increase a child's ability to participate in physical activity, which can improve health, lengthen life, decrease illness, reduce screen time, and increase play in their lives! This program also provides an important chance for your child to be active at an early age, as active children become active, healthy adults. This project has been endorsed by, and has passed the ethical standards of, your child's school board and Western University.

If your child registers for the *ACT-i-Pass Program* he/she will **receive a pass in July that will allow them to access free physical activity opportunities offered through our partners, including the City of London/Spectrum, The Boys and Girls Club of London, and The YMCA of Western Ontario.**

To register your child for the *ACT-i-Pass*:

- ☐ Clearly fill out the ***ACT-i-Pass Registration*** section on the ***registration form,*** including your mailing address so we can mail the card directly to you;
- ☐ Complete the ***demographic questions (Optional)***;
- ☐ Return the ***registration form*** to your child's teacher;
- ☐ Receive the ***ACT-i-Pass*** by mail in July 2015; and
- ☐ Use your pass to access recreational facilities and programs throughout London between July 2015 and June 2016. Program schedules are updated seasonally, and can be found at www.inmotion4life.ca/actipass. A sample schedule can be found on the back of this letter.

Thank you for your interest in the program. To learn more about the program you can check out our ***informational videos***, ***frequently asked questions***, and ***ACT-i-Pass in the News*** on the project websites at www.inmotion4life.ca/actipass or www.playeveryday.ca.

Kindly,

London's Child & Youth Network

Act-i-Pass Registration Form

The following information will be used exclusively to contact you about the ACT-i-Pass program. All personal information will be stored and managed by Western University under its ethical standards. By providing this information, you agree to allow your child to participate in the ACT-i-Pass program.

*If you prefer to register and complete the optional survey **online**, please visit inmotion4life.ca/actipass. Simply complete the online form and your child will be registered for the ACT-i-Pass program. If you have any questions or concerns, please contact the evaluation team at* [redacted]

Please write clearly so we can ensure your child receives their pass in July.

Child's Information:

_____ _____
Child's First Name Child's Last Name

_____ _____
School Name Grade 4 Teacher

_____ _____ _____
Unit # House # Street Name

_____ __ __ __ - __ __ __
City Postal Code

Parent /Guardian Information:

_____ _____
Parent's First Name Parent's Last Name

(__ __ __) __ __ __ - __ __ __ __ (__ __ __) __ __ __ - __ __ __ __
Daytime Phone # Evening Phone #:

_____@_____
Email Address

Signatures:

I have fully completed the above information accurately; I understand the rules of the Child & Youth Network's ACT-i-Pass program, and the rules of partnering organizations. I have explained the rules to my child and agree that the Child & Youth Network and partnering organizations will not be responsible for any accident to the boy/girl while on the premises of facilities or while engaged in any activities in the program.

_____ _____
Parent / Guardian Signature Date

Demographic Questions:

1. Today's date (mm/dd/yyyy)? __ __ / __ __ / __ __ __ __
2. My child is a: ☐ Boy ☐ Girl
3. What is your child's birth date (mm/dd/yyyy)? __ __ / __ __ / __ __ __ __
4. Please indicate your child's race/ethnicity (please check the appropriate response(s)):

☐ Aboriginal (Inuit, Metis)	☐ Arab/West Asian (Armenian, Moroccan)
☐ Black (e.g., African, Jamaican)	☐ Chinese
☐ Filipino	☐ Japanese
☐ Korean	☐ Latin American
☐ South Asian	☐ South East Asian
☐ White (Caucasian)	☐ Other

5. Are you and your family immigrants to Canada? If so, how long have you lived in Canada?

☐ Not immigrants	☐ 5 years or less
☐ 6 to 10 years	☐ More than 10 years

6. How many people live in your child's main home? ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 or more
7. How many children live in your child's main home? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 or more
8. How many cars are owned by your household? ☐ 0 ☐ 1 ☐ 2 ☐ 3 or more
9. My child's current height is: _____ cm OR _____ ft _____ in
10. My child's current weight is: _____ kg OR _____ pounds

Physical Activity Questions

Physical activity is any activity that increases the heart rate and causes someone to be out of breath. Physical activity can take place while playing sports, doing school activities, playing with friends, or walking to school.

1. Over the past 7 days, on ***how many days*** was your child physically active for a total of at ***least 60 minutes per day***?

☐ 0 Days	☐ 1 day	☐ 2 days	☐ 3 days
☐ 4 days	☐ 5 days	☐ 6 days	☐ 7 days

2. About how many ***hours a week*** does your child usually take part in physical activity that makes him him/her out of breath or warmer than usual ***outside of school*** while ***participating in lessons or league or team sports***?

☐ Never	☐ 4 to less than 7 hours per week
☐ Less than 2 hours per week	☐ 7 or more hours per week
☐ 2 to less than 4 hours per week	

3. About how many ***hours a week*** does your child usually take part in physical activity that makes him/her out of breath or warmer than usual ***outside of school*** while ***participating in unorganized activities***, either on own or with friends?

☐ Never
☐ Less than 2 hours per week
☐ 2 to less than 4 hours per week
☐ 4 to less than 7 hours per week
☐ 7 or more hours per week

4. Which of the following ***physical*** activities does your child usually do during a typical ***WEEK***? (from the start of the current term, do ***NOT*** include school holidays)

During a typical WEEK what activities does your CHILD usually do?	MONDAY – FRIDAY		SATURDAY - SUNDAY	
	Number of times	Average number of minutes per time	Number of times	Average number of minutes per time
Walking to/from School (walking to and from school counts as 2)				
Biking to/from School				
Skateboard or Scooter to/from School				
4 Square or Other Playground Games				
Baseball / Softball				
Basketball				
Bicycling				
Gymnastics / Trampoline / Dance				
Hockey / Ringette				
Ice Skating				
Play on Playground Equipment				
Run / Jog / Track & Field				
Skateboard / Scooter / Rollerblading				
Skipping / Tag / Running Games				
Soccer				
Swimming				
Volleyball				
Walking (e.g., a dog, for exercise)				
Other: _____				
Other: _____				

5. Do you have any feedback or comments regarding the ACT-i-Pass program? _____

_____

_____

Appendix C Grade 5 ACT-i-Pass Research Project Letter of Information

Research Project Letter: Evaluate the Impact of the Grade 5 Act-I-Pass Program on Children's Use of Recreation Facilities in London for Physical Activity

Dear Parent or Guardian,

Dr. Jason Gilliland and his research team from Western University invite you to participate in a study aimed at understanding how the *Grade 5 Act-I-Pass* may impact your child's use of local recreation facilities and programs for physical activity. The study involves grade 4 classes at elementary schools in London, Ontario in May 2015.

What is being studied? Our team is studying the effectiveness of the Child & Youth Network's Grade 5 ACT-I-Pass Pilot Program, to evaluate its effectiveness for improving children's access to public recreation facilities and programs, and increasing their participation in physical activities.

What will happen in this study? As the child's parent/guardian, you will be asked to complete the Demographic Questions on the registration form. The survey asks questions about your household and your child. It usually takes about 5 minutes to fill out.

Do I have to participate in this study? Your participation in this study is *completely voluntary*. You do not have to participate and can refuse to answer any questions. Participation in the study is not required for you to receive the ACT-i-Pass.

What are the benefits of participating? Research shows that our children`s health may be related to how well they can access recreation opportunities. This study will help us to better understand the impact of neighbourhood recreation facilities on children`s healthy physical activity to help policymakers and municipal staff remove existing barriers to physical activity.

What are the risks of participating? There is a slight chance that you may be uncomfortable sharing details of your family, which may be seen by your child's teacher while the survey is being collected. We will also be collecting postal codes to estimate distance to the nearest recreation facility, addresses to send you the ACT-i-Pass through the mail, and phone number/email to allow us to get in touch if you move before receiving the ACT-i-Pass. All identifying information will be stored separate from other survey data. Materials and data files will ONLY be viewed by members of the research team and will be stored in a locked filing cabinet until transferred onto a password protected computer in a secure facility at the University of Western Ontario. The results of this study will only be presented for groups so that children will never be individually identifiable.

Who do I contact if I have any other questions? Should you have any questions or concerns about participating in this project, you can contact the lead researcher, Dr. Jason Gilliland, at the University of Western Ontario [redacted] If you have any further questions regarding your rights as a study participant, please contact the Office of Research Ethics [redacted]

This letter is for you to keep. Please return the attached Registration form and demographic questions to your teacher.

By completing the optional demographic questions of the registration form you are providing your consent to participate in this study.

Thank you for the generous support of the ACT-i-Pass funders:

Ontario

Canadian Cancer Society / Société canadienne du cancer

CIHR IRSC
Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

Appendix D Grade 5 ACT-i-Pass Child Survey

Western

ACT-i-Pass Survey for Youth

We need your help to make the ***Act-i-Pass*** program a success. Your honest answers to the questions are very important to us. This will not take too long to complete.

A. General Information

1. I am ☐ female ☐ male

   a. My current age is _____ years old.

   b. Please circle the month in which you were born:

   Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

2. My ethnicity *(please circle the appropriate response(s))*:

☐ Aboriginal (Inuit, Metis)	☐ Arab/West Asian (Armenian, Moroccan)
☐ Black (e.g., African, Jamaican)	☐ Chinese
☐ Filipino	☐ Japanese
☐ Korean	☐ Latin American
☐ South Asian	☐ South East Asian
☐ White (Caucasian)	☐ Other

3. Were you born in Canada? ☐ Yes ☐ No

   a. If no, how many years have you lived in Canada? _____

4. My <u>primary home</u> (where you sleep most or all nights) is a:

   ☐ single-parent household
   ☐ two-parent household
   ☐ other : _____

5. My home:

   ☐ I live in one home (sleep all nights in the same home)
   ☐ I split my time equally between 2 homes / parents
   ☐ I live in mostly one home but regularly visit/live in a second home / parent
   ☐ I have another home arrangement: _____

6. How many people live (including yourself AND other children) in your primary household?

   ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 or more

7. How many <u>other</u> children (NOT including yourself) live in your primary household?

   ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 or more

8. Postal code at your primary home: __ __ __ - __ __ __

9. How many days a week do you live at this address?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

10. If you have a secondary home (where you sleep some nights), what is the postal code:

__ __ __ - __ __ __

11. How many cars are owned by your household? ☐ None ☐ 1 ☐ 2 ☐ 3 or more

12. Do you or your family members have a London Transit Bus Pass? ☐ Yes ☐ No

B. Leisure-Time Activities

Tell us how much time on a typical SCHOOL DAY (week day) you spend doing the following activities. Please think about the time from when you wake up until you go to bed outside of school.

Please circle the best answer for you.	No time	Less than 30 min	30 min to 1hr	1 to 2hr	More than 2hr	I do not have a
1. Watching television/videos/DVDs	☐	☐	☐	☐	☐	TV...
2. Playing video or computer games (Playstation / Xbox / Wii)	☐	☐	☐	☐	☐	system
3. Playing hand held game player (Nintendo DS / Sony PSP / iPod Touch)	☐	☐	☐	☐	☐	player
4. Using the internet or emailing	☐	☐	☐	☐	☐	Access to internet
5. Talking or texting on cell phone	☐	☐	☐	☐	☐	Cell phone

C. Physical Activity & Active Recreation

Physical activity is any activity that increases your heart rate and/or their breathing. Please tell us a little about your physical activity behaviours.

1. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)?

☐ I don't do PE ☐ Quite Often
☐ Hardly Ever ☐ Always
☐ Sometimes

2. In the last 7 days, what did you do most of the time at recess?

   ☐ Sat down (talking, reading, doing schoolwork)
   ☐ Stood around or walked around
   ☐ Ran or played a little bit
   ☐ Ran around and played quite a bit
   ☐ Ran and played hard most of the time

3. In the last 7 days, what did you normally do at lunch (besides eating lunch)?

   ☐ Sat down (talking, reading, doing schoolwork)
   ☐ Stood around or walked around
   ☐ Ran or played a little bit
   ☐ Ran around and played quite a bit
   ☐ Ran and played hard most of the time

4. In the last 7 days, on how many days right after school, did you do sports, dance, or play games in which you were very active?

   ☐ None
   ☐ 1 time last week
   ☐ 2-3 times last week
   ☐ 4 times last week
   ☐ 5 times last week

5. In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active?

   ☐ None
   ☐ 1 time last week
   ☐ 2 or 3 times last week
   ☐ 4 or 5 times last week
   ☐ 6 or 7 times last week

6. On the last weekend, how many times did you do sports, dance, or play games in which you were very active?

   ☐ None
   ☐ 1 time
   ☐ 2 or 3 times
   ☐ 4 or 5 times
   ☐ 6 or more times

7. Which one of the following describes you best for the last 7 days? Read all five statements before deciding on the one answer that describes you.

   ☐ All or most of my free time was spent doing things that involve little physical effort
   ☐ I sometimes (1-2 times last week) did physical things in my free time.
   ☐ I often (3-4 times last week) did physical things in my free time
   ☐ I quite often (5-6 times last week) did physical things in my free time
   ☐ I very often (7 or more times last week) did physical things in my free time

8. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

Day of the Week	None	Little Bit	Medium	Often	Very Often
Monday	☐	☐	☐	☐	☐
Tuesday	☐	☐	☐	☐	☐
Wednesday	☐	☐	☐	☐	☐
Thursday	☐	☐	☐	☐	☐
Friday	☐	☐	☐	☐	☐
Saturday	☐	☐	☐	☐	☐
Sunday	☐	☐	☐	☐	☐

9. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times?

Physical Activities	No	1-2	3-4	5-6	7 times or more
a. Bicycling	☐	☐	☐	☐	☐
b. Walking	☐	☐	☐	☐	☐
c. Ice Skating	☐	☐	☐	☐	☐
d. Rollerblading	☐	☐	☐	☐	☐
e. Skateboarding / Scootering	☐	☐	☐	☐	☐
f. Skipping / Tag / Running Games	☐	☐	☐	☐	☐
g. Play Catch (Ball, Frisbee)	☐	☐	☐	☐	☐
h. Dance	☐	☐	☐	☐	☐
i. Soccer	☐	☐	☐	☐	☐
j. Hockey / Ringette	☐	☐	☐	☐	☐
k. Swimming	☐	☐	☐	☐	☐
l. Basketball	☐	☐	☐	☐	☐
m. Baseball / Softball	☐	☐	☐	☐	☐
n. Martial Arts (Karate, Judo)	☐	☐	☐	☐	☐
o. Volleyball	☐	☐	☐	☐	☐
p. Football / Rugby	☐	☐	☐	☐	☐

Physical Activities	No	1-2	3-4	5-6	7 times or more
q. Skiing / Snowboarding	☐	☐	☐	☐	☐
r. Racquet Sports (Tennis, Badminton)	☐	☐	☐	☐	☐
s. Run / Jogging / Track & Field	☐	☐	☐	☐	☐
t. Gymnastics	☐	☐	☐	☐	☐
u. Trampoline	☐	☐	☐	☐	☐
v. Other? _____	☐	☐	☐	☐	☐
w. Other? _____	☐	☐	☐	☐	☐

D. Barriers to Physical Activity

Please tell us whether you agree or disagree with the following.

It is difficult for me to be active more often because...	I strongly disagree	I disagree a little bit	I agree a little bit	I strongly agree
1. My parents are too busy to take me.	☐	☐	☐	☐
2. I am too busy doing other activities.	☐	☐	☐	☐
3. I am involved in other non-active programs (e.g., Voice Lessons, Boy Scouts, Girl Guides)	☐	☐	☐	☐
4. I get too much homework.	☐	☐	☐	☐
5. My parents do not have a car to take me.	☐	☐	☐	☐
6. The nearest recreation centre (arena, pool, gym) is too far away.	☐	☐	☐	☐
7. The nearest park is too far away.	☐	☐	☐	☐
8. I don't have any energy after school	☐	☐	☐	☐
9. I find physical activity boring	☐	☐	☐	☐
10. I don't understand the rules of sports.	☐	☐	☐	☐
11. I am no good at sports and other physical activity	☐	☐	☐	☐
12. I don't want to get hurt	☐	☐	☐	☐
13. I don't like to be active.	☐	☐	☐	☐
14. I don't like sports.	☐	☐	☐	☐
15. I am already active enough.	☐	☐	☐	☐
16. Programs are not available in my neighbourhood that I am interested in.	☐	☐	☐	☐

It is difficult for me to be active more often because...	I strongly disagree	I disagree a little bit	I agree a little bit	I strongly agree
17. The programs I am interested in are always full.	☐	☐	☐	☐
18. It costs too much money.	☐	☐	☐	☐
19. I have no one to be active with.	☐	☐	☐	☐
20. It is embarrassing to play sports.	☐	☐	☐	☐
21. I have a physical disability that makes it difficult for me to play *(specify)*:_____	☐	☐	☐	☐
22. I have a health problem (i.e., asthma, cold, flu) *(specify)* _____	☐	☐	☐	☐
23. Other _____	☐	☐	☐	☐
24. Other _____	☐	☐	☐	☐

E. Recreation places and sports facilities where you live

For the following places / facilities, please tell us whether	Are there any located in your neighborhood?		Do you typically use or visit these places?	
a. Indoor recreation centre	Yes	No	Yes	No
b. Arena	Yes	No	Yes	No
c. River, pond, or creek	Yes	No	Yes	No
d. Natural Area (e.g., Forest, Field)	Yes	No	Yes	No
e. Sports field (soccer, football)	Yes	No	Yes	No
f. Basketball court	Yes	No	Yes	No
g. Tennis court	Yes	No	Yes	No
h. Skate park	Yes	No	Yes	No
i. Baseball diamond	Yes	No	Yes	No
j. Swimming pool	Yes	No	Yes	No
k. Splash Pad or wading pool	Yes	No	Yes	No
l. Public playground with play equipment (e.g., climber, swings)	Yes	No	Yes	No
m. Physical Activity Programs (e.g., swimming lessons, basketball teams)	Yes	No	Yes	No
n. YMCA	Yes	No	Yes	No
o. Boys and Girls Club	Yes	No	Yes	No

F. Parental Support for Physical Activity

During a typical week, how often has a member of your household: (For example, your father, mother, brother, sister, grandparent, or other relatives):	Never	1 - 2 Days	3 -4 Days	5 - 6 Days	Daily
1. Watched you participate in physical activity or play sports?	☐	☐	☐	☐	☐
2. Encouraged you to do sports or physical activity?	☐	☐	☐	☐	☐
3. Provided transportation to a place where you can do physical activity or sports?	☐	☐	☐	☐	☐
4. Done a physical activity or played sports with you?	☐	☐	☐	☐	☐

G. Peer Support for Physical Activity

During a typical week, how often	Never	1 - 2 Days	3 -4 Days	5 - 6 Days	Daily
1. Do your friends encourage you to do sports or physical activities?	☐	☐	☐	☐	☐
2. Do your friends do physical activity or play sports with you?	☐	☐	☐	☐	☐
3. Do your friends or classmates tease you about not being good at physical activities or sports?	☐	☐	☐	☐	☐
4. Do your friends tell you that you are doing well in physical activities or sports?	☐	☐	☐	☐	☐

Appendix E Semi-structured Service Provider Interview Guide

Winter/Spring 2016

Service Provider Interview Guide

1. Can you please share your existing knowledge of the ACT-i-Pass program
2. Where did you learn about the program? OR what information were you provided with about the program
3. From that interaction, what information did you find to be beneficial and what would you have liked to know more about?
    a. How can we better support your facility in the future? (Provide materials, training to front line staff, schedule updates, etc.)
4. To the best of your knowledge/ability can you please describe how the ACT-i-Pass program functions at your facility?
    a. What works well?
    b. What can be improved upon?
5. Based on your description of the program, how do you think the program can be improved to better serve your community of participants?
6. What do you think could increase interest and use of the program?
    a. What changes would you make? (programming, locations, information)
7. What do you believe are the benefits of the ACT-i-Pass program?
8. Can you please describe the challenges that your facility/programs have faced when implementing the program?
9. Has your facility or program structure changed at all as a result of the ACT-i-Pass program? If so, how has it changed?
10. What do you believe are the major barriers to providing recreation access to children in London?
    a. Do you think that the ACT-i-Pass program helps to alleviate any of those?
    b. Do you have any suggestions for improvement?
11. In your experience, how does transportation to and from recreation facilities impact access to your programs or facilities?
    a. Have you ever considered a transit system to help manage this? (describe BGC example)

Curriculum Vitae

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