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Investigating Children's Experiences and Participation in a Free Community-Based Physical Activity Program: The Grade 5 ACT-i-Pass

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Abstract

Physical activity is an important component of children's health and development; however, a majority of Canadian children are not meeting the physical activity recommendations. This thesis aimed to identify the factors that influenced children's enrollment and participation in a free community-based physical activity program, the Grade 5 ACT-i-Pass (G5AP). This thesis consisted of two individual, but interrelated studies. First, focus groups with G5AP participants were used to explore the factors that influenced children's perceived physical activity levels and participation in the program. Second, a spatially-targeted promotional campaign was developed and implemented to help evaluate the impact of promotions on program registrations, with particular interest in low-uptake areas of London, Ontario. The results indicated that various aspects of accessibility affected children's involvement in the program. Findings from this thesis provide suggestions for future research, as well as implications for caregivers, policymakers, program co-ordinators and health care professionals for future health promotion initiatives.

Keywords

Children, Physical Activity, Community-Based Interventions, Mixed Methods, Perception, Health Determinants, Accessibility, Promotional Campaign, Registration, Program Uptake

Summary for Lay Audience

Low physical activity levels among Canadian children is a public health concern, as most children (ages five to 11 years) and youth (ages 12 to 17 years) are not attaining the recommended amount of physical activity. Community-based interventions have become a popular health promotion strategy for supporting health behaviour change at a population-level. This thesis examined the Grade 5 ACT-i-Pass Program (G5AP), a community-based physical activity initiative in London, Ontario, to investigate the factors that influence children's involvement in a free physical activity program.

This thesis consisted of two interrelated manuscripts. First, this thesis explored children's experiences and perceptions of their involvement in the G5AP. An analysis of G5AP focus groups (n=101) was used to investigate children's perceived physical activity levels, and factors that acted as barriers or enablers to program use. This thesis also described the influence of a promotional campaign on the number of grade five children (n=4,701) that registered for the G5AP. A combination of spatial analysis and statistical tests were used to examine the change in the registration rates from the pre-campaign year (2018-2019) to the campaign year (2019-2020).

Overall, findings reveal that the accessibility of the program affected children's enrollment and use of the G5AP. Children's participation in physical activity opportunities could be influenced by three forms of accessibility: geographic accessibility (i.e., distance to recreational facilities and transportation options), economic accessibility (i.e., cost of transportation and lack of local recreational opportunities), and information accessibility (i.e., quality and quantity of informative resources). The G5AP promotional campaign effectively increased the registration rate of the program, with children that received both passive (i.e., posters and advertisements) and active (i.e., presentations) forms of recruitment having the greatest increase in registrations. Thus, findings contribute to the understanding of information accessibility and engagement in community-based health initiatives. Future research regarding all three types of accessibility must be considered when implementing interventions to provide accessible programming to all groups in the target population.

Co-Authorship Statement

This thesis follows an integrated paper format and includes two separate but interrelated manuscripts. Each of the manuscripts within the thesis will be submitted for publication from a peer reviewed journal. The details of co-authorship for each of the manuscripts are provided below.

Chapter 3: Ostermeier, E., Reilly, K.C., Nelson Ferguson, K., Coen, S., & Gilliland, J.A. (2020). "Ahhh it was paradise, but inside": Children's Experiences and Perceptions of a Free Physical Activity Pass.

Emma Ostermeier was the primary author of Chapter 3, with Dr. Kristen Reilly, Dr. Kendra Nelson Ferguson, Dr. Stephanie Coen and Dr. Jason Gilliland as co-authors. Emma Ostermeier acted as one of the researchers during data analysis and wrote the manuscript. Dr. Reilly acted as one of the researchers during data analysis and provided edits to the manuscript. Dr. Gilliland is the principal investigator of the project and designed the evaluation of the Grade 5 ACT-i-Pass, including the focus group guides. Dr. Gilliland, Dr. Nelson Ferguson, and Dr. Coen provided guidance throughout the analysis and were involved in the editing of the manuscript.

Chapter 4: Ostermeier, E., Martin, G., Clark, A.F., Seabrook, J., & Gilliland, J.A. (2020). Evaluating the Impact of a Promotional Campaign Interventions on Registrations for a Free Community-Based Physical Activity Program: The Grade 5 ACT-i-Pass.

Emma Ostermeier was the primary author of Chapter 4, with Dr. Gina Martin, Dr. Andrew Clark, Dr. Jamie Seabrook and Dr. Jason Gilliland as co-authors. Emma Ostermeier and Dr. Gilliland designed and conceptualized the promotional campaign. Emma Ostermeier distributed the promotions, conducted the data analysis and wrote the manuscript. Dr. Gilliland is the principal investigator for the evaluation of the Grade 5 ACT-i-Pass. Dr. Clark created the maps in ArcGIS. Dr. Gilliland, Dr. Martin, Dr. Clark and Dr. Seabrook assisted on the analysis and edited the final manuscript.

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Chapter 1

1 Introduction

1.1 Research Context

Low physical activity levels among Canadian children is a concerning public health issue, with limited progress seen over the last 10 years (ParticipACTION, 2020). In 2020, only 39% of Canadian children (ages five to 11 years) and youth (ages 12 to 17 years) are accumulating the recommended 60 minutes of daily moderate-to-vigorous physical activity (MVPA) (ParticipACTION, 2020). Physical inactivity can negatively impact numerous aspects of children's health, including, but not limited to, an increased risk of high blood pressure, metabolic syndrome, anxiety, and depression; and heightened challenges with body composition, bone mineral density, physical fitness, and self-esteem (Biddle & Asare, 2011; Castelli, Hillman, Buck, & Erwin, 2007; Janssen & LeBlanc, 2010; Public Health Agency of Canada, 2018). Additionally, inactivity can result in detrimental behavioural outcomes, such as decreased academic achievement (Castelli et al., 2007), lower self-esteem (Biddle & Asare, 2011), and poorer overall quality of life (WHO, 2010). Therefore, creating and evaluating strategies that encourage children to partake in physical activity is critical for supporting children's health and well-being.

Various interacting factors result in a child's physical activity behaviours. First, multiple sociodemographic factors are linked to lower physical activity levels, including sex/gender, ethnicity, and socioeconomic status (Colley et al., 2017; Smith, Clark, Wilk, Tucker, & Gilliland, 2020). Age is also associated to the declines in physical activity levels during childhood, with the greatest declines appearing around the age of 10 years (Colley et al., 2017), which is around the time children gain the autonomy to select their own activities (Atkin, Gorely, Biddle, Cavill, & Foster, 2011; Wickel & Belton, 2016). Children's ability to select activities has resulted in leisure-time physical activity being replaced with sedentary activities (Barnes et al., 2016).

Social factors have also been associated with health behaviours. Social environment is a combination of the social norms, social support, and social cohesion that influences children's perceptions of their physical activity choices (McNeill, Kreuter, & Subramanian, 2006). There have been multiple variables of the social environment that have been linked to lower physical activity, including stigma towards individuals who are overweight or disabled (Martin, 2013; Pickett & Cunningham, 2017), gendered behaviours and activities (Schmalz & Kerstetter, 2006), and parental and peer support (Ullrich-French & Smith, 2009; Wilk, Clark, Maltby, Smith, et al., 2018). Children who perceive negative attitudes or receive judgemental comments from others during activities can result in children avoiding involvement in that activity or use of recreational spaces in the future (Kunesh, Hasbrook, & Lewthwaite, 2016).

A developing area in the field of physical activity research is the geographic accessibility of programming. The physical environment can influence children's access to recreational facilities (e.g., community centres, pools, arenas, parks, trails, and privately-owned businesses) based on the distance between their homes and recreational spaces, and the availability of active or motorized forms of transportation (Clark, Campbell, Tucker, Wilk, & Gilliland, 2019). If vehicular transportation is not available, children have a lower variety of facility options and are limited to opportunities offered near their homes (Ogilvie, Lamb, Ferguson, & Ellaway, 2011). Providing recreational spaces within neighbourhoods, such as parks, has been shown to increase children's physical activity levels (Mitchell, Clark, & Gilliland, 2016). Conversely, children without local recreational spaces for physical activity have limited opportunities to be active outside of school, resulting in lower physical activity levels than peers with greater access to recreational spaces (Blanck et al., 2012).

In response to children's low physical activity levels, various community groups and policymakers have advocated for the development of physical activity initiatives that can encourage children to live active lifestyles (ParticipACTION, 2020; Public Health Agency of Canada, 2018). Schools have commonly been used as the setting for physical activity interventions, as the structured curriculum and the policies for daily physical

activity provide a controlled research environment and enable greater generalizability of findings to other settings (e.g., schools in different cities) (Stone, McKenzie, Welk, & Booth, 1998). However, community-based programs are recognized as a cost-effective method for health promotion that can encourage healthy behaviour changes at a population level (Heath et al., 2012; Roux et al., 2008). Moreover, community-level initiatives provide youth physical activity opportunities outside of school (Gilliland et al., 2015; Perry, Garside, Morones, & Hayman, 2012), the time of day where children experience the largest declines in physical activity as they age (Brooke, Atkin, Corder, Ekelund, & van Sluijs, 2016). Although community-based programs can result in initial changes to health behaviours, they have been criticized for their inability to make lasting health adjustments due to the need for programs to reach a large population, resulting in a lack of consideration of the unique health determinants of individuals (Fry, Nikpay, Leslie, & Buntin, 2018; Pate et al., 2003). This may result in participants being unable or having difficulties maintaining health behaviours following the program (Nilsen, 2006). Therefore, further research is required to understand the limitations of community-based physical activity initiatives, and to create strategies that will produce sustainable, effective programming and lasting health behaviour changes (Shediac-Rizkallah & Bone, 1998).

This thesis focuses on the Grade 5 ACT-i-Pass Program (G5AP), a naturally-occurring, community-based physical activity initiative in London, Ontario that provides grade five children free access to recreational facilities across the city. This thesis aims to determine aspects of the program that influenced participants' physical activity and participation in the G5AP, and to examine the impact of a promotional campaign on the program registration rate.

1.2 Theoretical Context

As a researcher, it is important to declare my positionality within society and the research to provide context into the characteristics, experiences, beliefs, and social position that may have influence the research process and/or outcomes from the studies (Mason-Bish, 2019). First, I am a young, Caucasian, woman that lived in an upper-middle class

neighbourhood within a large town in Ontario, Canada. Primarily, it is important to note that I grew up living an athletic lifestyle. As a child, I lived in an active household, including a brother who took part in competitive sports, and parents that encouraged their children participation in physical activity. Throughout my childhood, I was a competitive soccer player and took part in various other activities, including swimming and volleyball. My daily schedule tended to include an activity after school, primarily a game or a practice. My experiences in athletics throughout my childhood, combined with the physical inactivity amongst children, guided my interest in engage children in physical activity opportunities and encouraged me to pursue a Master's in this areas of research.

This thesis utilized a pragmatic paradigm. This concept does not follow the ontological or epidemiological structure used in positivist or constructionist approaches. Instead, pragmatism is dependent upon the individual and shared beliefs and/or experiences within the community that result in the action of interest (i.e., physical activity) (Morgan, 2014). Primarily, a pragmatic approach focuses on applying the appropriate methodology based on the research question(s), including the implementation of mixed-methods to increase the scope of the research, and to provide a more thorough understanding of the subject matter (Morgan, 2014). The two manuscripts in this thesis were guided by the socio-ecological model (Chapter 3) and the physical activity accessibility model (Chapter 4) during the development and analysis of the studies.

1.2.1 Socio-Ecological Model

Evaluations of public health initiatives have found that altering health behaviours requires programs to consider the target population and the context of where the program is taking place (Mehtälä, Sääkslahti, Inkinen, & Poskiparta, 2014). Expanding beyond an intrapersonal evaluation of physical activity behaviours, the socio-ecological model has become a popular approach in physical activity research as it applies a population-level analysis and recognizes the complex relationship between different levels of determinants that result in health behaviours (Lorraine Cale & Harris, 2006; Sallis, Owen, & Fisher, 2015). Expanding physical activity determinants beyond intrapersonal factors by including environmental, socio-cultural, and political determinants provides a more

comprehensive interpretation of children's physical activity participation (Sallis et al., 2015). Theoretically, the maximum health benefits will come from interventions that consider individual motivators, as well as environmental and political contexts (WHO, 1986).

This conceptual model guided the first study in this thesis (Chapter 3). The specific representation of the socio-ecological model used as a framework for this thesis is Campbell's (2017) socio-ecological model of children's participation in destination physical activity programs, an adapted form of Sallis, Fisher, & Owen's (2008) ecological model of health behaviours. Unlike other forms of the socio-ecological model, Campbell's adaptation is uniquely created to evaluate the determinants that influence children's attendance at indoor recreational facilities (Campbell, 2017). This model was the most appropriate framework for this study, as it is designed to examine the determinants that influence children's participation in physical activity opportunities. As Figure 1.1 displays, there are four fundamental levels of determinants (i.e., intrapersonal, interpersonal, the built environment, and policy), and within each level there are multiple factors that children encounter (Campbell, 2017). Interactions between the levels, combined with the multiple factors within each level, results in a child's health behaviours (Sallis et al., 2015).

The first level is intrapersonal factors, which encompasses a combination of individual-level determinants, including factors like age, sex/gender, ethnicity, interests, and physical activity-related skills. The second level involves interpersonal factors. These determinants explain how interactions and relationships with others (e.g., parents, peers, and friends) influence physical activity. The third level, the built environment, is focused on the organization of the human-made physical environment, including the location of recreational facilities, the transportation infrastructure, and the quality of facilities. Finally, the fourth level is policy, which involves the government's investment in recreation opportunities, development regulations, and public health initiatives.

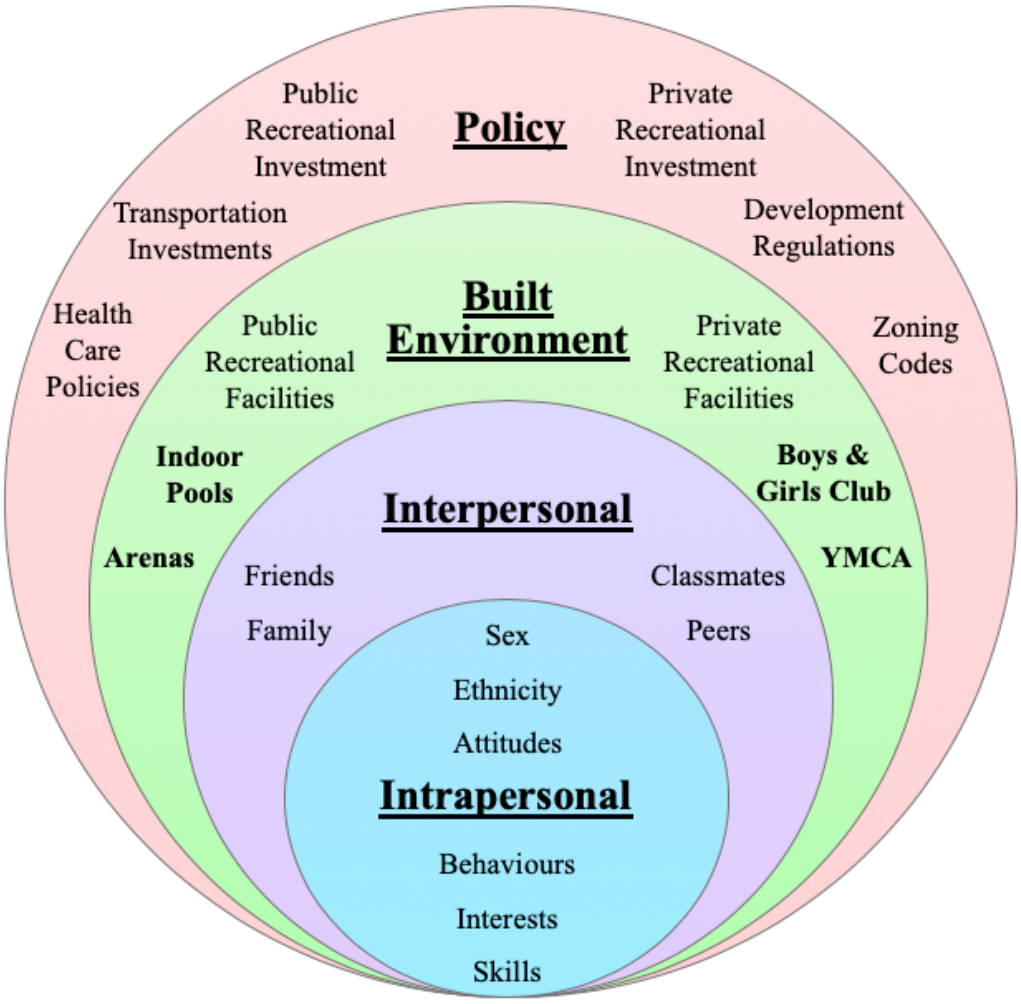

Figure 1.1 Socio-ecological model for children's participation in destination physical activity programs – Campbell (2017).

1.2.2 Physical Activity Accessibility Model

Applying the factors analyzed in the socio-ecological model, Clark et al. (2019) created the physical activity accessibility model, which focuses on how different forms of accessibility impact children's use of community-based programs. Access to physical activity involves multiple factors, including the location of indoor and outdoor recreational spaces (e.g., parks, trails, community centres, pools, and arenas), the option to use active transport (e.g., the location of schools and the neighbourhood environment), and the availability of vehicular transportation (e.g., public and private methods). While it

does not guarantee usage of programs, access is an essential determinant for participation in community-based programs, as it provides children the ability to utilize physical activity programming (Sallis et al., 2015).

The physical activity accessibility model informed the second study in this thesis (Chapter 4). The physical activity accessibility model is appropriate for this study, as it isolates the various determinants from the socio-ecological model that impact accessibility to community-based recreational programming. Expanding beyond the physical barriers to programming provides researchers the opportunity to consider the diverse forms of accessibility. Additionally, the physical activity accessibility model was created using previous evaluations of the G5AP (Clark et al., 2019); therefore, this model considers the determinants that influence children's access to free community-based physical activity programs.

As displayed in Figure 1.2, accessibility is separated into three major categories: (1) information accessibility; (2) geographic accessibility; and (3) economic accessibility. When the three forms of accessibility interact, additional facets of accessibility are generated, including mobility options, spatial awareness, and opportunity awareness. The model proposes that programs are deemed accessible when information, geographic, and economic accessibility occur simultaneously.

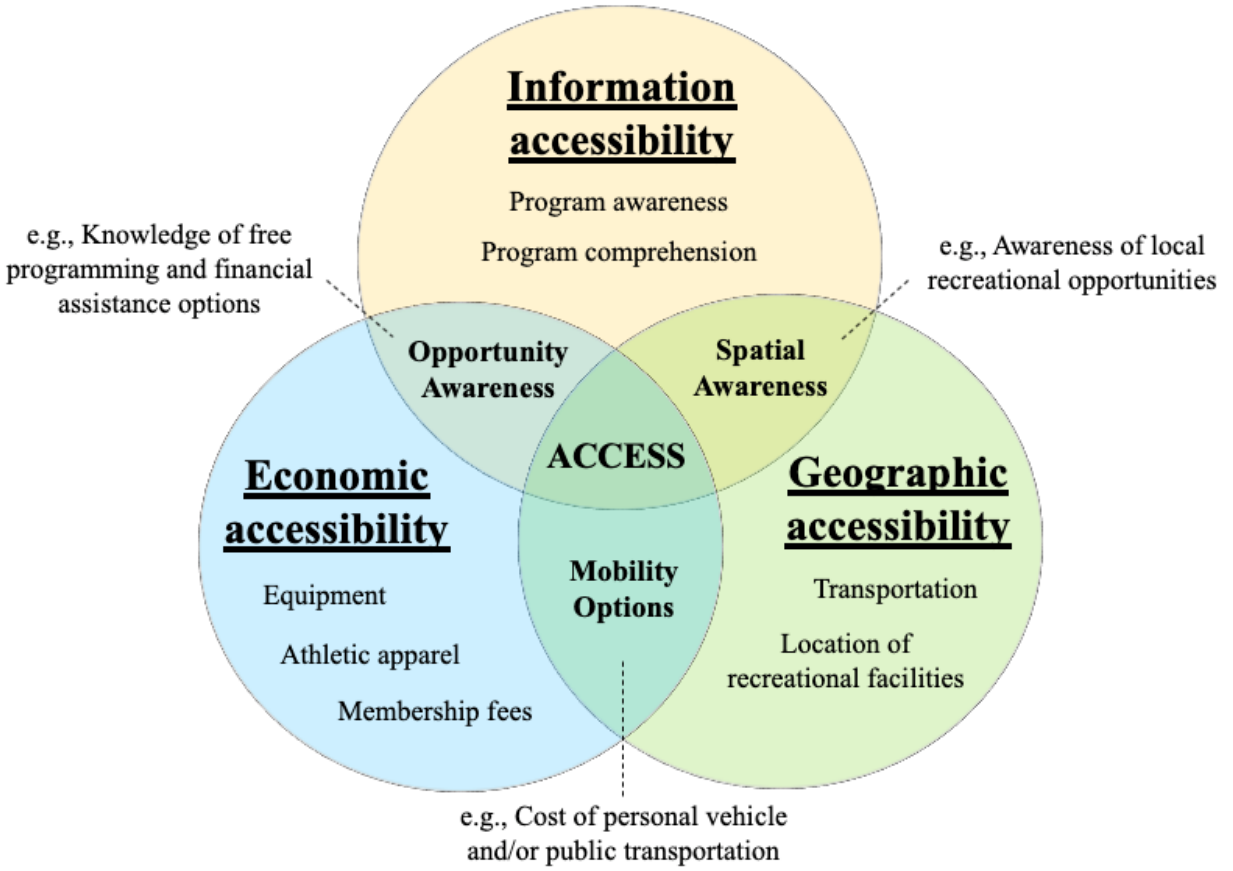

Figure 1.2 Physical activity accessibility model - adapted from Clark et al. (2019).

Information accessibility refers to the number of resources and the quality of content provided to the target population (Clark et al., 2019). Supplying adequate information can instill healthy lifestyles in a community by altering perceptions of physical activity, educating about the health benefits of daily activity, and highlighting local physical activity opportunities (Kahn et al., 2002). In the case of the G5AP, information provides program awareness and comprehension of the various aspects of the program, including participating locations, types of activities, and how they can involve themselves in the program (Clark et al., 2019).

Geographic accessibility involves the ability for participants to reach recreational facilities (Clark et al., 2019), and this includes the availability of transportation (i.e., vehicular or active forms), and the proximity of indoor and outdoor recreational spaces to

children's homes (Brownson, Hoehner, Day, Forsyth, & Sallis, 2009). The geographic accessibility of recreational facilities is an important factor to consider, as children who lack local recreation programming and are unable to find a mode of transportation are less likely to take part in physical activity opportunities (Clark et al., 2019).

Finally, economic accessibility relates to the cost and capability of a family to afford programming (Clark et al., 2019). To participate in recreational programming, many locations require a membership fee, with some specialty activities requiring additional payment. Although the G5AP is a free physical activity opportunity, there are other costs associated with physical activity that need to be considered, such as car ownership, fuel, sports equipment, and athletic apparel (Brabyn & Sutton, 2013).

1.3 The Grade 5 ACT-i-Pass Program

This thesis evaluated the G5AP, a naturally-occurring physical activity intervention in London, Ontario. The G5AP offers grade five students (ages nine to 11 years) and one accompanying friend or family member free access to select recreational facilities in London, Ontario, such as the YMCA, the Boys & Girls Club, public pools, and public arenas (Gilliland et al., 2015). In connection with the Human Environments Analysis Laboratory (HEAL) and community partners, London's Child and Youth Network (CYN) developed the G5AP to increase children's physical activity level; and improve accessibility to recreational facilities by removing financial constraints, and expanding knowledge of the available opportunities in the local community (Gilliland et al., 2015).

1.3.1 Setting

London, Ontario is a mid-sized city located in Southwestern Ontario, Canada. London is comprised of a variety of outdoor spaces, such as parks and gardens, and various community recreational centres (e.g., pools, arenas, and gymnasiums) (Gilliland, Holmes, Irwin, & Tucker, 2006). Due to its location, the city experiences extreme summer and winter conditions that can impact the quantity of MVPA and types of activities children can partake in during different times of the year (Tucker & Gilliland, 2007). Additionally, London is located in close proximity to both Lake Erie and Lake Huron, creating humid

conditions that result in frequent precipitation in the summer, and a high quantity of snow in the winter.

Statistics Canada (2017) Census of the Population reported that London has a population of 494,069 people, with 81,240 residents (16.4%) between the ages of zero to 14 years. London has a diverse population with 94,690 residents (19.17%) classified as immigrants, predominantly from European (i.e., England, Poland, Portugal, and Netherlands) and Asian (i.e., China, India, Iraq, and Philippines) countries. The average size of a family is 2.9 people per household. Of the family households, 81,330 households (72.19%) were described as families with children, with 24,415 households (21.67%) recorded as single-parent families. The median family income for economic families was 84,469 CAD, which is below the provincial median (91,089 CAD). Additionally, 48,870 residents (17%) were classified as low-income, which is higher than the provincial average (14.4%). Due to the diversity within the population and the variety of recreational opportunities throughout the city, London, Ontario is an ideal location to evaluate a community-based physical activity intervention.

1.3.2 Participants and Recruitment

Children were eligible for the program if they met the following inclusion criteria: (1) attended a school or resided in London, Ontario; and (2) enrolled in a grade five class. This cohort was selected as previous studies have found that declines in daily MVPA begin around the ages of 9 to 11 years (Colley et al., 2017; Roberts et al., 2017). In the 2019-2020 year, the program was offered to 4,701 grade five students at 108 schools across four public school boards (i.e., the Public School Board, the Catholic School Board, the French language Public School Board, and the French language Catholic School Board), as well as various private schools.

Recruitment started at the beginning of April when information packages were delivered to the school boards and principles. These packages contained details about the program and an example registration form to notify schools of the G5AP (Appendix A). Registration for the program opened in mid-April to children who were finishing grade four. At this time, introduction packages were distributed through schools to eligible

students. The purpose of the packages was to inform children and their parents/guardians of the program and they contained a description of the G5AP, a list of service provider details, and a registration form. Children were offered two methods to register for the program: (1) returning the paper registration form to their teacher by the specified due date in May; or (2) completing the registration form online on the G5AP website (www.playeveryday.ca) any time before April of the following year. For evaluation purposes, parents who completed the online registration form were asked to complete a voluntary survey. Following the completion of the registration form, the pass was distributed to participants through the mail.

1.3.3 Previous Evaluations of the G5AP

There have been previous studies evaluating the G5AP, including the program effectiveness and determinants that influence program participation and uptake. First, assessments of the G5AP have measured the effects of various socio-economic and environmental factors on program uptake. Clark et al. (2018) conducted a spatial analysis of the geographic and socio-economic uptake of the G5AP in the 2014-2015 program year to assess the equity of the program. The study concluded that neighbourhoods with a high proportion of recent immigrants, single-parent families, and higher-income households were more likely to register for the program. Program registration was also positively associated with children receiving an in-class presentation from an G5AP representative. However, there was an inverse relationship between the distance to service providers and program registration; therefore, children who lived near recreational facilities were more likely to enrol in the program.

Additionally, evaluations of the G5AP have investigated children's participation in the program. Clark et al., (2019) examined the influence of various intrapersonal, interpersonal and environmental factors on pass use. The study found that gender (i.e., girls), greater parental support, lower paternal educational attainment (i.e., high school diploma or less), and lower median household income positively influenced pass use. Environmental factors, including service providers near children's homes and attending a school with a service provider bus stop, were found to increase program usage.

Furthermore, actively recruiting participants via presentations resulted in greater program use.

Finally, previous studies have examined the effectiveness of the G5AP at increasing children's physical activity levels. Smith et al. (2020) examined the impact of the G5AP on participants' physical activity levels. The findings indicated that children who participated in the G5AP acquired greater amounts of physical activity, and the program was particularly beneficial for subgroups with lower physical activity levels, including girls and visible minorities.

1.4 Research Objectives

Although there is a large body of literature on the factors that influence children's physical activity behaviours and participation in recreational opportunities, gaps in the literature on community-based physical activity initiatives remain. This thesis aims to address two existing gaps in the literature: (1) supplementing quantitative findings on the G5AP by revealing factors that children believe impact their physical activity levels and participation in the program; and (2) expanding upon the understanding of information accessibility by measuring the impact of a promotional campaign suggested by previous G5AP participants on children's enrollment in the G5AP. Establishing a greater understanding of community-based program implementation has important implications for community groups, program managers, and policymakers on aspects that influence participation in public health initiatives.

To address the gaps in the literature, this thesis answers the following questions:

1) How did the G5AP influence children's perceived physical activity levels?

2) What enablers and/or barriers did children feel they encountered when accessing or participating in the G5AP?

3) How did a promotional campaign impact the number of children that registered in the G5AP, particularly in low program registration areas of London, Ontario?

These questions were answered using a variety of data from the G5AP collected by Dr. Jason Gilliland and members of the HEAL. To understand children's experiences and perceptions of the program (Questions 1 and 2), a qualitative analysis of focus groups comprising of G5AP participants was conducted. This study highlights the program features children felt altered their activity levels, encouraged or inhibited participation in the G5AP, as well as recommended improvements to the current organization of the program (Chapter 3). The impact of information accessibility on program enrollment (Question 3), was evaluated using an intervention study involving the implementation of a spatially-targeted G5AP promotional campaign, particularly targeting neighbourhoods with significantly lower registration rates. The study assessed the changes in the number of registrations from the pre-campaign year (2018-2019) to the campaign year (2019-2020), as well as the influence of different promotion types on program registration rates (Chapter 4). The outcomes from these objectives can inform community groups and policymakers of the fundamental physical activity determinants for children and strategies to consider when implementing community-based health programs. This information can be utilized to improve the effectiveness and accessibility of current and future community-based health initiatives.

1.5 Thesis Format

This thesis is presented in an integrated paper format and includes two separate but interrelated manuscripts. While these are two independent studies, both evaluate children's involvement in a free physical activity initiative, the G5AP. As both studies are evaluating similar aspects of the same program, there is repetition in some background information and literature between chapters. While both studies highlight suggested changes to the program, one study focuses on children's suggested program improvements, whereas the second study implements one of the suggestions to evaluate the impact on program involvement. Brief descriptions of each thesis chapter are provided below.

Chapter 2 provides a comprehensive review of the literature on children's physical activity levels and factors associated with the declines in physical activity behaviours.

This chapter will discuss children's physical activity, health determinants that affect physical activity behaviours, and previous community-based physical activity interventions. In addition, this chapter includes background on the accessibility of community-based physical activity opportunities, and the influence of promotions on program involvement.

Chapter 3 investigates children's perceptions and experiences during the G5AP. This study consisted of a conventional content analysis of focus groups with G5AP participants. The questions concentrated on children's perceived physical activity levels, factors that acted as barriers or enablers to program access and use, and possible improvements to the program. The results of this study will provide a further understanding of the factors children identify as influential on their physical activity levels and program participation. Additionally, the results will be used to develop a list of general suggestions for other community-level health interventions.

Chapter 4 describes the influence of a promotional campaign on G5AP registrations to examine the impact of information accessibility (i.e., program awareness) on the program registration rate. A geospatial analysis was used to examine the change in neighbourhood registration rates in spatially-targeted low-registration areas of the city. Additionally, the data provided on registration forms combined with population-level data were used to assess the influence of promotions on the registration rate of the G5AP at a citywide, neighbourhood, and school level. This quantitative analysis will provide context into the relationship between information accessibility and program registration.

Chapter 5 summarizes the findings from the qualitative and the quantitative studies. This chapter will identify the implications of the findings for researchers, policymakers and community groups; acknowledge research limitations; and provide suggestions for future research.

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Chapter 2

2 Literature Review

2.1 Overview

This chapter will be expanding on the concepts discussed in Chapter 1 by reviewing the literature related to children's physical activity and community-based interventions. Specifically, this review will describe Canadian children's physical activity behaviours, existing physical activity interventions, and current gaps in the literature. This chapter is divided into six sections: Section 2.2 provides the search strategy used to collect the studies for this review; Section 2.3 defines physical activity and outlines physical activity measurement; Section 2.4 describes the Canadian physical activity guidelines and Canadian children's physical activity levels; Section 2.5 applied the socio-ecological model to illustrate the determinants that influence children's physical activity; Section 2.6 discusses current approaches to physical activity interventions and children's accessibility to community-based programs; and Section 2.7 summarizes the content provided in the review and highlights gaps in the literature that this thesis will explore.

2.2 Search Strategy and Results

The literature review was conducted using a title-abstract search of four databases: PubMed, SPORTDiscus, CINHAL, and Scopus. Search terms included: "child", "physical activity", "intervention", "community-based", "promotion", "advertise", "perception", "barrier", and "enabler". The inclusion criteria included studies that were available in English and utilized one of the following study designs: systematic reviews, scoping reviews, meta-analyses, quantitative studies, and qualitative studies. The results of the search were combined in the reference management software Mendeley. The search resulted in a total of 18,287 unique papers. The papers were then title screened to remove studies that did not discuss children's physical activity. This resulted in 283 papers to utilize in this review. If further information on a topic was required, two

methods were implemented to find additional resources: (1) searching the reference lists; and (2) citation searching (i.e., finding papers that have cited a particular paper).

2.3 Defining Physical Activity

Physical activity is defined as any bodily movement generated by skeletal muscle that results in energy expenditure (Caspersen, Powell & Christenson, 1985). The quantity of energy expended is dependent on the frequency, duration and intensity of activities (Bonomi, Goris, Yin, & Westerterp, 2009). Intensity (i.e., light, moderate and vigorous) is commonly used to characterize physical activity, which is defined by the Metabolic Equivalents of Tasks (METs) needed to complete an activity (Public Health Agency of Canada, 2018). METs measure the amount of energy a child uses during an activity compared to the energy that their body requires to function at rest; therefore, if a child is taking part in an activity that is 2.0 METs, then they are using at least two times the energy than what their body requires when at rest (Ainsworth et al., 1993). The intensity of the activity is important to consider, as the amount of energy exerted impacts the extent to which children attain beneficial health and psycho-social outcomes (Public Health Agency of Canada, 2018). Further explanation of children's physical activity, including intensity, is provided in Figure 2.1.

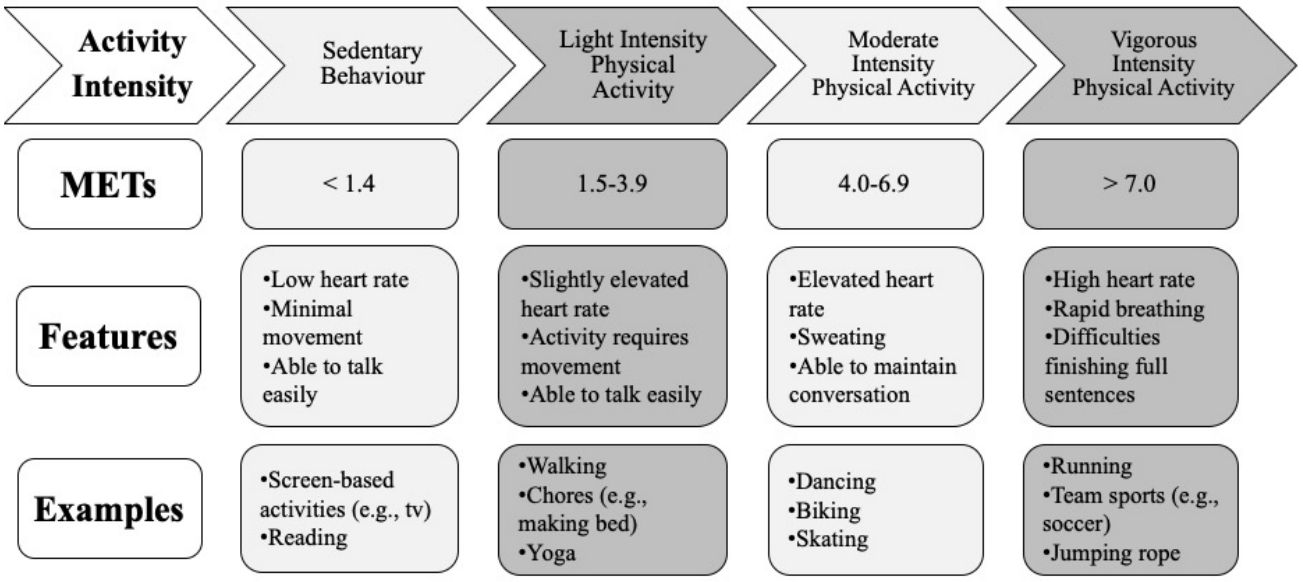

Figure 2.1 Characteristics of children's physical activity – adapted from the (Public Health Agency of Canada, 2018).

2.4 Canadian Children's Physical Activity

Tremblay et al. (2016) provide a detailed explanation of the development process and recommendations created for *the Canadian 24-Hour Movement Guidelines for Children and Youth*. These guidelines are unique compared to previous renditions as the recommendations have been expanded to all movement behaviours children ages five to 17 years experience throughout the day, including physical activity, sedentary behaviours, and sleep. The guidelines suggest children accumulate an average of 60 minutes of daily moderate-to-vigorous physical activity per week. MVPA is selected as the preferred type of physical activity, as optimal health outcomes are associated with more intense activities. Although not as advantageous as MVPA, the guidelines do encourage children to engage in light-intensity activities, as they have been associated with positive health outcomes and can limit the amount of time children partake in sedentary activities. Moreover, the guidelines recommend children to not exceed two hours of recreational screen time per day and accumulate nine to 11 hours of sleep per night.

Obtaining adequate amounts of physical activity is an important part of children's development as it is associated with beneficial physical and psycho-social outcomes (ParticipACTION, 2020; Roberts et al., 2017; Tremblay et al., 2016). Previous studies have indicated that MVPA can improve children's health, including a reduced risk of high blood pressure and metabolic syndrome; and improved cardiovascular performance, muscular strength, body composition, and bone mineral density (Janssen & LeBlanc, 2010; Poitras et al., 2016; Public Health Agency of Canada, 2018). Further, studies have shown that physical activity can result in advantageous psycho-social outcomes for children, such as a reduced risk of anxiety and depression; and greater academic achievement, cognitive function, and self-esteem (Biddle & Asare, 2011; Booth et al., 2013; Castelli et al., 2007).

Based on the standards set by *the Canadian 24-Hour Movement Guidelines for Children and Youth*, only 39% of children between the ages of five to 17 years are accumulating the recommended 60 minutes of MVPA, with no significant changes in the proportion of

children achieving the recommended physical activity since 2007 (ParticipACTION, 2020). Additionally, 90% of children are obtaining greater than two hours of screen time every day, with children between the ages of eight to 12 years accumulating up to eight hours of screen time per day (Freeman, King, & Pickett, 2016). Thus, finding ways of increasing children's activity is imperative (WHO, 2010). However, to create effective programming, it is important to consider the various factors that can influence children's physical activity levels (Sallis et al., 2015).

2.5 Predictors of Children's Physical Activity

Children's physical activity levels can be affected by a variety of factors that either act as enablers or barriers to physical activity participation (Sallis et al., 2015). Barriers are defined as structural or perceived factors that are out of the control of an individual and limits their physical activity opportunities (Bedimo-Rung, Mowen, & Cohen, 2005). Conversely, enablers are structural or perceived factors within a community that facilitate and/or encourage the use of physical activity opportunities (Thorpe, Johnston, & Kumar, 2012). Children's health behaviours, such as physical activity, are complex in nature due to the interactions between multiple levels of determinants, in addition to the influence of the factors within each of the levels (Sallis et al., 2015). Based on the socio-ecological model for children's participation in destination physical activity programs (Campbell, 2017), there are four levels of determinants that influence children's physical activity participation: (1) intrapersonal (i.e., personal characteristics), (2) interpersonal (i.e., social relationships), (3) the built environment (i.e., human-made physical environment), and (4) policy (i.e., government investment and regulations). The remainder of this section will provide examples of determinants that influence children's physical activity participation at each of the four levels specified in the socio-ecological model.

2.5.1 Intrapersonal Level Factors

Children's demographic characteristics have been associated with participation in physical activity. For instance, gender has consistently been associated with children's physical activity levels, with only 33% of girls accumulating adequate physical activity

compared to 60% of boys (ParticipACTION, 2020). Additionally, declines in physical activity have been associated with age (ParticipACTION, 2020; Roberts et al., 2017). Studies have shown that the proportion of children obtaining adequate physical activity levels become lower as children transition from childhood (ages five to 11 years) to adolescence (ages 12 to 17 years), declining from 46% to 30% respectively (ParticipACTION, 2020). Race and ethnicity are two additional factors associated with physical activity, with visible minorities having lower physical activity levels (Sallis, Prochaska, & Taylor, 2000; Whitt-Glover et al., 2009). Finally, socio-economic status (SES) can influence children's activity levels, as children from lower-income households have been found to have less physical activity opportunities due to the lower quantity and quality of resources low SES neighbourhoods (Morgan et al., 2016).

Moreover, children's behavioural characteristics can affect their participation in physical activity. For instance, self-efficacy (i.e., a child's belief in their physical activity abilities) has been significantly associated with physical activity levels (Dzewaltowski, Geller, Rosenkranz, & Karteroliotis, 2010). This can include children's confidence in activities, their attitudes towards barriers, and their ability to ask adults or peers to assist in physical activity participation (Dzewaltowski et al., 2010). Studies have also shown that activity preferences influence physical activity levels (Sallis et al., 2000), as children are more likely to be active when they have access to activities they enjoy (Resaland et al., 2019). Preferences for screen-based activities can hinder physical activity levels, as the literature has shown an inverse relationship between the amount of time children partake in sedentary activities and physical activity levels (Barnes et al., 2016).

2.5.2 Interpersonal Level Factors

Social support from parents and peers has been associated with children's physical activity levels (Ullrich-French, Mcdonough, & Smith, 2012; Wilk, Clark, Maltby, Smith, et al., 2018). First, parental support has been found to encourage children to engage in physical activity (Trost & Loprinzi, 2011), with previous studies indicating that active parents were more supportive and encouraging of their child's physical activity compared to inactive parents (Gustafson & Rhodes, 2006). Parental support involves a variety of

factors that facilitate children's physical activity participation, including paying for necessary equipment, transporting children to activities, praising children for being active, or parents taking part in activities with their children (Beets, Cardinal, & Alderman, 2010).

Additionally, peer support has been significantly associated with children's physical activity levels (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Wilk, Clark, Maltby, Smith, et al., 2018). For example, children who receive peer support have a reduced likelihood of exceeding the two hour screen time recommendation and have greater odds of engaging in moderate intensity physical activity five or more days per week (Haidar, Ranjit, Archer, & Hoelscher, 2019). Children's physical activity can be dependent on a variety of factors associated with peer support, such as peer involvement in activities, invitations to activities, and encouragement from friends to overcome barriers to activities (Fitzgerald, Fitzgerald, & Aherne, 2012).

Perceived acceptance from others (i.e., parents, peers, and strangers) can also affect children's physical activity behaviours. Based on Deci & Ryan's (2008) self-determination theory (SDT), controlled motivations are external factors that can affect the way people behave based on an assessment of the rewards or punishments created by social norms. Motivation to take part in activities will decline if a child determines there is the possibility for shame or disapproval from others (Deci & Ryan, 2008). Based on the SDT, stigmatization can discourage participation in physical activity by creating negative attitudes toward activities (Vartanian & Novak, 2011). For example, different forms of stigma, such as physical and mental abilities, weight, and gender norms, can act as barriers that discourage children from taking part in physical activity opportunities (Bauer, Yang, & Austin, 2004).

2.5.3 Built Environment

The built environment is a barrier that has been discussed in the physical activity literature (Sallis & Glanz, 2006). This level of determinants involves the formation of the spaces and places made up of buildings, transportation routes, and landscape patterns by altering the environment naturally or through human-made processes

(Blacksher & Lovasi, 2012; Gregory, Johnston, Pratt, Watts, & Whatmore, 2011). The built environment has undergone drastic changes with the growth in urbanization and these alterations have created an environment where access to physical activity opportunities has become challenging, and the availability to sedentary activities has grown (Kannel & Sorlie, 1979). As cities have developed, the length of commutes between stores, schools and facilities has increased (Gregory et al., 2011). These changes have made individuals reliant on vehicular modes of transportation (Hill & Peters, 1998; Kannel & Sorlie, 1979). Alternately, providing children recreational spaces within their neighbourhood can increase physical activity levels, as this offers children the option to use active modes of transport to access local physical activity opportunities (Mitchell et al., 2016; Tucker et al., 2009).

Alterations to the physical environment have also impacted parents' perceptions of neighbourhood safety, which can limit children's participation in physical activity (Allender, Cowburn, & Foster, 2006). Parents are more hesitant to allow their children to play outside without supervision, due to outdoor spaces transitioning from child-dominated to children requiring adult supervision and this limits children's after school physical activity opportunities (Karsten, 2006; Solomon-Moore et al., 2018). Previous research has illustrated that parents discourage children from participating in activities where the environment is perceived as unsafe (Bostock, 2001) or when activities are not accessible (Allender et al., 2006). Overall, the literature suggests that these alterations to the built environment have negatively impacted children's physical activity (Karsten, 2006; Solomon-Moore et al., 2018).

2.5.4 Policy Level Factors

Government regulations and incentives can influence health behaviours in the community by creating settings that facilitate and encourage physical activity participation (Clemens & Lincoln, 2018). The creation of new policies is dependent on a variety of factors, including the characteristics of the population, the social context, the setting, the political priorities, and the evidence provided by previous research (Aro et al., 2015). 'Evidence-informed' policymaking involves health policymakers engaging with researchers and

community groups to create strategies and programs that target areas of need in the community and utilize the most effective method for health promotion based on previous evidence (Aro et al., 2015).

Policy can encourage physical activity behaviours by providing members of the community greater access to additional recreational opportunities (Stone, Faulkner, Zeglen-Hunt, & Bonne, 2012). Previous studies evaluating physical activity policies have found that policies targeting schools have the potential to effectively increase children's physical activity (Stone et al., 2012). Designing school curriculum that mandate designated times for children to be active (i.e., physical education classes, recess, and after school programs) has been found to improve children's physical activity in school settings (Lagarde & LeBlanc, 2010). Additionally, governments providing tax credits for enrolling children in physical activity programs can encourage parents to engage children in physical activity programming; however, the effectiveness of these incentives are not conclusive (von Tigerstrom, Larre, & Sauder, 2011).

2.6 Physical Activity Interventions

To create effective physical activity initiatives, community groups, program co-ordinators and public health officials need to take into consideration the levels of determinants described in Section 2.5 (Sallis et al., 2015). Programs can either focus on one determinant or they can take a multi-component approach (Gilliland et al., 2015). When programs take into consideration the determinants that influence participation in healthy behaviours, physical activity programs increase their likelihood of effectively encouraging children to achieve the recommended amount of daily MVPA (Sallis et al., 2015).

As displayed in Figure 2.2, there are three key groups of modifiable physical activity determinants that policymakers or program co-ordinators can target: (1) information-based, (2) behavioural and social, and (3) environmental and policy (Kahn et al., 2002). Subsequently, the type of physical activity intervention needs to be determined, which is commonly influenced by location, as programs tend to select settings that the

target population frequents and/or already uses (Lagarde & LeBlanc, 2010). There are four intervention types used in children's physical activity promotion: (1) individual-based, (2) family-based, (3) school-based, and (4) community-based (American Dietetic Association, 2006). The remainder of this section will discuss the four intervention types; primarily focusing on the effectiveness and accessibility of community-based interventions.

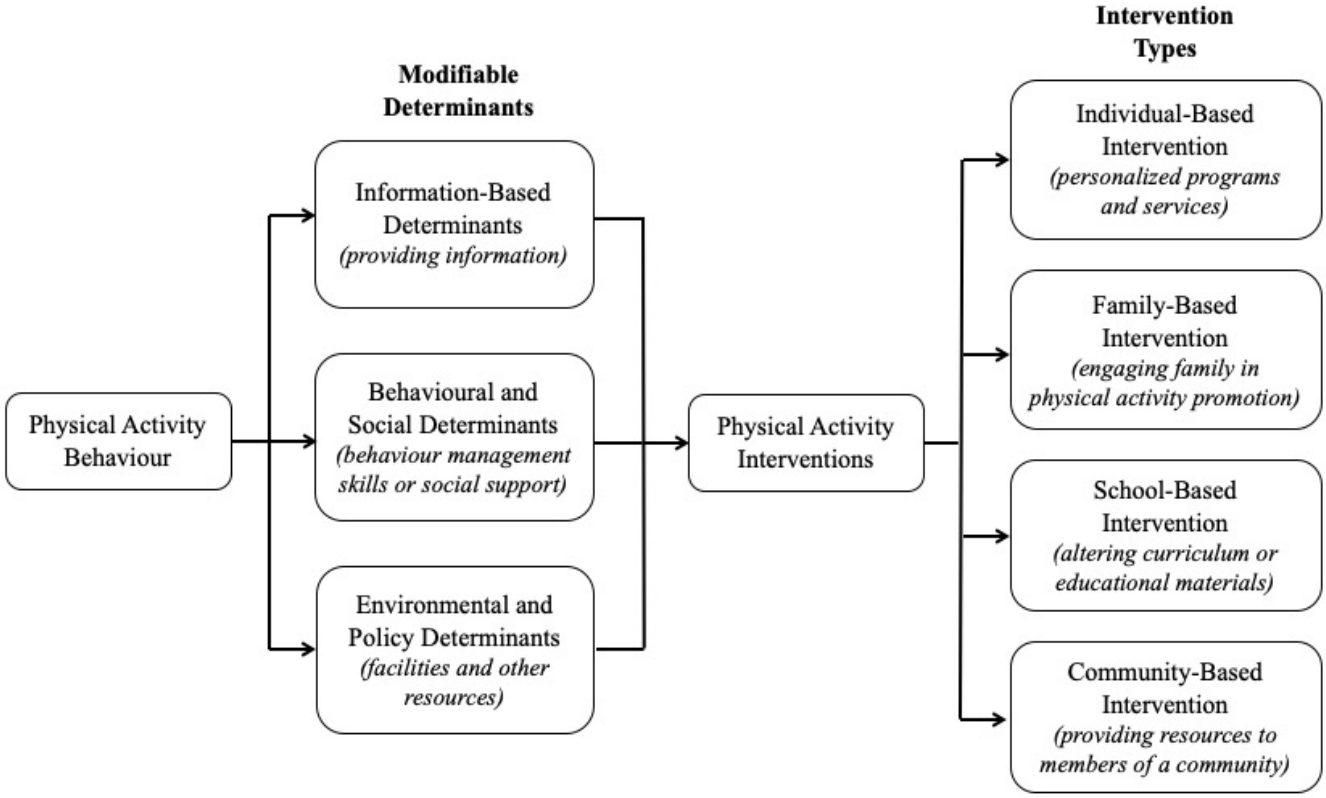

Figure 2.2 Conceptual model of physical activity interventions – adapted from Kahn et al. (2002).

2.6.1 Individual-Based Interventions

Individual-based interventions involves a personalized physical activity program that includes a one-on-one consultation with a health professional (American Dietetic Association, 2006). Commonly, health promotions at the individual level use the social cognitive theory as a framework, which explains that an individual's behaviours are based on their interactions with the environment, the individual themselves, and

behaviours (Locke, 1987). Thus, individual-based interventions target individual health risks, self-efficacy, health goals, and perceived social support to encourage healthy behaviour changes (Anderson, Winett, Wojcik, & Williams, 2010).

Previous studies have shown that children who received online physical activity counselling resulted in beneficial health outcomes (Saelens et al., 2002). Moreover, providing children pedometers and independent step goals resulted in children from all baseline physical activity levels having increase step counts (Kang & Brinthaupt, 2009). Effective individual-level interventions tend to involve motivators (e.g., pedometer step count goals and recording progress) that have resulted in children accumulating greater amounts of physical activity (Brown et al., 2016).

Nonetheless, individual-level interventions are typically used for children who are at high risk of illness, primarily obesity, and are not utilized as a general health promotion tactic (American Dietetic Association, 2006). Additionally, in-person consultations are costly and are not an effective way to improve health at a population-level (Marcus, Owen, Forsyth, Cavill, & Fridinger, 1998).

2.6.2 Family-Based Interventions

Family-based interventions involve the integration of family members into children's physical activity initiatives (Brown et al., 2016). Based on the family systems theory, children's actions and behaviours are constantly shaped by other family members' actions and behaviours (Berge & Everts, 2011). Therefore, family-based interventions can increase children's physical activity by creating a supportive home environment that encourages and maintains health behaviour changes (Brown et al., 2016).

As mentioned in Section 2.5.2, parental support is positively associated with children's physical activity when parents provide transportation, encouragement or companionship during activities (Beets et al., 2010). Previous studies assessing family-based interventions have shown that programs that engage parents and children in workshops that focused on developing children's self-efficacy resulted in higher physical activity levels (van Sluijs, Kriemler, & McMinn, 2011). Alternatively, parents using a reward

system for engaging in healthy behaviours can encourage children to accumulate greater amounts of physical activity (Brown et al., 2016).

However, family-based programs are encouraged to be tailored to families' unique context (e.g., ethnicity and time constraints of the family) (Brown et al., 2016; Chen, Weiss, Heyman, & Lustig, 2010), which requires additional costs and resources (Müller-Riemenschneider, Reinhold, & Willich, 2009). Additionally, the long-term benefits of family-based interventions are uncertain, as it is unknown if families maintain the goals and expectations implemented during the intervention (Kothandan, 2014).

2.6.3 School-Based Interventions

Schools are a popular setting for physical activity research as they provide easier access to participants, and they offer a controlled environment due to the standardization of the school curriculum and infrastructure (McLeroy, Norton, Kegler, Burdine, & Sumaya, 2003). As a result, schools are considered optimal places for health behaviour research as the results are generalizable to other institutions (Stone, McKenzie, Welk & Booth, 1998).

There have been various approaches to school-based initiatives, such as alterations to the curriculum, physical education classes or school policy (Atkin et al., 2011; Cale & Harris, 2006). For example, previous studies have shown that there is a large amount of variability in children's physical activity levels during recess (Beyler, James-Burdumy, Bleeker, Fortson, & Benjamin, 2015). To encourage greater amounts of physical activity during recess time, interventions studies have indicated that playground marking and structures are effective tools for encouraging greater amounts of physical activity (Ridgers, Stratton, Fairclough, & Twisk, 2007). Further, interventions have targeted physical education (PE) classes, a designated time in the school curriculum for physical activity (van de Kop, van Kernebeek, Otten, Toussaint, & Verhoeff, 2019). Increasing the length of PE classes and expanding the variety of activities taught throughout the school year have been associated with children attaining greater amounts of MVPA (Cale & Harris, 2006; Kahn et al., 2002).

While there are benefits to school-based physical activity interventions, the literature has shown that the success of interventions are variable, as teacher compliance and the delivery of the intervention can impact physical activity outcomes (van de Kop et al., 2019). Thus, an alternative and supplementary approach to physical activity initiatives is to allocate a greater number of resources towards community-based programs that can replace sedentary lifestyles with additional physical activity options after school and on weekends (Atkin, Gorely, Biddle, Cavill, & Foster, 2011; L. Cale & Harris, 2006).

2.6.4 Community-Based Interventions

'Community-based' is a general term for a variety of health promotion tactics, as the community can refer to the setting of the intervention, the target for the intervention, agent to reinforce healthy behaviours, or as the provider of resources (McLeroy et al., 2003). For this thesis, community-based programs are defined as a population-level approach to health promotion that involves government officials, facility organizers and/or researchers working in collaboration to implement and promote physical activity by offering programs to a population of interest (Bopp & Fallon, 2008; Heath et al., 2012). The target population typically consists of individuals within a geographic location, but can be specified to a certain gender, race, SES, or another related cohort (Bopp & Fallon, 2008).

Community-based approaches are endorsed for health promotion as it can make population-level changes to health behaviours (Heath et al., 2012). Additionally, community-based interventions can effectively influence children's physical activity levels, as they take a multi-level approach to health promotion by considering the level of determinants that can influence children's physical activity behaviours specified in the socio-ecological model (Sallis et al., 2015).

Previous evaluations of community-based programs have illustrated that population-level interventions can positively influence children's physical activity levels (Smith, Clark, Wilk, Tucker, & Gilliland, 2020). For instance, programs that provide portable play equipment, free programming, and greater access to parks encouraged children to participate in greater amounts of physical activity (Neelon et al., 2015). Alternately,

programs that provided children supervised playground time on school property after school and on weekends increased children's physical activity levels (van Sluijs et al., 2011). Community-based interventions have the greatest effect on children's physical activity when programs integrate interactive group sessions, such as exercise classes (Bock, Jarczok, & Litaker, 2014), or utilize a multi-level approach (DeBate et al., 2009).

In Canada, creating interventions at a community level is a feasible tactic, as many municipalities have recreational community centres and programming available, with many programs specifically tailored for children and their families (Barnes et al., 2016). With a large quantity of service providers available, these interventions have the potential to integrate multiple community groups as stakeholders (Bopp & Fallon, 2008; Pate et al., 2000). The availability of recreational facilities combined with community partnerships can create sustainable programs that encourage Canadian children to use spaces designated for physical activity, resulting in higher physical activity levels (McLeroy et al., 2003).

Nonetheless, community programs have been criticized for their ability to alter health outcomes (Fry et al., 2018), resulting in the discontinuation of the program once funding has ended (Shediac-Rizkallah & Bone, 1998). Moreover, the accessibility of community-based physical activity programs can be a challenge, as a program's effectiveness is dependent on children utilizing the available recreational programming (Clark et al., 2019). Therefore, it is important to understand the different factors that encourage or limit the use of community-based physical activity initiatives in order to implement sustainable, effective programming (Shediac-Rizkallah & Bone, 1998).

2.6.4.1 Geographic Accessibility of Community-Based Programs

Geographic accessibility refers to children's ability to attend recreational facilities where programming is available (Clark et al., 2019). The design of the built environment, including the transportation infrastructure, the location of recreational facilities, and the available mobility options have been associated with children's access to physical activity opportunities (Clark et al., 2019; Handy, Boarnet, Ewing, & Killingsworth, 2002).

A lack of public recreational facilities near a child's home can create barriers to accessing formal spaces for physical activity (WHO, 2010). The existence of recreational spaces within neighbourhoods is positively associated with children's physical activity levels (Mitchell et al., 2016; Tucker et al., 2009). Participation in community-based programs is also greater in areas that have a variety of recreational facilities (Clark et al., 2019). However, for those who do not live near recreational facilities, vehicular transportation is required (Moore et al., 2010). Available transportation can influence children's participation in community-based programs as greater mobility options have been found to improve children's access to facilities (Clark et al., 2019). Children can face challenges organizing transportation to activities due to parental time constraints or public transportation lacking routes or buses (Richter, Wilcox, Greaney, Henderson, & Ainsworth, 2002).

Further, geographic accessibility can differ based on demographic and economic variables. For instance, previous studies have shown that boys have greater access to neighbourhood recreational spaces compared to girls, as boys having greater independent mobility (Mitchell et al., 2016). Compared to different subgroups within the population, low-SES groups are particularly vulnerable to environmental factors, such as the transportation infrastructure and the location of recreational spaces (Yen & Kaplan, 1998). Neighbourhoods with lower SES have been associated with fewer recreational opportunities (Brodersen, Steptoe, Boniface, & Wardle, 2007). Lack of vehicle ownership is also more common in low-income families in comparison to wealthy households, limiting children to local recreational opportunities (Kumanyika & Grier, 2006)

2.6.4.2 Economic Accessibility of Community-Based Programs

The economic accessibility of programs involves children's ability to afford the available programming (Clark et al., 2019). Expenses can negatively impact children's physical activity levels as finances can limit children's opportunities to be active (Epstein, 1998; Hardy, Kelly, Chapman, King, & Farrell, 2010). Specifically, cost has been reported as a barrier to physical activity opportunities, resulting in low-SES children engaging in fewer

vigorous physical activities (Reece et al., 2020; Salmon, Crawford, Owen, Bauman, & Sallis, 2003). Many vigorous activities, including team sports, are considered a financial commitment as there are multiple expenses required, such as registration, facility fees, equipment, and uniform costs (Hardy et al., 2010; Richter et al., 2002; Salmon et al., 2003).

Without free or inexpensive programming options, children from low-SES families were more likely to report sedentary and low-intensity activities, as they are perceived as more affordable (Hardy et al., 2010; Salmon et al., 2003). For instance, screen-time is commonly a one-time expense that can entertain the whole family, while recreational activities require continual membership expenses for each individual who participates (Hardy et al., 2010). With larger and/or low SES families, not only is the sedentary option more practical from a financial perspective, but recreational options might not be feasible (Salmon et al., 2003).

Additionally, expenses are not only directly associated with the activity, but the cost of transportation to facilities can limit children's mobility options (Clark et al., 2019; Moore et al., 2010). A combination of distance to certain facilities and increasing gas prices have made it unaffordable for some families to participate in recreational physical activity (Moore et al., 2010). Decreasing or removing the expenses associated with activities can increase participation in physical activity opportunities (Moore et al., 2010; Richter et al., 2002).

2.6.4.3 Information Accessibility of Community-Based Programs

The information accessibility of programs encompasses the quantity and quality of the information provided to children (Clark et al., 2019). Information is an effective approach to health promotion, as informative resources can motivate children to take part in physical activity (Kahn et al., 2002). In the case of physical activity, information can alter children's physical activity by increasing their awareness of local activity opportunities and improving children's comprehension of programs (Clark et al., 2019).

Primarily, interventions that utilize information are focus on educating children about physical activity and the negative health outcomes associated with inactivity in a school or community setting (Kahn et al., 2002). At the community-level, information is commonly dispersed through promotions. Promotions consist of advertisements, messages, and/or activities that can inform the target population of a particular health behaviour and promote healthy behaviour changes (Wong et al., 2004). Based on the concept of social marketing by Kotler & Zaltman (1971), the goal of health promotion through promotional campaigns is to influence physical activity levels by changing social norms and motivating children to engage in the desired health behaviour.

Examples of health promotion campaigns have indicated that promotions can positively influence children's health behaviours. For instance, the VERB™ campaign was a multi-media physical activity promotion initiative in the United States targeting children ages nine to 13 years (Wong et al., 2004). The aim of the campaign was to provide positive messaging about physical activity to motivate children to engage in activities (Wong et al., 2004). Studies evaluating VERB™ found that children who reported seeing advertisements had higher physical activity than children who were unaware of the program (Huhman et al., 2010). Similarly, the HEALTHY study was a communication campaign targeting middle school children to reduce children's risk of type two diabetes (Schneider et al., 2013). Evaluations of the intervention showed that promotions were able to encourage children to make positive health behaviour changes (Schneider et al., 2013).

2.7 Summary

This chapter examined the current literature on children's physical activity and the factors that influence their participation in physical activity opportunities. This chapter also reviewed current programs promoting physical activity, specifically focusing on community-based initiatives. The current research indicates that there has been limited change in Canadian children's physical activity levels; thus, implementing programs that can encourage children to live active lifestyles are critical in improving this trend. Encouraging children to accumulate greater amounts of physical activity can be a

challenge due to the various factors that can deter or enable children's health behaviours. As a result, community-based interventions are an encouraged method of health promotion as they can consider the various levels of factors and can make population-level behaviour changes.

This thesis aims to expand upon the literature on children's involvement in community-based physical activity initiatives by addressing two existing gaps in the literature. First, much of the research on community-based physical activity uses quantitative data to evaluate health behaviour changes and involvement in physical activity; however, further research is required on understanding participants' perceptions of programs by conducting qualitative studies. Therefore, Chapter 3 will examine children's experiences and perceptions of a free physical activity program. Second, studies have thoroughly evaluated the geographic and economic accessibility of programs, but the influence of information accessibility of community-based programming remains relatively unknown. As a result, Chapter 4 will provide context into the influence of information accessibility (i.e., program awareness) on the registration rate for a free physical activity program. Finally, Chapter 5 will synthesize the findings from Chapters 3 and 4 and will describe the implications of this thesis for researchers, policymakers and community groups.

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Chapter 3

3 Children's Experiences and Perceptions of a Free Physical Activity Program in London, Ontario

3.1 Abstract

Children's physical inactivity is a significant public health concern. With a majority of children not attaining the recommended 60 minutes of daily physical activity, implementing programs and interventions that can encourage children to engage in physical activity is imperative. The Grade 5 ACT-i-Pass (G5AP) is a naturally-occurring community-based physical activity intervention that provides free recreational programming to grade five children across London, Ontario, Canada. Previous evaluations of the program have examined various determinants that influence program uptake, pass use, and changes in participants' physical activity levels; however, children's experiences and perceptions of the program remains unknown. This study utilized a conventional content analysis of 28 focus groups with past G5AP participants to understand the influence of the program on children's perceived physical activity levels, and to identify the enablers and/or barriers that children believed influenced their participation in or access to G5AP programming. The analysis identified five distinct themes, including two themes describing participants' perceived changes to their physical activity levels (i.e., additional physical activity opportunities, and well-being and self-efficacy), and three themes explaining enablers and/or barriers to G5AP programming (i.e., program structure and implementation, spatial accessibility of programming, and social supports and constraints). The findings from the focus groups were used to create recommendations for program co-ordinators and policymakers to consider in current and future community-based physical activity programs.

3.2 Background

Children's low physical activity levels are a continuing public health concern, with only 39% of children five to 17 years of age accumulating the recommended 60 minutes of

moderate-to-vigorous physical activity daily (ParticipACTION, 2020). There are multiple benefits for children engaging in physical activity, including improved health (Janssen & LeBlanc, 2010), and advantageous psychosocial outcomes such as reduced risk of depression and anxiety; and heightened academic achievement, cognitive functioning, and self-esteem (Castelli, Hillman, Buck, & Erwin, 2007; Biddle & Asare, 2011; Tomporowski, Davis, Miller, & Naglieri, 2008). Due to the beneficial outcomes associated with physical activity, it is important to establish strategies that encourage children to live active lifestyles for supporting children's overall health and well-being.

Community-based interventions are a desirable method of health promotion as they can account for a variety of determinants that can support (e.g., parental support, interest in activities that elicit MVPA, local recreation spaces) or restrict (e.g., lack of local recreation spaces, insufficient transportation options, and financial constraints) access and/or use of available recreational programming (Baker & Brownson, 1998; West & Shores, 2008). Community-based health promotion efforts typically involve resources and/or programming being provided to a specific community to improve multiple determinants of health and therefore reduce the risks and prevalence of certain illnesses at a population level (Baker & Brownson, 1998). Evaluations of physical activity initiatives have found that community-based programs that provide children with a supportive (i.e., staff and peer support) and appropriate (i.e., types of activities and equipment) environment can positively influence both boys and girls physical activity levels (Beets, 2012; West & Shores, 2008). Thus, offering accessible recreational opportunities after school can positively influence children's physical activity levels (Beets, Beighle, Erwin, & Huberty, 2009).

Community-based health initiatives have nevertheless been critiqued for their inability to promote substantial changes in health-related behaviours (Guldan, 1996). Physical activity is particularly difficult to modify through community-based programs as there are multiple determinants to consider during the development and implementation of the program (Nilsen, 2006). For example, communities selected based on geographic location may be made up of a diverse group of individuals, including a variety of races, genders, ethnicities, and socioeconomic statuses (Pate et al., 2003). In many cases, the

impact of a health determinant varies between different groups within the population (Pate et al., 2003). The influence of these factors can also vary within groups due to an individual's unique perception of their environment (Orstad, McDonough, Stapleton, Altincekic, & Troped, 2017). Consequently, it is challenging to create a program that applies to the whole community, which may result in decreased effectiveness and lower participation in the program (Nilsen, 2006). Considering these challenges, evaluations of community-level interventions are critical in order to assess the programs' influence on the health outcomes for different subgroups within the community, and to discover cognitive, behavioural, and environmental influences that shape health behaviours (Brodersen et al., 2007).

The Grade 5 ACT-i-Pass (G5AP) is a naturally-occurring community-based physical activity intervention in London, Ontario, Canada that provides grade five children (ages 9-11 years) and an accompanying guest free access to recreational programming across the city (Gilliland et al., 2015) (further description of the program is provided in Section 1.3). The G5AP encourages physical activity by limiting financial constraints, and informing children and their caregivers of the local recreational opportunities in London (Gilliland et al., 2015). Grade five children were selected as the target population as research has observed large declines in physical activity levels during the transition from childhood (ages five to 11 years) to adolescence (ages 12 to 17 years) (Colley et al., 2017; Roberts et al., 2017); therefore, implementing interventions for this demographic is imperative to maintain healthy physical activity levels.

Previous evaluations of the G5AP have shown that the pass is popular among subgroups associated with lower physical activity levels, including girls, children from low-income households, and children with low geographic accessibility to recreational facilities (Clark et al., 2019). While the recent quantitative assessments of the program have identified intrapersonal, interpersonal and environmental determinants to program participation, pass use, and changes in physical activity levels (Clark et al., 2018, 2019; Smith et al., 2020), there have been no qualitative assessments of the program to date. Qualitative studies are valuable as they can provide a deeper understanding of the complex factors that influence physical activity behaviours (Davison & Birch, 2001).

Therefore, an exploration G5AP participants' perceptions of the program was undertaken to expand upon the existing knowledge on the factors that influence children's physical activity levels and access to recreational programming.

The purpose of this study is to develop an understanding of children's experiences and perceptions of the G5AP, including gendered, economic, and geographic differences in children's experiences. This research explores the following questions: (1) how did the G5AP influence children's perceived physical activity levels? and (2) what enablers and/or barriers did children feel they encountered when accessing or participating in the G5AP?

3.3 Methods

3.3.1 Recruitment and Participants

Participant recruitment began in the fall of 2015, following completion of a larger evaluation of the G5AP. The study protocol was approved by Western University's Research Ethics Board (NM-REB #103954), as well as the research review committees of the Thames Valley District School Board and the London District Catholic School Board (Appendix B).

Elementary school principals were contacted by email to discuss their school's participation in the study. Researchers selected a sample of urban and suburban schools, varying in terms of median family income, and the variety and quantity of service providers in the school catchment areas to add diversity to the focus group participants. Eligible participants were children registered for the G5AP in the 2014-2015 year and were enrolled in a grade six class in the 2015-2016 school year at one of the 10 schools participating in the G5AP focus group study. This cohort was selected as they recently participated in the G5AP; therefore, they had recent memory of their overall experience in the program. A sample was randomly selected from the list of children at each school who had parental consent to partake in a focus group. Prior to selecting students for the focus groups, members of the Western University's Human Environments Analysis Laboratory (HEAL) visited schools to meet with selected children to further explain the

purpose of the focus groups and to distribute parental information and child assent forms to ensure the parents/guardians and the child consented to partake in a focus group. At each school, participants were organized into focus groups based on whether they used or did not use the G5AP. To be classified as a user, participants had to use the pass at a recreational facility at least one time. Participant information was determined from a follow-up survey completed by a parent/guardian (Gilliland et al., 2015).

Of the 1,673 grade five children enrolled in the G5AP, 101 G5AP registrants (6%) took part in a focus group. There were 28 focus groups conducted in 10 elementary schools across the city. The 10 schools varied in terms of socio-economic status, based on the median family incomes of the school catchment areas: two low income schools (i.e., <60,000 CAD), five middle income schools (i.e., 60,001 - 90,000 CAD), and three upper-middle income schools (i.e., >90,001 CAD). The schools also varied by the quantity of local service providers (i.e., recreational facilities supplying G5AP programming located with 1600 metres from the school). There were five schools with a low amount of local service providers (i.e., zero or one facility), three schools having a moderate amount of local service providers (i.e., two facilities), and two schools having a high amount of local service providers (i.e., three or more facilities). Six of the schools hosted two focus groups (i.e., one user group and one non-user group), and the remaining four schools hosted four focus groups (i.e., two user groups and two non-user groups). The sample of participants was roughly balanced in terms of those who identified as users (54%) versus non-users (46%), and girls (52%) versus boys (48%).

3.3.2 Data Collection

Each focus group consisted of 30-minute, semi-structured conversations with two to four participants. Focus groups were selected in place of individual interviews as they are an efficient and effective method of gaining participant perspectives for evaluating interventions (Patton, 1990). This approach provided participants with the opportunity to interact with peers, which can improve data quality by providing a supportive environment with others that have similar experiences (Morgan, Gibbs, Maxwell, & Britten, 2002). Focus groups were conducted during lunch and recess time in a communal

space within the participating schools (e.g., library, cafeteria or gymnasium), with participants receiving food and refreshments. Schools were selected as the setting for the focus groups to provide a comfortable space for participants, as well as easier access to potential participants for the research team. One member of the team from Western's HEAL moderated the focus groups using a script composed of five to eight open-ended questions and prompts, while a second team member was responsible for notetaking and audio-recording. Moderators consisted of HEAL graduate students that were not involved in the data analysis or manuscript writing stages of the study. There were separate scripts prepared for the user and non-user groups, as questions concerning changes in physical activity levels and experiences participating in the program did not apply to the non-user group (see Appendix C and Appendix D for interview guides). The final focus groups consisted mixed-gender groups of either G5AP users or non-users. Prior to the focus groups, researchers met with moderators to explain the script and provide suggestions for the discussions in order to deliver consistent facilitation of focus groups.

At the beginning of the interview, participants were asked if they consented to the discussion being audio-recorded, followed by introductions. To consider the power dynamic between respondents and the interviewers, the interviewers informed participants that they were free to discuss any subject matter they thought was relevant to the discussion and that they did not have to respond to questions they are not comfortable answering (Morgan et al., 2002). Participants were also informed that there are no wrong answers and their responses were confidential. Questions focused on their experiences during the program (e.g., what was your experience with the ACT-i-Pass program?), factors that facilitated or hindered program use (e.g., what did you like about the ACT-i-Pass program?), and possible solutions or changes that would encourage participation in the G5AP (e.g., what would you change about the ACT-i-Pass program that would make it better?).

3.3.3 Data Analysis

Conversations were audio-recorded, transcribed verbatim, resulting in a total of 412 pages of transcripts. The transcripts were de-identified and reviewed for accuracy by the

moderator and notetaker. The focus groups were analyzed independently by the primary (EO) and secondary (KR) author with the aid of software (NVivo 12) following Hsieh and Shannon's (2005) procedure for an inductive conventional content analysis. This process involved: (1) reviewing the transcripts; (2) coding words and statements based on key concepts; (3) while coding, recording first impressions and initial analysis; (4) sorting associated codes into categories; and (5) combining categories into larger, overarching themes (Hsieh & Shannon, 2005). Once the themes were finalized, researchers selected quotes that exemplified each theme.

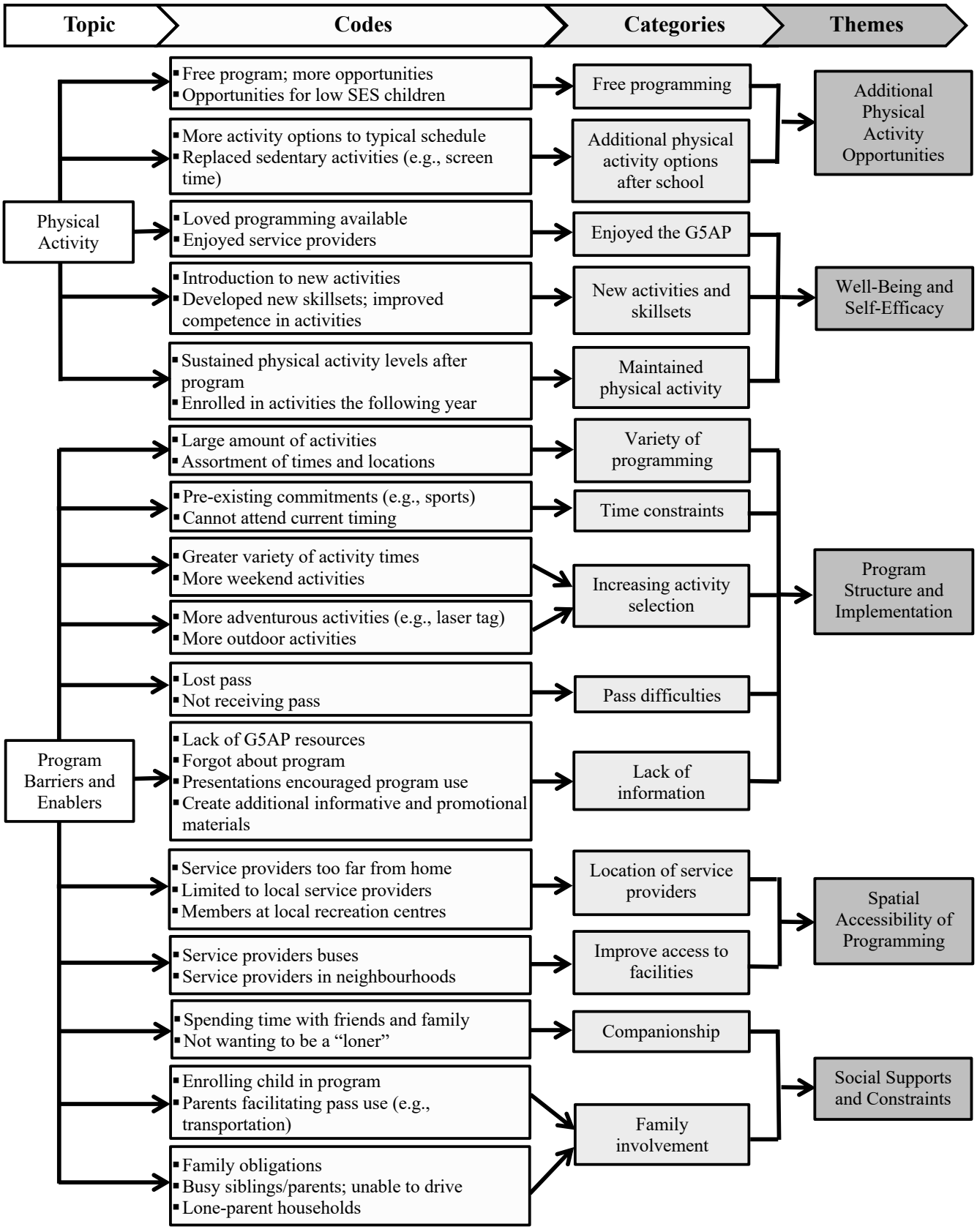
To enhance the quality of the analysis, Lincoln & Guba's (1985) criteria for trustworthiness was applied. Credibility (i.e., results presented represent the experiences of the focus group participants), dependability (i.e., the results being replicated if the study was conducted by another researcher), and conformability (i.e., the impact of researchers' biases and perspectives of the outcomes presented) were achieved through analyst triangulation (Elo et al., 2014; Lincoln & Guba, 1985; Pandey & Patnaik, 2014). This process involved the initial analysis being completed independently, with two researchers (EO and KR) listening to the focus groups, coding the transcripts, and sorting codes into themes. Subsequently, the researchers' findings were validated through peer debriefing. If disagreements occurred between researchers, disputes were settled with an additional researcher (KN, SC, and JG). Multiple analysts examining the initial themes allowed researchers to confirm their findings and add new perspectives to the data, which improved the reliability and replicability of the findings (Carter, Bryant-Lukosius, Dicenso, Blythe, & Neville, 2014; Treharne & Riggs, 2015). Additionally, multiple analysts added objectivity to the findings by controlling for researchers' pre-conceived assumptions and beliefs throughout the analysis (Elo et al., 2014). The final aspect of trustworthiness, transferability (i.e., generalizability of the results to different groups or settings), was promoted using data source triangulation (Carter et al., 2014; Lincoln & Guba, 1985). The focus groups included children from various demographic and economic backgrounds, which provided a variety of perspectives, and improved the validity and generalizability of the findings (Carter et al., 2014). Finally, to take into account the positionality of the researchers (Section 1.2), the researchers recorded notes

on their thoughts and interpretations of the data during the creation of the themes to add reflexivity to the analysis.

3.4 Results

The analysis of the focus groups identified five distinct themes (Figure 3.1). The themes were categorized based on each research question: (1) perceived alterations to participants' physical activity (i.e., additional physical activity opportunities, and well-being and self-efficacy); (2) identified enablers and barriers to G5AP programming (i.e., program structure and implementation, spatial accessibility of programming, and social supports and constraints). Additional quotes on participants' perceptions of their physical activity are available in Appendix E.

Figure 3.1 Code map from the conventional content analysis of G5AP focus groups.



3.4.1 Children's Perceived Physical Activity Levels

Participants believed that the G5AP increased their physical activity levels, as illustrated by two themes: (1) additional physical activity opportunities; and (2) well-being and self-efficacy.

3.4.1.1 Additional Physical Activity Opportunities

Overall, participants perceived an increase in their physical activity levels during the program due to the G5AP providing complementary activities to their usual schedule. One participant stated, "I would play more soccer, so I was more active" (Boy, G5AP user). Similarly, another child reported, "it wasn't any new sports for me, but [the ACT-i-Pass] did increase the amount I did them" (Boy, G5AP user). Participants also credited the G5AP for reducing the time they partook in sedentary activities. For example, one participant explained, "Instead of thinking like 'oh I'll just go to my room and play video games' I was like 'oh maybe I should go to the ACT-i-Pass'" (Girl, G5AP user). Thus, the participants attributed increased physical activity levels to the additional activity options available with the G5AP, and the program replacing screen-based activities with physical activities.

Participants also felt that the free programming available with the pass increased their physical activity levels, as it gave them the ability to take part in more activities. Participants believed free programming offered additional physical activity opportunities that they were previously unable to participate in due to enrolment fees. One participant explained, "I got to go skating and swimming and usually I don't do that stuff. But it was free, so I went a lot" (Boy, G5AP user). Further, participants felt the G5AP provided programming to families in lower socioeconomic groups that were unable to access service providers without the G5AP. For instance, one participant mentioned, "they're [service providers are] too much money for most people and especially me 'cause my mom doesn't really have a job that pays, so that's why she was really happy to hear that the ACT-i-Pass was coming" (Girl, G5AP user). The responses from the participants indicated that free programming enabled participation in the G5AP by providing programs that children could not previously afford.

3.4.1.2 Well-Being and Self-Efficacy

Participants noted that they enjoyed partaking in the G5AP programming and gained physical activity-related skills, which encouraged them to be more physically active. Participants reported enjoying taking part in activities after school. One participant outlined, “[the ACT-i-Pass] was really awesome! It was a good time and I really enjoyed it” (Boy, G5AP user). Similarly, another participant explained, “I did Boys and Girls Club too. It was really awesome. It was a good time and I really enjoyed it” (Boy, G5AP user). Overall, participants attributed increased physical activity levels to enjoying the activity options available with the G5AP.

Moreover, participants, predominantly girls, indicated that they enjoyed that the G5AP not only provided a greater amount of activity choices, but also introduced them to new activities. According to one child, “Yeah, it [the ACT-i-Pass] definitely did it for me [increased physical activity levels], ‘cause this year I actually started dance and then I started running” (Girl, G5AP user). Another participant explained, “Well at the time, I didn’t do volleyball, so I tried volleyball, like something new. I also did cheer ‘cause like I've never done it before” (Girl, G5AP user). Participants also described how participation in the program expanded their physical activity-related skills: “I learned like bumping, spiking [volleyball skills]” (Girl, G5AP user). Generally, participants felt that the G5AP allowed children to participate in new activities, and taught fundamentals and skills that increased their confidence and proficiency in different activities.

Furthermore, some participants believed that they maintained higher physical activity levels following the G5AP due to the program introducing them to activities and service providers they enjoyed. For example, one participant described, “it was my first time [playing basketball] and now I’m gonna try out for the basketball team” (Girl, G5AP user). Another participant felt they were more active following the program: “My dad now is gearing to go find every single free skate that’s available and he’s trying to get us to be able to go to stick and puck on Fridays and free skates on Sundays and Wednesdays” (Boy, G5AP user). Therefore, participants felt that the G5AP had a long-

term effect on their physical activity, as they continued using service providers and programming the following year.

3.4.2 Enablers and Barriers to G5AP Programming

Throughout the discussion, participants responded to questions regarding the factors that they felt facilitated or hindered program participation. Three themes were identified from the focus groups: (1) program structure and implementation; (2) spatial accessibility of programming; and (3) social supports and constraints.

3.4.2.1 Program Structure and Implementation

Participants felt that various aspects of the program design affected their participation in the program. First, some participants mentioned that the variety and types of programming available with the G5AP enabled program participation. Participants attributed access to the program to the variety of activities and service providers, as well as the convenient program times. One participant felt that the program "removed the restriction of the times" as they could go for "free skates whenever you wanted" (Boy, G5AP user). Another child expanded on this idea by explaining, "it was also nice because they [the service providers] were dotted around the city, so [it was] not just one place [that] was next to where every single place was. It was spread out, so that north could get involved, south, west, east" (Boy, G5AP user). Participants also felt that the selection of activities encouraged the use of the pass, as there were a variety of activities that could reach a broad assortment of interests. Specifically, participants highlighted the combination of weekly activities and drop-in times as an encouraging feature of the program:

> I also liked how there was different kinds of things where some you could just kind of come in whenever you wanted, but there was others where it was kind of like a schedule, so it was kind of like a weekly thing. (Girl, G5AP user)

Based on the discussion in the focus groups, participants believed that the variety of activities and locations across the city with programming at multiple times each day enhanced the accessibility of the program.

Participants also characterized some aspects of the program design and implementation as barriers to G5AP participation. For example, participants believed that time constraints hindered program participation, particularly participants who were classified as non-users. Participants referred to extracurriculars and responsibilities as barriers to participating in the G5AP. This was emphasized in the following quote:

> Well I play the sports so often, it's kind of hard to fit in my schedule. I'm training four or five times a week and then I have a game on the weekend and sometimes you just not able to get it [the ACT-i-Pass] in your schedule with school and all that, you know. (Boy, G5AP non-user)

Likewise, one participant explained "I do dance a lot of days of the week and I have violin, so I didn't really have much time to do whatever I want" (Girl, G5AP non-user). Thus, participants felt that pre-existing commitments (e.g., organized sports, music lessons, and schoolwork) limited their ability to attend G5AP programming.

To alleviate the issue of children's schedules conflicting with program times, participants suggested expanding the G5AP programming and activity options. Although the variety within the program was described as a benefit, participants believed that including additional activity options, service providers, and activity times would increase participation in the program. As one participant suggested:

> I wish like similar programs were on separate days, 'cause I know a lot of weeks I could never do it, because the one thing that I really wanted to do that week I was always busy… So it would be more helpful if the same thing was like twice in one week in the ACT-i-Pass. (Boy, G5AP non-user)

One participant described the need for "more variety of programs, like different sports" (Boy, G5AP non-user). He continued by emphasizing the need for adventurous activities: "If they don't have archery then maybe archery, because I've always wanted to try that". Further, participants expressed interest in a higher number of outdoor activities. For example, during the winter, one child recommended, "a reserved area for like snowball fights and stuff" (Boy G5AP non-user). More social and unstructured activities were also suggested: "It [ACT-i-Pass programs] take place at like [an anonymous] park and we played like manhunt or whatever, some sort of communal thing where you can gather up at a park or whatever" (Girl, G5AP user). Based on the responses from the focus groups,

increasing the number of venues and times, adding more adventurous activities, and including outdoor activities would improve engagement in the program.

Participants also described administrative issues that negatively influenced their attendance at G5AP programming. Participants highlighted the physical pass as a problem, including distributing the pass, losing a pass, and replacing a lost pass. One child mentioned, “another reason I couldn’t use it [the pass], I never got it. They never delivered it” (Boy, G5AP non-user). Another participant felt that losing their pass affected their participation in the G5AP:

> I went skating and then I lost it for the whole year, so we ordered another one. We got the other one, and then somehow I don’t know where my mom put it. Then I had found it right at the end of the year, so I only got to use it twice for skating and then it was expired. (Girl, G5AP user)

Participants also highlighted challenges trying to acquire a new pass, with one child explaining, “the last month of the time I had my ACT-i-Pass, I lost it, and they went to go get me one, but by the time I got it [the pass], it was expired so I couldn’t use it” (Girl, G5AP user). Overall, participants felt that difficulties receiving or misplacing their pass limited the amount of time they could utilize G5AP programming.

Moreover, participants felt that limited information about the G5AP reduced their use of the pass, as they were not aware of all the aspects of the program. One child explained, “when we signed up for this [the ACT-i-Pass], I had no idea there was an email, I had no idea there was a bus, I had no idea of anything… like just give more information” (Girl, G5AP non-user). Participants also reported difficulties entering service providers due to the front desk staff being unaware of the G5AP. When entering service providers, one participant explained, “the managers would all know about it, but when I would go in for a drop-in program, the front clerk person wouldn’t really understand what that [the pass] was” (Boy, G5AP user). As a result, participants felt that the distribution of the pass, limited accessible information, and unaware front desk staff hindered their access to programming, which affected their overall participation in the program.

To improve program awareness and clarify aspects of the program to children, participants recommended additional G5AP promotions and resources to increase the

program enrollment and pass use. Overall, participants believed that in-class presentations were an effective method for recruiting children for the program, which is emphasized in the following quote:

> It [the presentation] was pretty helpful, because, like, it kinda told us a bit like about the program, so like we would know a bit more about it before we go ask our parents 'Can we have this, can we have this?' (Girl, G5AP non-user)

Another child felt that the presenters "were energetic about it and they said that we could do a lot of things with it and I was excited to test it [the pass] out" (Girl, G5AP non-user). Participants also thought that reminders would overcome the issue of forgetting about the pass. One child suggested that G5AP program co-ordinators get "parent's email to send them something that says 'have you used the pass?' just to remind them and the child that they have it and they won't forget about it" (Girl, G5AP non-user). Finally, participants wanted to add clarity to what locations accepted the pass by explaining, "at the places [service providers] that you could do it [the program], they should have a sign that says 'ACT-i-Pass is able to [be] use[d] here" (Boy, G5AP user). It is apparent that promoting directly to the children, mainly in the form of presentations, and providing reminders would encourage children to participate in the program.

3.4.2.2 Spatial Accessibility of Programming

Participants described the spatial accessibility of G5AP programming as a barrier to their participation in the program. Participants' descriptions of the spatial accessibility encompassed the distance to G5AP service providers and transportation options. The accessibility of service providers and programming was discussed in many of the focus groups, with two principal perspectives resulting from the discussions. First, participants that attended low or middle income schools felt that they experienced difficulties attending activities, stating "it was a bit difficult [using the pass], because where I live the only thing I really can do is a hockey arena but I'm already signed up for that" (Boy, G5AP non-user). The cost of transportation was also an issue highlighted by lower-income participants, with one child mentioning, "we only use stuff in my neighbourhood cause my mom doesn't [have] that much money to [get] gas" (Girl, G5AP user). Alternatively, participants that attended middle and upper-middle income schools

believed that the large distance to selected service providers obstructed them from the activities or service providers they wanted to attend: “The YMCA is kind of far and my parents don't want to drive me, or I don't have anyone to drive me” (Girl, G5AP user). As a result, some participants believed they attended “mainly [local community center], just because they’re closer” (Boy, G5AP user). It is evident that participants felt limited to their local recreational options, as service providers were too far from their homes and they had difficulties arranging transportation.

Going forward, participants felt that the G5AP needed to improve the accessibility of programming. Participants believed that decreasing the distance to recreational venues would improve the overall accessibility of the program. One participant expanded, stating:

> [The ACT-i-Pass should] try to make things that different areas like, because I think it seemed a place where all the dance programs were downtown or something and like all the sports things were like more like the other part of London. (Girl, G5AP user)

Another participant explained the advantages of local programming options, stating, “if it was close, I’d probably walk with my friends. We could commute together and if our parents were busy with something we could probably just go” (Girl, G5AP non-user). An alternative solution suggested by participants was providing transportation to service providers to alleviate the issues of distance and family responsibilities. One participant proposed, “if [service providers] could maybe have a bus here ‘cause I’d like to do that instead of my mom having to drive me because we live in an area that’s farther away” (Girl, G5AP user). Overall, participants believed that improving the distribution of venues or providing transportation would increase program participation.

3.4.2.3 Social Supports and Constraints

Participants perceived their family and friends as influencers on their participation in the program. One aspect of the G5AP that facilitated program use was the plus one option. Participants believed that the ability to bring a guest increased involvement in activities and utilization of service providers. For example, participants stated that a companion enabled play by creating a comfortable environment. One participant explained, “you're

not really going alone. Like if you don't know anyone, then you have a friend. So say you're doing golf, then you would have a friend, otherwise you're just with all these strangers" (Boy, G5AP user). Likewise, another participant enjoyed having a friend "'cause a lot of times when you see people you're probably, like, too shy to introduce yourself, so it's better when you have friends with you" (Boy, G5AP user). Therefore, participants believed that a companion was essential for participation in activities as a friend limited interactions with strangers. Participants also appreciated the opportunity to spend time with family and friends. One participant explained that the G5AP "was honestly awesome. Having my best friend with me, plus it was free. We could stay there all we want. Ahhh it was like paradise, but inside" (Boy, G5AP user). Another participant stated, "the thing that I liked about the ACT-i-Pass the most is that you could bring someone with you, because then it's like, great now I can go for free with my friend" (Boy, G5AP user). It was evident that participants felt that involving friends and family in activities encouraged program participation.

However, some participants, predominantly girls, indicated that there were social challenges that restricted participation and access to the program. For example, one participant felt they were unable to participate in activities by stating, "I never have anyone to go with me" and "[I] don't want to be a loner" (Girl, G5AP non-user). One child expanded on this concept by saying, "when I go alone, I'm kinda bored… but then when someone is there, you're like "OK! Let's do this! Let's see who can do the best dive!" (Girl, G5AP user). Overall, the G5AP providing the option to bring a friend or family member to activities was perceived as a facilitator.

Family involvement in the program was also highlighted as a factor that influenced G5AP participation. Participants felt that encouragement from parents, guardians and/or other family members improved access and use of the pass. Participants explained that their parents enrolled them in the program to "[become] more active" (Girl, G5AP user). One child mentioned, "my friends from other schools, they were also grade five and they got the ACT-i-Pass, and then all the parents agreed that we should all go together" (Boy, G5AP user). Another participant talked about the benefits of their family participating in activities: "My friends kind of helped me when they went into it, but they didn't really

stick with it as much as I did, so I kind of had to keep myself going. My brother really helped with that and so did my dad" (Boy, G5AP user). Another factor that participants emphasized was family members' ability to provide or arrange transportation to service providers. One participant explained, "my parents dropped me off and when they couldn't drop me off, I'd go with my parent's friends" (Boy, G5AP user). Overall, the responses from the participants suggested that enrolling their child in the program, planning activities with other parents, and offering transportation to activities facilitated participation in the G5AP, which increased the overall accessibility and participation in the program.

Conversely, participants felt that having a busy family limited their ability to access G5AP programming. One participant talked about their challenges to participating, saying, "my parents take turns working late and my dad also sometimes has to stay late too, so I'm home alone with my brother and I can't leave him there" (Girl, G5AP non-user). Similarly, another participant mentioned, "I never have anyone to take me [to ACT-i-Pass programming]" (Girl, G5AP non-user). One participant felt their busy siblings hindered their ability to attend G5AP programming: "I would have gone except like my parents are really busy with my brothers, so my brothers were always… they have a lot of sports too and me, so they couldn't really drive me" (Boy, G5AP non-user).

Moreover, participants explained that family obligations restricted their ability to attend G5AP programming. For example, one participant stated, "well, my grandpa recently had a hip surgery in the summer, and now he has no left hip, so he's recovering most of the summer and I was visiting him, so what's why I didn't get to use it often" (Male, G5AP non-user). Some participants also highlighted the challenges of having a single caregiver or divorced parents: "My mom is in Kingston learning and my dad had to take care of my baby brother, so I didn't really have time to use it" (Girl, G5AP non-user). The responses from the participants suggest family constraints can negatively impact involvement in the program due to the parents' availability or family obligations that coincide with activities.

3.5 Discussion

The purpose of this study was to explore children's perceptions and experiences of the G5AP, a free physical activity program. The program was perceived to have positively influenced participants' physical activity levels by providing children with additional resources and enjoyable programming. In addition, participants highlighted program structure and implementation, spatial accessibility of programming, and social supports and constraints as factors that positively and/or negatively influenced program participation. To increase accessibility and involvement in the G5AP, participants suggested offering a greater assortment of options (i.e., locations, times, and activities), providing a form of transportation or more local physical activity opportunities, and improving program promotions and resources.

Girls participating in the program emphasized the importance of expanding their physical activity-related skills, and the social environment at recreational centres on their participation in the program. Providing the opportunity to learn new activities can help develop children's activity-related skills and activity competence, which can encourage greater involvement in physical activity programs (Barnett, Morgan, Van Beurden, Ball, & Lubans, 2011; Harvey, Pearson, Sanzo, & Lennon, 2018). Moreover, girls have been found to have different perceptions of recreational spaces compared to boys (Coen, Mitchell, Tillmann, & Gilliland, 2018). Coen et al. (2018) conducted focus groups with girls ages 10 to 12 years and participants highlighted that interacting with peers of a similar age positively influenced their engagement in physical activity. As girls are consistently reported in the literature as having lower physical activity levels compared to boys (Barnes et al., 2016; Colley et al., 2017; Roberts et al., 2017), providing girls with the skills and the comfort to engage in physical activity can help increase their current physical activity levels, as well as create lasting health behaviours (Smith et al., 2020).

Participants highlighted the importance of free recreational programming for low-income households. While participants enjoyed that the G5AP increased activity options during their leisure time, these child participants recognized that free programming provided the greatest opportunity to children in low-income households. Low socioeconomic status is

associated with lower physical activity levels, and one determinant that differs between high-income and low-income neighbourhoods is the availability of affordable programming (Brodersen et al., 2007). For instance, Mckenzie, Moody, Carlson, Lopez, & Elder (2013) assessed the recreational programming available at 30 community centres across San Diego, California. Their results indicated that recreation centres in low-socioeconomic neighbourhoods had limited cost-free activities available. Similarly, Estabrooks, Lee, & Gyurcsik (2003) found that low-, medium- and high-income neighbourhoods contained the same number of pay-to-use recreational opportunities; however, a large proportion of the free-for-use programming was located in high-income areas. Macintyre (2000) describes this occurrence as "deprivation amplification", where individuals with few personal resources reside in areas that lack the public resources to support their financial shortages. In other words, most free programming is not being supplied in areas where financial support is required. Therefore, programs like the G5AP are beneficial as they offer affordable programming that may be lacking in low-income neighbourhoods.

Additionally, participants described spatial accessibility as a barrier to recreational spaces. Analysis of the focus group discussion found that participants who attended schools in lower income neighbourhoods described greater difficulties accessing G5AP service providers due to the distance between their homes and the recreational facilities, as well as the cost of transportation. The presence of recreational opportunities within neighbourhoods is positively associated with children's physical activity levels (Mitchell et al., 2016; Tucker et al., 2009) and enrollment in community-based programs (Clark et al., 2019). Compared to different subgroups within the population, previous research has indicated that low-socioeconomic groups are particularly vulnerable to environmental factors, such as the transportation infrastructure and the location of recreational spaces (Yen & Kaplan, 1998), as low-income families are more likely to have nonstandard work schedules and lack of vehicle ownership in comparison to high-income individuals (Kumanyika & Grier, 2006). Therefore, children who reside in low-income neighbourhoods are more dependent on local physical activity opportunities (Humbert et al., 2006). However, an interesting finding of this study was that access to recreational facilities was a barrier for children from all socio-economic backgrounds, as participants

who attended schools in higher-income neighbourhoods explained that their activities of interest were not located at the local recreation centres and attendance of G5AP programming was dependent on their parents' ability to transport them to the activities. To encourage participation in programming, program co-ordinators need to improve access to recreational opportunities, including organizing forms of transportation or providing programming within neighbourhoods (Sallis, Prochaska, & Taylor, 2000). Also, providing popular activities in various areas of the city can help improve participation in G5AP programming. Alternative solutions may include hosting informal outdoor activities in public parks, such as water balloon fights or tobogganing, in neighbourhoods that lack recreational facilities.

Participants also deemed the lack of informative resources and reminders as a negative aspect of the G5AP. Accordingly, participants recommended the use of promotions and advertisements as a strategy to alleviate this issue. Reminders and promotions, including newsletters, phone calls, and printed materials, have been associated with increased physical activity (Burke, Giangiulio, Gillam, Beilin, & Houghton, 2003). For instance, Huhman et al. (2007) evaluated the VERB™ campaign, a multi-media campaign promoting physical activity to children ages 9 to 13 years. The study found that children who had seen VERB™ promotions reported greater participation in physical activity outside of school in comparison to children who were unaware of the campaign. In line with the literature, findings from this study indicate that direct and interactive forms of advertising, such as presentations, were valuable methods for program promotion. Clark et al. (2019) demonstrated that engaging children in the G5AP via in-class presentations resulted in a higher participation rate compared to promoting directly to parents via handouts without providing further context about the program. While these studies show promising results at influencing physical activity behaviours, further research is needed to measure the impact of promotions on physical activity program uptake, as well as evaluating how effective different promotional strategies are at encouraging targeted groups (i.e., parents, children and educators) to enrol and participate in physical activity programs.

One key finding that appeared throughout the discussions was the importance of peers and family on program participation. Previous studies have found a positive association between physical activity participation and children's perceived social connection (Ullrich-French et al., 2012), indicating that children may not partake in sufficient amounts of physical activity when they are alone (Beets et al., 2006). Support from family and peers is linked to higher physical activity levels (Wilk, Clark, Maltby, Smith, et al., 2018), and continued participation in physical activity programs (Ullrich-French & Smith, 2009). Parental support is associated with higher physical activity levels due to a combination of encouragement, involvement, and facilitation from parents (Gustafson & Rhodes, 2006; Trost & Loprinzi, 2011). Specific examples of parental support include providing transportation to recreational venues (Sallis et al., 1992; Welk, Wood, & Morss, 2003), praising their child for being active (Beets et al., 2010), and performing activities with their children (Beets et al., 2010). Additionally, previous literature has shown that peer support can encourage children to engage in physical activity behaviours (Beets et al., 2006; Wilk, Clark, Maltby, Smith, et al., 2018). Fitzgerald, Fitzgerald and Aherne (2012) conducted a systematic review examining the relationship between peers and physical activity participation amongst children ages 10 to 18 years. The findings from the review suggest that peers positively influence physical activity outcomes through peer involvement in activities, invitations to activities, and encouragement from friends to overcome perceived barriers (e.g., fatigue) to activities. Further research is needed on the specific aspects of children's social needs that motivate or hinder their participation in physical activity opportunities.

Despite offering important findings, the authors acknowledge there are limitations to this study. First, schools were selected as the setting for the G5AP focus groups to provide a familiar space for the participants. However, adding moderators from the research team into the school environment may have influenced participants' behaviour and/or their interactions with their peers; consequently, the focus group environment may have introduced social bias into participants' responses. Additionally, participants were classified as a G5AP user or non-user based on a survey completed by their parent or guardian; however, some participants stated they belonged in a different program user group. As a result, if participants were classified into the wrong user status, they would

not have had the experiences necessary to answer certain questions. Finally, this study did not consider how ethnicity, recent immigration, or family characteristics influenced children's perceptions of the G5AP, although previous studies have associated some sociodemographic characteristics with varying levels of G5AP participation (Clark et al., 2019; Smith et al., 2020).

3.6 Conclusion

Community-based physical activity programs can improve children's overall quality of life by encouraging children to accumulate greater amounts of daily MVPA. While most assessments of community-based initiatives have been quantitative by design, qualitative research allows for a deeper exploration of how such programs' influence physical activity behaviours and how certain factors may serve as barriers or enablers to program participation. The five themes identified in the current study provide context into the aspects of community-based programs that may influence program participation and increase children's physical activity levels. Findings suggest that public health officials, program co-ordinators and policymakers should consider the following factors when implementing community-based programs: (1) provide a variety of programming options to fit a diversity of children's interests and families' schedules; (2) offer free, local programming and informative resources in multiple neighbourhoods to improve children's accessibility to physical activity opportunities; and (3) encourage children to engage in activities with family and friends to support their participation in physical activity.

Although the current study provides insight into perceptions of one specific community-based physical activity initiative, future research is needed to fill additional gaps in the literature. Evaluating additional sociodemographic factors associated with physical activity levels may help to recognize the unique perceptions of sub-populations within the community. Evaluations of recommendations provided by participants (i.e., influence of available information on program uptake, impact of providing local recreational opportunities and/or transportation on program use) are also required. Social interactions appeared to be a strong influence on physical activity participation; therefore, further

research into the social determinants that influence participation in physical activity, including sex and gender based analysis, will add to the understanding of how interactions with others impact physical activity behaviours.

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Chapter 4

4 Evaluating the Impact of a Promotional Campaign Intervention on Registrations For a Free Community-Based Physical Activity Program: The Grade 5 ACT-i-Pass

4.1 Abstract

It is recommended that children accumulate 60 minutes of daily moderate-to-vigorous physical activity (MVPA); however, most Canadian children are not achieving these standards. The Grade 5 ACT-i-Pass (G5AP) is a community-based physical activity program in London, Ontario that aims to increase children's physical activity levels by providing children free recreational programming. Previous evaluations of the G5AP have shown that the program was associated with improvements in children's physical activity levels; however, program uptake (i.e., child's registration with or without program use) varied across the city based on neighbourhood characteristics and how children were introduced to the program at their schools. To assess the influence of information accessibility on G5AP registrations, this study implemented and evaluated a spatially-targeted G5AP promotional campaign as an information intervention. Using a novel geospatial and statistical approach, the change in the registration rate between the pre-campaign year (2018-2019) and the campaign year (2019-2020) was measured both at the neighbourhood and school levels. The findings from this study indicated that the promotional campaign significantly increased overall program uptake in the campaign year, particularly in areas that received spatially-targeted promotions due to having low uptake in the pre-campaign year. Active forms of recruitment (i.e., presentations) resulted in the greatest increases on program registration. The findings from this study illustrate the importance of information accessibility for community-based health initiatives, and the influence of various forms of promotions on the registration rate for health promotion programs. To improve the effectiveness of community-based health initiatives, current and future programs should implement promotions to develop program awareness throughout the target population.

4.2 Background

Low physical activity levels among Canadian children is a concerning public health issue, with 39% of children between the ages of five to 17 years accumulating the recommended 60 minutes of moderate-to-vigorous physical activity (MVPA) daily (ParticipACTION, 2020). Obtaining the recommended amount of physical activity is an important part of children's development as it is associated with beneficial physical, mental and psycho-social outcomes, including a reduced risk of high blood pressure, metabolic syndrome, anxiety, and depression; and improved body composition, bone mineral density, physical fitness, academic achievement, and self-esteem (Biddle & Asare, 2011; Castelli et al., 2007; Janssen & LeBlanc, 2010a; Public Health Agency of Canada, 2018). Although the benefits of physical activity are frequently reported, the proportion of children accumulating 60 minutes of daily MVPA remains low (ParticipACTION, 2020); therefore, it is critical to implement new programs and strategies that can encourage children to increase their daily physical activity.

Community-based physical activity interventions have become prevalent in the field of health promotion (Baker & Brownson, 1998). The popularity of community-level approaches has grown due to their ability to account for a variety of determinants that can support (e.g., parental support, interest in activities that elicit MVPA, and local recreation spaces) or restrict (e.g., lack of local recreation spaces, insufficient transportation options, and financial constraints) access and/or use of available recreational programming (West & Shores, 2008). In the case of children's physical activity, community-based programs are beneficial as they offer children activities after school. As children spend a majority of their waking time outside of school, providing recreational opportunities outside of school is a valuable approach to improving children's physical activity levels (Beets et al., 2009; Hatfield & Chomitz, 2015; Public Health Agency of Canada, 2018).

When creating an effective community-based program, one factor that needs to be considered is the accessibility of programming to the target population. The

accessibility of physical activity opportunities can be affected by a variety of factors, including personal, social, or environmental determinants (Aytur, Rodriguez, Evenson, Catellier, & Rosamond, 2008). Children who have greater access to recreational resources have been found to accumulate larger amounts of MVPA outside of school (Mitchell et al., 2016); therefore, it is important to consider the accessibility of programs to ensure eligible individuals can utilize the available physical activity opportunities.

As described in Section 1.2.2, Clark et al. (2019) developed the physical activity accessibility model to evaluate the accessibility of community-based programs. Accessibility is divided into three forms: (1) geographic accessibility (i.e., location of recreational facilities and transportation); (2) economic accessibility (i.e., costs for programming and equipment); and (3) information accessibility (i.e., program materials and resources) (Figure 1.2). For the target population to gain access to the recreational opportunities, the three forms of accessibility need to be incorporated into a program.

Previous studies examining a community-based physical activity initiative in London, Ontario, the Grade 5 ACT-i-Pass (G5AP), have utilized this physical activity accessibility model to understand children's accessibility to programming (Clark et al., 2019). Predominantly, evaluations of the program have measured the influence of economic accessibility and geographic accessibility on enrollment and use of the program (Clark et al., 2018, 2019). However, there is a shortage of studies examining the information accessibility of the G5AP. A qualitative analysis of focus groups with past G5AP participants conducted by Ostermeier, Reilly, Nelson Ferguson, Cohen and Gilliland (2020; Chapter 3) highlighted the need for further research on information accessibility, with children believing that there was insufficient information about the program, and suggested the G5AP provide additional resources, supplementary promotions, and in-class presentations for the future program years. Currently, evaluations have only assessed the impacts of in-class presentations on G5AP uptake (Clark et al., 2018), pass use (Clark et al., 2019), and physical activity outcomes (Smith et al., 2020); thus, the

impact of other forms of information accessibility on the G5AP registration rate remains largely unknown.

Elaborating on the physical activity accessibility model,
 describes the effects of information accessibility for community-based programs. Information accessibility involves the quality and the quantity of materials distributed to the target population during program implementation (Clark et al., 2019). There are two key reasons program co-ordinators should integrate information accessibility into programs. First, providing adequate resources can improve program comprehension (Clark et al., 2019). Participants' understanding of programs is affected by the quality of resources provided and the assortment of resources available (e.g., various languages). When creating programs for children, it is also important to tailor the language and imagery to the age group of interest. To engage a greater number of the target population in programs, children and parents need to understand the program content, as well as details that explain the specific aspects and rules of the program.

The second purpose of information accessibility is to inform the target population of the program to increase program awareness (Clark et al., 2019; F. Wong et al., 2004). Program awareness is influenced by the channels used to share information and locations where information and promotional materials can be found. A common method of generating program awareness is through a promotional campaign. Promotions are one of the tools commonly used in marketing to communicate products to the target population (Goi, 2009), and are comprised of advertisements, messages, and activities that are distributed to inform individuals of a particular product or brand (Wong et al., 2004). In the case of community-based physical activity initiatives, promotional campaigns can encourage children to engage in healthy behaviours, as they can inform and interest potential participants in health promotion programs (Wong et al., 2004). .Previous evaluations of promotional campaigns endorsing health behaviours have indicated that children who are exposed to promotions experienced positive changes to health behaviours (Huhman et al., 2010; Schneider et al., 2013). Overall, a program's ability to effectively change health behaviours is dependent on their ability to attract participants;

therefore, ensuring potential participants are aware of the program is critical to program success.

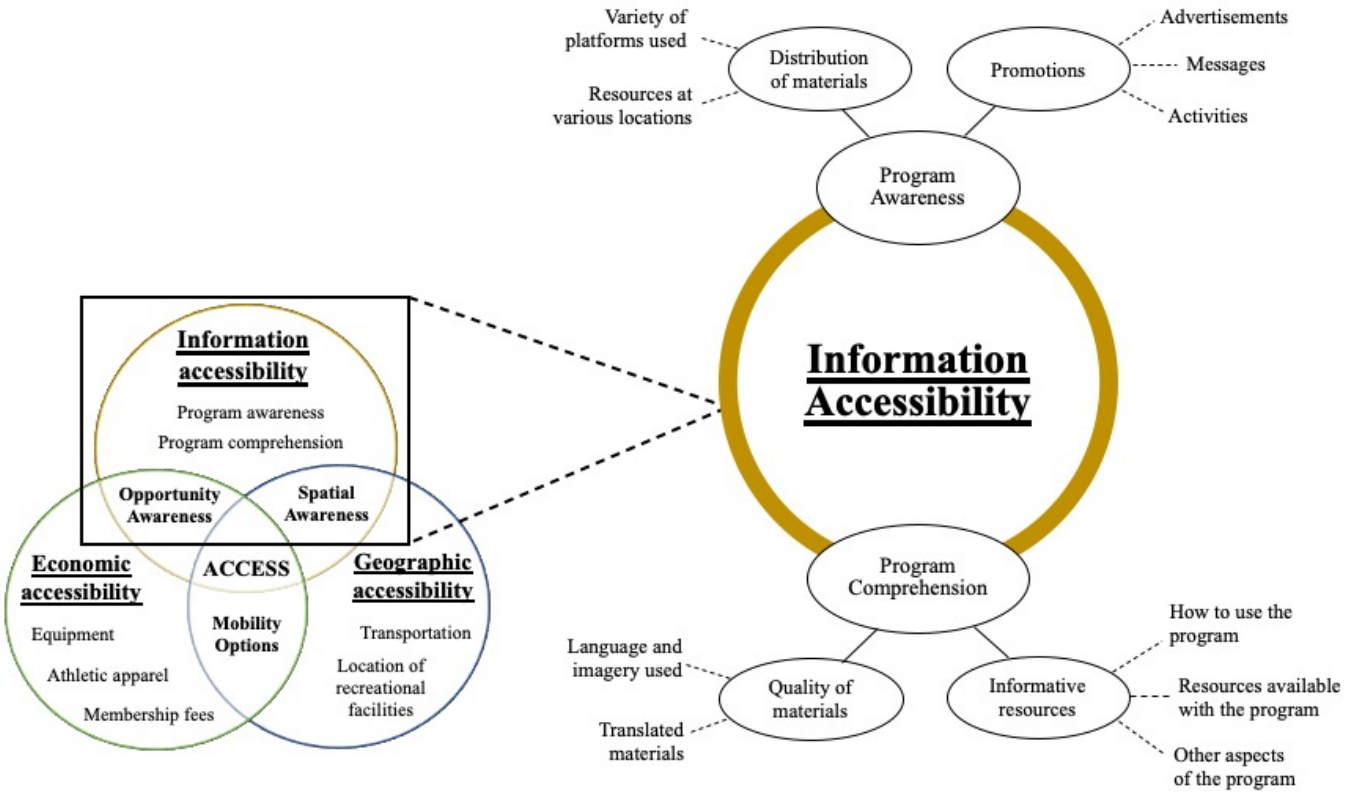

Figure 4.1 Information accessibility of community-based programs.

The purpose of this study is to assess how improving information accessibility (i.e., program awareness) may increase program uptake. Uptake is referred to as the act of registration whether or not the child uses the program, as defined in previous G5AP evaluations (Clark et al., 2018). This study has two objectives: (1) to evaluate the effectiveness of a promotional campaign implemented during the 2019-2020 school year on changing the citywide G5AP registration rate; and (2) to determine if the neighbourhoods and schools that received spatially-targeted promotions had greater changes in the registration rate compared to those that received general promotions. Additionally, the current study includes the influence of neighbourhood socio-economic status (SES) factors on program enrollment, as previous studies have found that G5AP uptake varied among different neighbourhoods and population groups (Clark et al., 2018). To accomplish these objectives, this study examines four key research questions:

(1) How did the number of registrations in the campaign year (2019-2020) compare to the registrations in the pre-campaign year (2018-2019)?
(2) How did the neighbourhood promotions conducted in low-registration neighbourhoods change the spatial clustering of high and low registration areas between the pre-campaign and campaign years?
(3) What promotional or SES variables were associated with the change in the neighbourhood registration rates from the pre-campaign year to the campaign year?
(4) How did neighbourhood promotions and/or school promotions impact school registration rates in the pre-campaign and campaign years?

4.3 Methods

4.3.1 The Grade 5 ACT-i-Pass Program

The Grade 5 ACT-i-Pass, or G5AP, is a community-based physical activity program developed by London's Child and Youth Network (CYN), a network of over 170 community organizations that work together to improve the well-being of children across the city, as an intervention to help improve children's physical activity levels. The G5AP offers grade five children (ages nine to 11 years) a pass for them and one guest to access free physical activity programming in the city of London, Ontario for an entire school year (Gilliland et al., 2015). The pass provides access to multiple recreation centres across the city (e.g., the YMCA, the Boys & Girls Club, and public pools and arenas), and includes a variety of activity options (e.g., drop-in gym times, recreational swim times, and family skating). Grade five children are chosen for this initiative as previous findings indicated that declines in daily MVPA begin around the ages of nine to 11 years (Colley et al., 2017; Roberts et al., 2017). The purpose of the G5AP is to increase children's physical activity levels by improving the accessibility to recreational facilities, removing financial constraints, and increasing awareness of the available opportunities in the local community. The Human Environments Analysis Laboratory (HEAL) at Western University administers and evaluates the program on behalf of the CYN. Further details about the G5AP are provided in Section 1.3.

4.3.2 Participants and Program Recruitment

Eligible G5AP participants included grade five children (ages nine to 11 years) who lived and/or attended a school in London, Ontario. During the pre-campaign year (i.e., 2018-2019), there were 4,679 grade five children eligible to register in the G5AP across 108 schools. In the campaign year (i.e., 2019-2020), there were 4,701 grade five children across 108 schools that were eligible to register in the program. In both years, general promotion of the program started in the beginning of April, with the research team sending a handout with details of the program and an example registration form to the school boards and school principals to notify them of the G5AP. Registration packages were then distributed to eligible grade four children through the schools near the end of April to inform parents and children of the program which begins in July (registration packages provided in Appendix A). Parents and/or guardians were provided with the option to submit the registration form as a paper copy to the child's teacher or via an online registration form available on the G5AP website (www.playeveryday.ca). The purpose of providing multiple registration options was to improve the availability of the registration form, which can increase the accessibility of the program. Children were able to register for the program anytime between mid-April until the end of April the following year. Once registration forms were submitted, children received the pass in the mail within two weeks and the pass was valid between July and the following June of their grade five year. Prior to data collection, this protocol was approved by Western University's Research Ethics Board (NM-REB #103954), as well as the four school boards in London, Ontario, Canada (Appendix B).

4.3.3 Promotional Campaign

The HEAL team and members of the CYN Healthy Eating / Healthy Physical Activity (HEHPA) working group developed a promotional campaign for the 2019-2020 G5AP year as an effort to increase registrations. The design of the campaign resulted in three types of promotions: (1) general promotions; (2) neighbourhood promotions; and (3) school promotions.

General promotions included seasonal information packages and monthly newsletters that were distributed during both the pre-campaign and campaign years, as well as social media platforms on Facebook (Grade 5 ACT-i-Pass Program) and Twitter (@g5actipass) implemented in the campaign year. Seasonal information packages were dispersed to eligible children through schools in May, October, and January of each year to provide information about the program and to encourage children to register. The G5AP newsletters contained updates about the program and service providers. Newsletters were distributed monthly by email to a mailing list of subscribers, the G5AP social media platforms, and program website. Finally, the new social media platforms posted four to six messages each week informing parents and guardians about available programming, benefits of the program, and how to register. General promotions targeted all grade five children, family members, and educators.

In addition to the general promotions, supplementary promotions were used in select neighbourhoods and schools that were spatially targeted based on low or declining registration rates in the pre-campaign year. Clark et al., (2018) conducted a geospatial analysis of the registration rate of the G5AP to examine the factors that influence program uptake. The study discovered that there were significant high and low registration areas, concluding that program uptake was not equal across the city. Following methodology described by Clark et al. (2018), this study used a Getis-Ord Gi* hot-spot analysis to identify neighbourhoods of low registration rates in the 2018-2019 year (Figure 4.2A) and declining rates of registration between 2014-2015 and 2018-2019 (Figure 4.2B), with dissemination areas (DAs) used as proxies for neighbourhoods. Significantly clustered low and declining registration rates (i.e., a group of DAs that have significantly lower registration rates than surrounding DAs) are identified by purple shading. Low-uptake clusters were the areas spatially targeted to receive neighbourhood and school promotions as part of the overall promotional campaign.

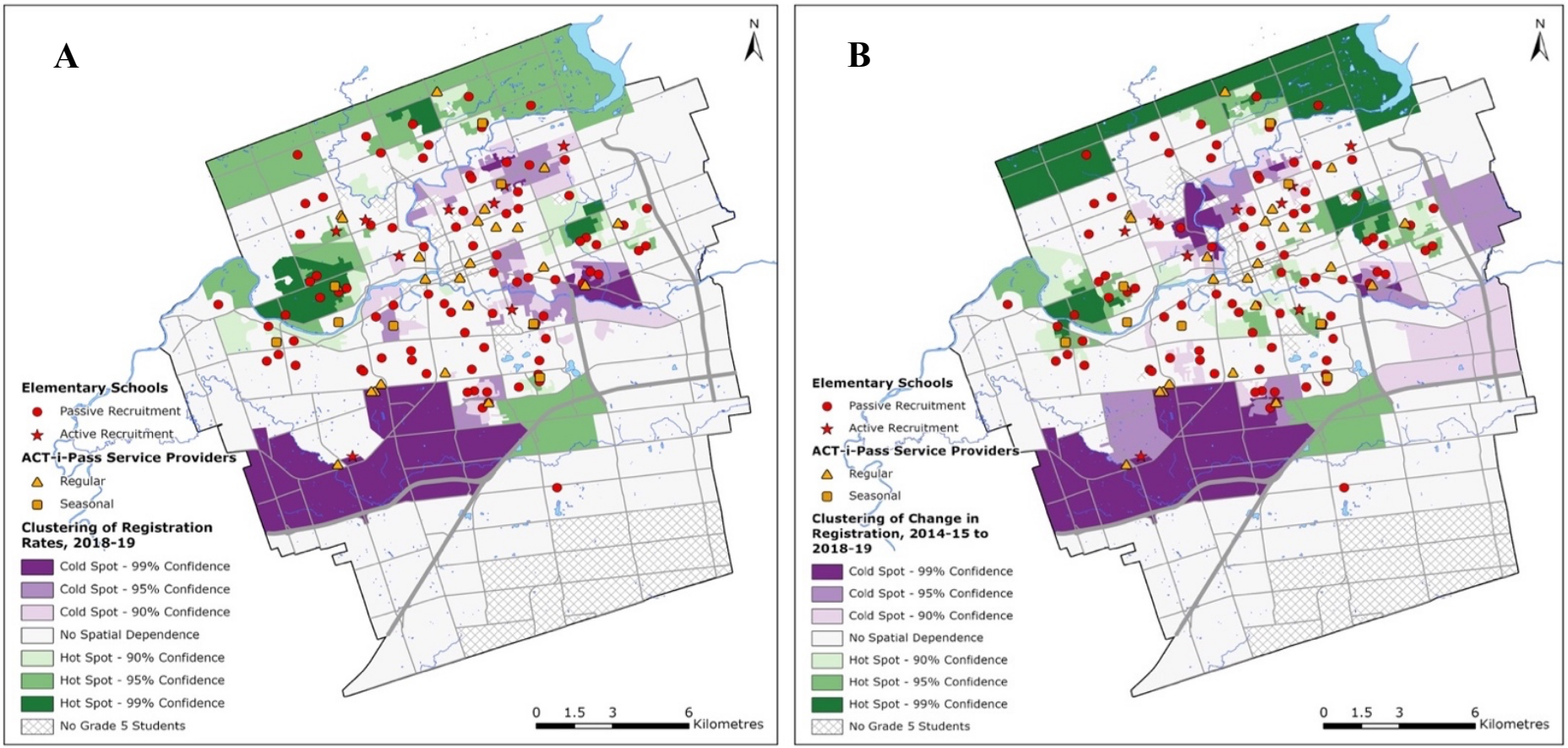

Figure 4.2 Getis-Ord Gi* hot-spot analysis of G5AP registrations in the 2018-2019 year (A) and areas with significant changes in registration between 2014-2015 to 2018-2019 (B).

Neighbourhood promotions included posters and Facebook advertisements targeting the parents and guardians of grade five children that lived within the spatially-targeted neighbourhoods with low registration rates. The posters were dispersed in the first week of December and the second week of January. Posters were placed in 102 unique locations, including grocery stores, pharmacies, community centres, libraries, mailboxes, coffee shops, and other private businesses where families may regularly visit (represented by the small purple dots in Figure 4.3). The posters contained general information about the program and how to register (see Appendix F). Facebook was also used to target parents in the low-uptake neighbourhoods by creating spatially-targeted advertisements directed to adults over the age of 21 years who lived in low-uptake areas of the city (represented by the large pink circles in Figure 4.3). The advertisements were circulated in early November, mid-December, and early February for three days, providing a short description of the program, a photo, and a link to the program's Facebook page (see Appendix G).

In addition to the neighbourhood promotions, nine schools in the low-uptake areas received school promotions, which consisted of in-class presentations to grade five children between mid-September to mid-January of the campaign year. The principals of the 24 schools within the low-uptake neighbourhoods were contacted for interest in hosting a presentation for their grade five classes, with nine schools consenting to presentations. The schools that received presentations are identified as *School Recruitment* (i.e., red stars) in Figure 4.3. Presentations were delivered by a member of the research team and consisted of a 15-20 minute discussion, including a description of the program, details about service providers, activities available, how to enrol in the program, and a question and answer period. At the end of the presentation, all children were provided G5AP pencils and stickers with information on how to register.

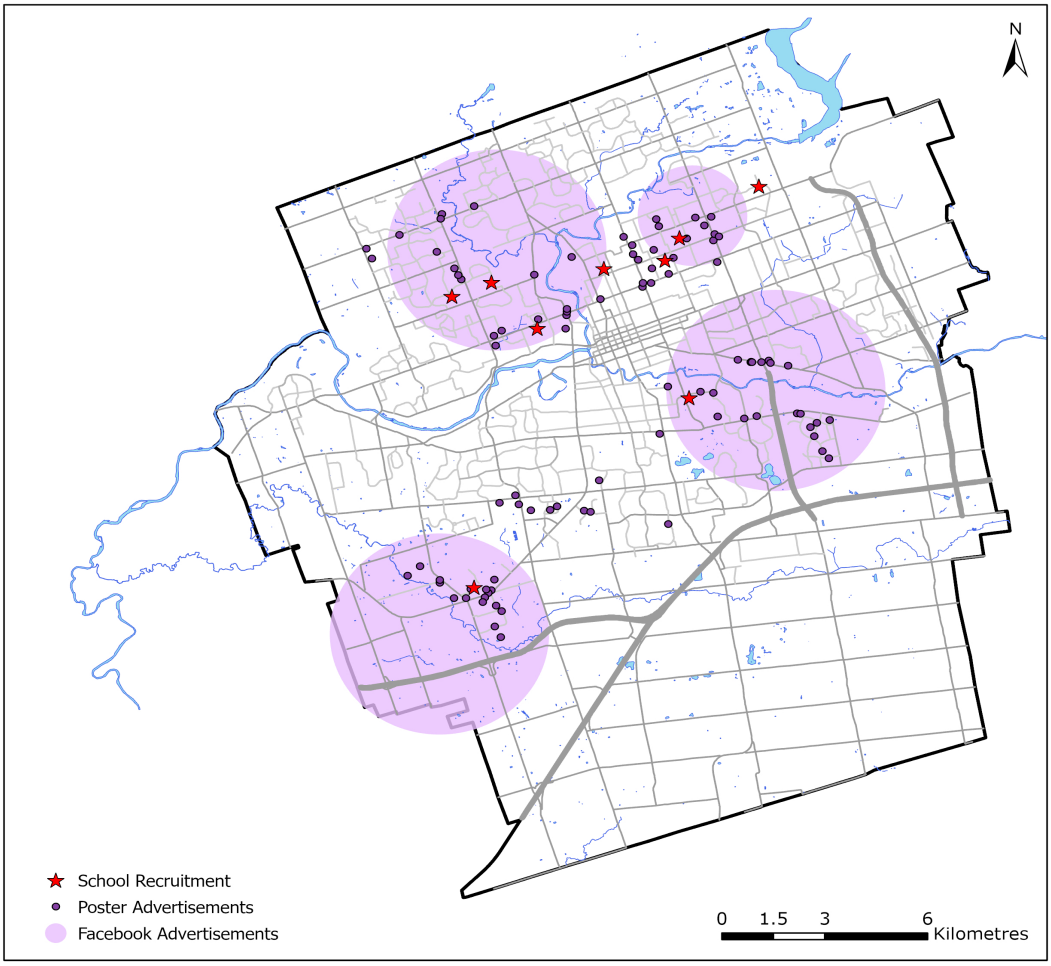

Figure 4.3 Locations of G5AP supplementary promotions (i.e., neighbourhood promotions and school promotions).

4.3.4 Measures

4.3.4.1 Dependent Variables

There were three dependent variables measured to address the research questions in this study: (1) the number of children registered for the G5AP by week; (2) the registration rate by DA; and (3) the registration rate by school.

The number of children registered for the G5AP by week (Question 1) was measured by the total number of children registered for the G5AP each week between the third week of April and March 1st. This variable was calculated for the pre-campaign year (2018-2019) and

campaign year (2019-2020). March 1st was selected as the cut-off date for this study as the program registration ended early in the campaign year due to the global COVID-19 pandemic. Program co-ordinators decided to close program registration early since the G5AP organizers were unable to send passes and children were unable to attend the services provided due to Provincial regulations around social distancing. Selecting March 1st as the last day of the study provided an equivalent time frame for data collection in the pre-campaign year and the campaign year.

The registration rate by DA (Questions 2 and 3) was measured by combining student-level data provided to HEAL through the local school bus consortia with the G5AP registration data. The local School Bus Consortia contained information on children in the English-speaking Catholic and public school boards (LDCSB and TVDSB); therefore, only grade five children who attend a school in LDCSB or TVDSB were included in the DA-level analysis due to availability of data for non-registering children. This represents 94 of the 108 elementary schools in London, Ontario (85.19%), which contained 4,401 of the 4,679 grade five children population (94.06%) in the pre-campaign year and 4,499 of the 4,701 grade five children population (95.70%) in the campaign year. The school bus database provided primary home postal codes for each grade five child by school and the G5AP registration data provides the home postal code of each child who registered for the G5AP. The data was combined by identifying whether each child is registered in the G5AP by matching postal codes and schools between the two databases. Registration rates by DA were calculated by first geocoding each child's postal code to their DA using the Postal Code Conversion File (Statistics Canada, 2016), and then dividing the number of children that registered by the total number of grade five children within each of the 570 DAs in London, Ontario.

The registration rate by school (Question 4) was measured using a list of grade five class sizes provided by the school boards and the school information provided in the G5AP registration data. Due to the large size of the catchment areas of the French first language schools and the various private schools, it was not possible to classify these schools as general promotions or neighbourhood promotions. As a result, English-speaking publicly-funded school boards were included in the school-level analysis, which represents 94.1% and 95.9% of the students in the City of London in the pre-campaign year and campaign year respectively. The number of children enrolled in the G5AP at each school was determined by

categorizing G5AP registration data by school and totaling the number of registrations received. The registration rate was calculated for each school by dividing the number of children enrolled in the G5AP at each school by the total number of children in grade five.

4.3.4.2 Independent Variables

The research questions were addressed using three categories of independent variables: (1) year of enrollment; (2) promotion type; and (3) neighbourhood SES. Year of enrollment was used to answer all four research questions and was categorized as a binary variable indicating whether the dependent variable represents the pre-campaign year of 2018-19 (0) or the campaign year of 2019-20 (1).

Promotion type was measured to address research Questions 3 and 4. For Question 3, there were two DA level promotion type variables that were created: (1) Whether a neighbourhood promotion occurred within the DA (binary); and (2) the proportion of children in a DA that received in-class presentations at school (continuous). For Question 4, three school-level variables were created to measure promotion type at schools, including whether the school was exposed to general promotion (binary), neighbourhood promotions (binary), and school promotions (binary).

Neighbourhood SES was used to address Question 3 to better understand if the promotions led to increased registration among sub-populations within the community. SES was measured at the DA level using data from the 2016 Census of Canada, including the proportion of the population that are recent immigrant (%), the proportion of the population not attaining a high school diploma (%), the proportion of families with one parent (%), and median family income (CAD). The percentage of the population that are recent immigrants was measured by dividing the number of people who are landed immigrants or new permanent residents between 2011 to 2016 by the total population. The percentage of the population not attaining a high school diploma was calculated by dividing the number of individuals aged 15 years or older who have not completed high school by the portion of the total population that was 15 year or older. Percentage of families with one parent was calculated by the number of lone parent households divided by the total number of census families with children. Finally, median family income was defined as the median level of income for census families (i.e., a household containing two or more people in a family unit).

4.3.5 Data Analysis

A variety of statistical tests and analyses were used to address the four research questions for this study. To address Question 1, a paired sample t-test was used to compare the overall change in weekly registrations between the pre-campaign and campaign year, as well as the seasonal differences in registration between the program weeks in the pre-campaign year and the campaign year. A paired t-test was selected for this analysis as the timing of the implementation process of the G5AP (i.e., opening and closing registration, and sending information packages to schools) is consistent each year; therefore, the program weeks are comparable between the pre-campaign year and the campaign year. As a result, the observations are not truly independent, and a paired t-test was an appropriate test (Park, 2005). The weeks were divided into seasons based on the G5AP seasonal schedule changes to account for seasonal differences in registration (Figure 4.4). Isolating seasonal registration rates also enabled the study to examine the impact of the promotional campaign during the fall and winter seasons when supplementary promotions were implemented. There were four time frames used to represented each season: (1) spring was from mid-April to mid-June; (2) summer was from mid-June to early September; (3) fall was from early September to early January; and (4) winter was from early January to mid-April. As the distribution of the registration data was left-skewed, the statistical tests were conducted using the logarithmically transformed weekly registration data.

Question 2 assessed the impact of the promotional campaign on the G5AP registration rate at a DA-level by utilizing two analyses. A Getis-Ord Gi* hot-spot analysis was performed in ArcGIS Pro 2.4 to identify significant high- and low-uptake clusters in the pre-campaign year (Anselin, 2010). This spatial analysis compared the registration rate in a DA to the surrounding DAs (Clark et al., 2018). DAs were defined using a distance weight of 1600 metres. Areas are classified as a hotspot or cold spot if a clusters of DAs had a significantly higher or lower registration rate compared to the average registration rate of the DAs across the city (Clark et al., 2018). The findings from the campaign year were compared to the cold-spots from the pre-campaign year to identify changes in the registration rates of the spatially-targeted DAs. Moreover, a mixed-effects ANOVA measured the impact of the neighbourhood promotions on the change in the G5AP registration rate from the pre-campaign year to the campaign year. This test allowed the researchers to evaluate program

uptake in the DAs at multiple time points (i.e., pre-campaign year and campaign year) (Sullivan, 2008).

Question 3, which addressed the impact of select SES variables and promotional variables on the registration rate, utilized two statistical analyses. First, a series of Pearson's correlation coefficients were used to examine for strength and direction of the relationship between neighbourhood SES characteristics and promotion type received to the registration rates in the pre-campaign and campaign years. Second, a multiple regression was conducted to evaluate the impact of neighbourhood SES characteristics and promotional variables on the registration rate. The multiple regression measured the effect of the predictor variables (i.e., SES factors and types of promotions received) on the outcome variable (i.e., the change in the registration rate from the pre-campaign year to the campaign year) (Mason & Perreault, 1991). This allowed researchers to account for a number of variables that may influence the registration rate (Cohen, Cohen, West, Aiken, 2013).

To evaluate Question 4, a mixed-effects ANOVA was conducted to measure the change in program registrations using repeated evaluations of schools at multiple time points (i.e., pre-campaign year and campaign year) (Sullivan, 2008).

All statistical tests were conducted in the statistical software IBM SPSS Statistic 26 (IBM Canada Ltd., Markham, Ontario, Canada).

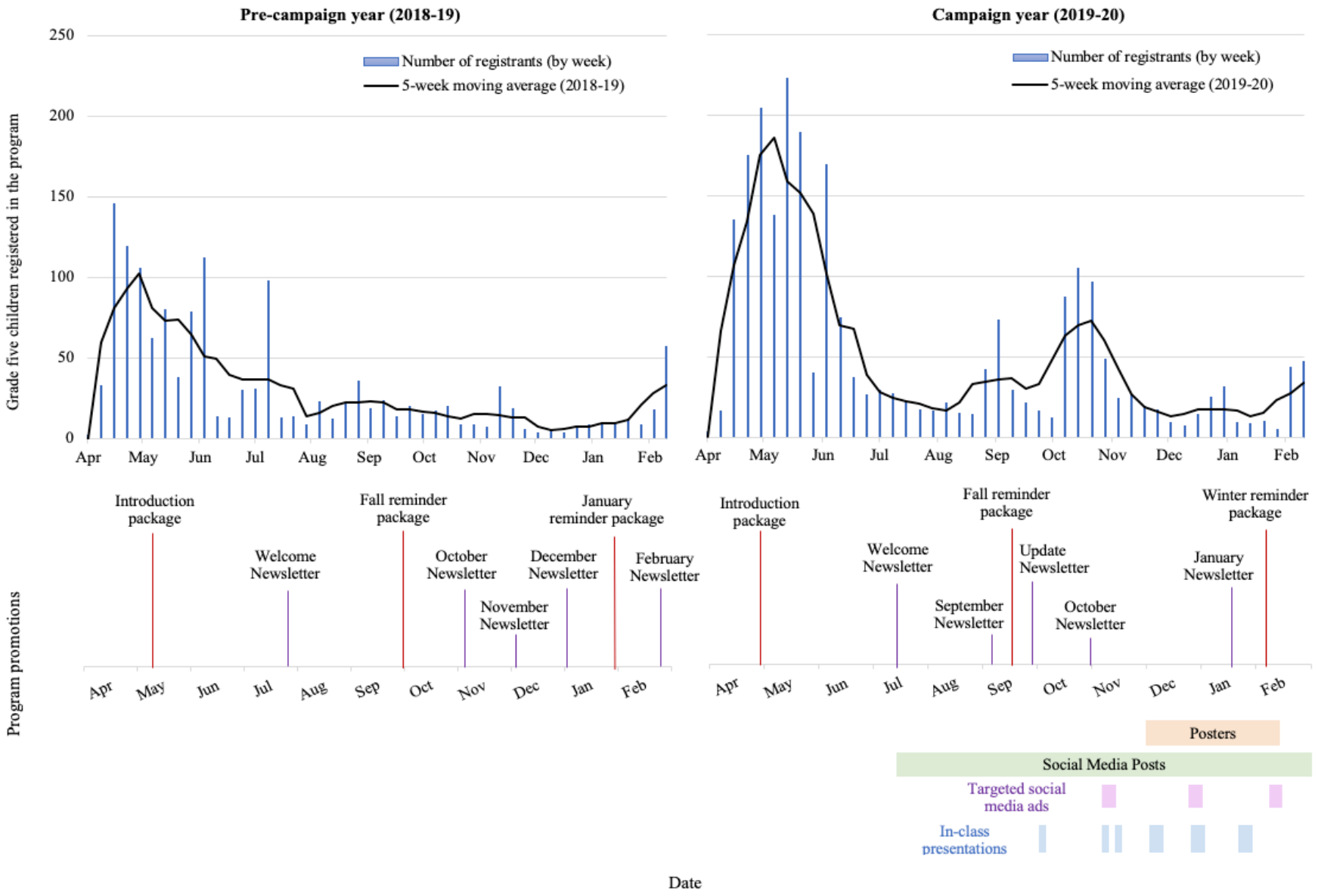

Figure 4.4 The weekly registration rates for the G5AP in the pre-campaign and campaign years.

4.4 Results

4.4.1 G5AP Registration Rates in the Pre-Campaign Year versus the Campaign Year

There was an increase in the registration rate from the pre-campaign year to the campaign year (Figure 4.4). During the pre-campaign year, 1,449 grade five children (31.00%) registered for the program, compared to 2,413 grade five children (51.33%) in the campaign year. A comparison of weekly registrations found a significant increase in the average registrations per week from 31.50 (*SD=35.16*) in the pre-campaign year to 52.46 (*SD=59.03*) in the campaign year (*p= 0.01*).

Table 4.1 Summary of the weekly means and standard deviation of enrollment in the G5AP in the pre-campaign and campaign years.

Time of Year	Weeks	Pre-Campaign Year			Campaign Year			Mean diff.	*p*
		Reg.	Mean[a]	SD	Reg.	Mean[a]	SD		
Overall registration	46	1449	31.50	35.16	2413	52.46	59.03	20.96	**0.01**
Spring	10	777	77.70	44.61	1292	129.20	80.96	51.50	0.13
Summer	13	334	25.69	23.29	413	31.77	20.32	6.08	0.21
Fall	15	206	13.73	8.27	530	35.33	33.04	21.6	**<0.01**
Winter	8	132	16.50	16.67	178	22.25	16.71	5.75	0.34

Bolded p-values represent significant values ($p \leq 0.05$)
Reg. = the number of the registrations received during the specified time period
a= Mean number of registrations per week

While overall registrations significantly increased from the pre-campaign year to the campaign year (*p = 0.01*), a closer look at seasonal differences identified that only fall, the season when supplementary promotions (i.e., neighbourhood and school promotions) were implemented, experienced a significant increase in registrations from 13.73 (*SD=8.27*)

registrations per week the pre-campaign year to 35.33 (*SD=33.04*) registrations per week the campaign year ($p < 0.01$) (Figure 4.4). There were no significant differences in registration between the pre-campaign and campaign years during spring ($p = 0.13$), summer ($p = 0.21$) or winter ($p = 0.34$) seasons.

4.4.2 Spatial Clustering of Low-Registration DAs

Figure 4.5 represents the registration rate by DA for the pre-campaign year (A) and the campaign year (B). The DAs are differentiated by shading based on the proportion of children registered for the G5AP in that area. The shading ranged from light blue to represent low registration areas (0-20%) to dark purple to identify areas with high registration (70-100%). Overall, the mean registration rate in each DA increased from 30.66% in the pre-campaign year to 43.78% in the campaign year. Additionally, the number of DAs that had over 50% of the grade five children enrolled in the G5AP increased from only 86 DAs in the pre-campaign year (15.10%) to 179 DAs in the campaign year (31.40%). Likewise, the DAs from the low program enrollment clusters in the previous year increased in registration from the pre-campaign year ($\mu = 26.96\%$) to the campaign year ($\mu = 43.59\%$).

The Getis-Ord Gi* hot-spot analysis is displayed in Figure 4.6. The results from the analysis showed that there are clusters of significantly higher and lower G5AP uptake areas in both the pre-campaign and campaign years. Significantly clustered low uptake DAs are indicated in purple shading, and significantly clustered high uptake DAs are signified in green shading. In the pre-campaign year, many of the hot-spot areas were located in the higher-income residential areas on the periphery of the city, while cold spots were found in DA clusters around the city comprising an assortment of densely populated, low-income areas and high-income, low-population density areas (Figure 4.6A). In contrast, many of the previous cold-spots clusters had higher registration rates in the campaign year; however, new cold-spot clusters appeared and were contained prominently in the northeast and southwest areas of the city (Figure 4.6B). The high program enrollment clusters in the pre-campaign year remained hot-spots in the campaign year.

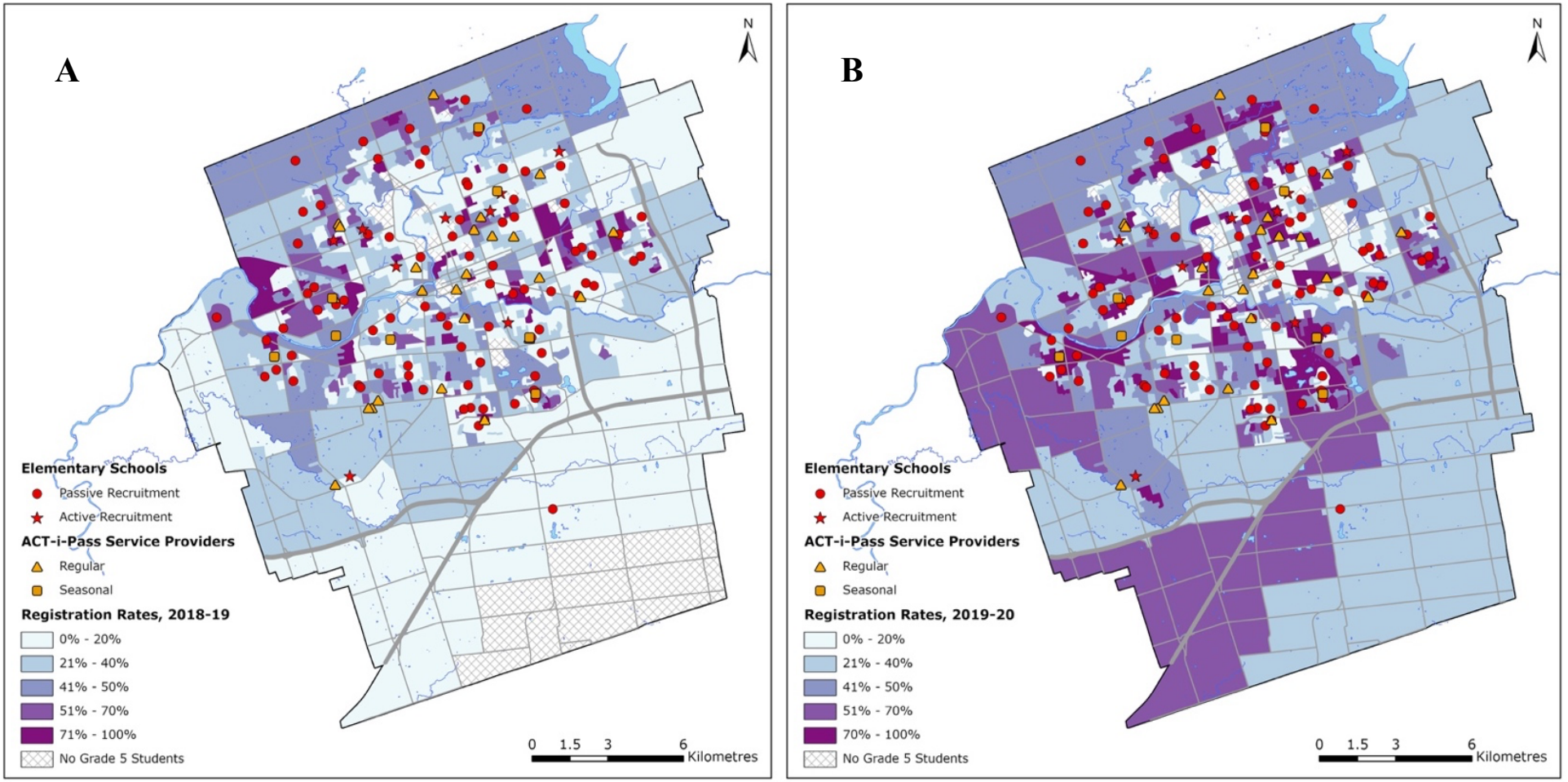

Figure 4.5 G5AP registrations rates by DA in the pre-campaign year (A) and the campaign year (B).

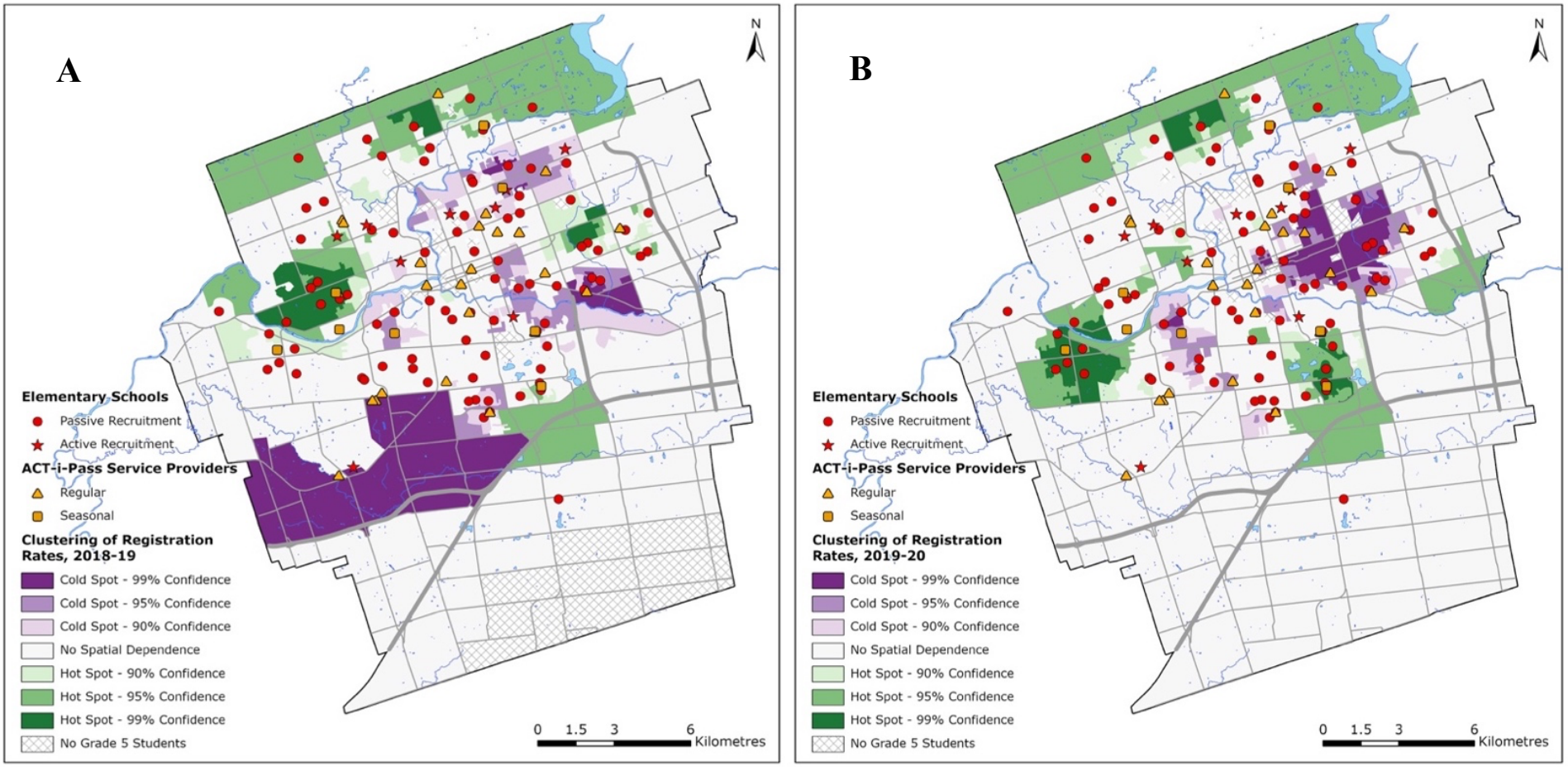

Figure 4.6 Getis-Ord Gi* hot-spot analysis of G5AP registrations in the pre-campaign year (A) and the campaign year (B).

There were no significant results for normality, outliers, or homogeneity of variance tests in the DA-level data; therefore, the test assumptions were met (Field, 2013). There was a statistically significant difference in the registration rate by DA, with the average registration rate increasing from 30.5% in the pre-campaign year to 44.24% in the campaign year (*F= 72.83; p <0.01*; η_p^2= 0.12) (Table 4.2). Additionally, there was a significant interaction between the year and the DA receiving neighbourhood promotions (*F= 3.85, p= 0.05;* η_p^2*= 0.01*), indicating that the change by year was significantly different between the neighbourhood promotion DAs and the general promotion DAs. The between-group effects also found a significant difference overall between those who received neighbourhood promotions versus general promotions (*F= 14.94, p <0.01;* η_p^2*= 0.03*).

Table 4.2 Results of a mixed-effects ANOVA comparing the G5AP registration rate by DA.

Measures	SS	df	MS	F	*p*	η_p^2
Within-group effects						
Year	48961.60	1	48961.60	72.83	**< 0.01**	0.12
Year x Neighbourhood Promotions	2588.30	1	2588.30	3.85	**0.05**	0.01
Error	360345.65	536	672.29			
Between-group effects						
Neighbourhood Promotions	407.43	1	407.43	14.94	**< 0.01**	0.03
Error	418919.06	536	781.57			

Bolded p-values represent significant values (p ≤ 0.05)
SS= Sum of the Squares; df = degrees of freedom; MS= Mean Sum of Squares; η_p^2= Partial Eta Squared

Due to the significant interactions between the year and the promotion type the DA received, post hoc tests were conducted using paired t-tests. The analysis revealed that both general promotions and neighbourhood promotions exhibited an increase in registrations. DAs that received neighbourhood promotions had the greatest increase in the G5AP registration rate with a 19.04% increase in children enrolling in the program the schools that received the school promotions (n=137, *p < 0.01*). DAs that received the general promotions also had

higher registration rates in the campaign year with 11.92% more children registered for the G5AP, a statistically significant increase (n=401, $p < 0.01$).

4.4.3 Influence of SES and Promotional Variables on Neighbourhood Registration Rates

Of the 570 DAs in London, Ontario, 139 DAs were located in one of the significant low uptake clusters from the pre-campaign year and received the spatially-targeted neighbourhood promotions (i.e., Facebook advertisements and posters). Moreover, 37.96% of grade five children within the spatially-targeted neighbourhoods received school promotions. On average, the families within DAs were composed of 2.27% (*SD=3.40%*) recently immigrating to Canada, 16.71% (*SD=8.16%*) of parents lacking a high school diploma, and 33.86% (*SD=15.57%*) of households containing a single parent. The median family income was $84,300, with the DAs ranging from $30,100 to $244,500. The number of grade five children living in each DA (A) and median family income of each DA (B) are visually represented in Figure 4.7.

Table 4.3 presents the Pearson correlation coefficients between the registration rate per DA, the promotion types, and SES variables. The promotional variables were positively associated with the change in the registration rate. The children within the DA receiving an in-class presentation was significantly associated to the increase in registration ($r= 0.22, p < 0.01$). Neighbourhood promotions were also significantly associated to the change in the registration rate ($r= 0.08, p= 0.05$). Moreover, the SES variables were not significantly associated with the change the registration rate, but select variables were significantly associated with registrations in the pre-campaign year and campaign year. In the pre-campaign year, the registration rate had a significant negative association with parent(s) lacking a high school diploma ($r= -0.12, p <0.01$) and lone-parent families ($r= -0.09, p= 0.05$). Similarly, the registration rates in the campaign year had significant negative associations with parent(s) lacking a high school diploma ($r= -0.14, p <0.01$) and lone-parent families ($r= -0.16, p <0.01$), and a significant positive relationship to median household income ($r = 0.14, p <0.01$).

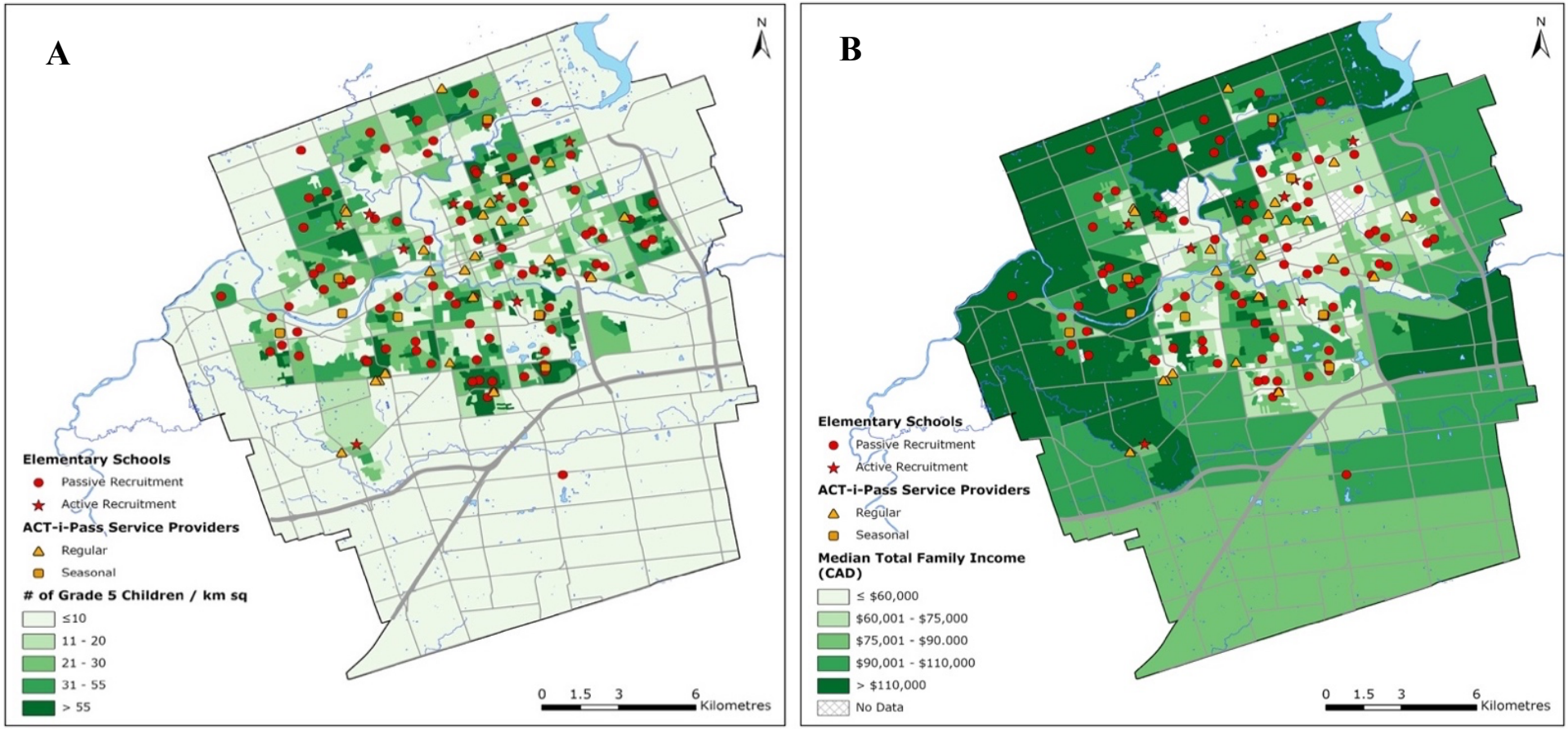

Figure 4.7 Demographic and socio-economic status variables by DA: (A) distribution of grade five children; and (B) median family income.

Table 4.3 Pearson Correlation Coefficients of registration rates, promotion types and SES factors.

Variable	Registration Rate *(2018-2019)*	Registration Rate *(2019-2020)*	Change in Registration Rate *(2018-2019 to 2019-2020)*
Registration Rate *(2018-2019)*	--	--	--
Registration Rate *(2019-2020)*	0.07	--	--
Change in Registration Rate *(2018-2019 to 2019-2020)*	**-0.64****	**0.72****	--
Neighbourhood Promotions[a]	**-0.20****	-0.05	**0.08***
School Promotions[b]	**-0.14****	0.01	**0.11****
Recent Immigrants	0.01	0.00	0.00
No High School Diploma	**-0.12****	**-0.14****	-0.03
Lone-Parent Families	**-0.09***	**-0.16****	-0.05
Median Family Income	0.07	**0.14****	0.03

Bolded coefficients represent significant values (*= correlation has a p-value ≤ 0.05; **= correlation has a p-value ≤ 0.01)

a = binary variable (i.e., yes [1] or no [0]); b = proportion of children in the DA that received an in-class presentation

The results from the multiple regression indicated that only one variable was significantly associated to the change in registration rate from the pre-campaign year to the campaign year: DAs that had a greater proportion of children who received an in-class presentation ($p = 0.01$) (Table 4.4). Neighbourhood promotions, recently immigrating to Canada, parent(s) lacking a high school diploma, lone-parent families, and median family income were not significantly associated to the change in the registration.

Table 4.4 Results of the Multiple Regression Analysis of the Change in Registration Rate by DA (n=570).

Independent Variable	Unstandardized Coefficients		Standardized Coefficients			95% CI		Collinearity Statistic	
	B	SE	ß	t	*p*	Lower	Upper	Tolerance	VIF
Constant	19.00	12.87		1.48	0.14	-6.28	44.28		
Neighbourhood Promotions[a]	5.96	3.82	0.07	1.56	0.12	-1.53	13.46	0.90	1.07
School Promotions[b]	0.11	0.04	0.12	2.59	**0.01**	0.03	0.20	0.91	1.10
Recent Immigrants	-0.07	0.48	-0.01	-0.14	0.89	-1.01	0.87	0.91	1.10
No High School Diploma	-0.01	0.24	-0.02	-0.40	0.69	-0.57	0.38	0.66	1.52
Lone-Parent Families	-0.20	0.16	-0.08	-1.22	0.22	-0.52	0.12	0.39	2.58
Median Family Income	-0.16	0.82	-0.01	-0.19	0.85	-1.77	1.46	0.35	2.84

Dependent variable: The change in the registration rate from the pre-campaign year to the campaign year per DA
Bolded p-values represent significant values (p-value ≤ 0.05)
SE = Standard Error; a = binary variable (i.e., yes [1] or no [0]); b = proportion of children in a DA that received an in-class presentation at school (%)

4.4.4 The Impact of Promotions on School Registration Rates

There were no significant results for normality or outliers in the school-level data; however, the Levene's test for homogeneity of variance was significant ($p=0.05$) for the pre-campaign year. As the largest group (i.e., general promotions) had the greatest variance, the F-statistic from the mixed-effects ANOVA have an increased likelihood of Type-II error (Field, 2013). However, there was a statistically significant change in the mean registration rate from the pre-campaign year to the campaign year at all schools ($F= 50.52, p < 0.01; \eta_p^2= 0.36$) (Table 4.5). There was an increase in the program registration rate by school from 30.7% in the pre-campaign year to 48.94% in the campaign year, an 18.24% increase. In addition, between-group effects found no significant overall difference between the promotion types ($F= 0.33, p= 0.72; \eta_p^2= 0.01$). However, a significant positive interaction was found in the interaction between the type of promotions received and the year enrolled in the G5AP ($F= 3.83, p = 0.03; \eta_p^2= 0.08$).

Table 4.5 Results of the mixed effects ANOVA comparing the G5AP registration rate at each school by promotion type (n=94).

Measures	SS	df	MS	F	*p*	η_p^2
Within-group effects						
Year	12221.95	1	12221.95	50.52	**<0.01**	0.36
Year x Promotion Type	1854.10	2	927.05	3.83	**0.03**	0.08
Error	22002.33	91	241.78			
Between-group effects						
Promotion Type	263.26	2	263.261	0.33	0.72	0.01
Error	36620.60	91	402.42			

Bolded p-values represent significant values ($p \leq 0.05$)
SS= Sum of the Squares; df = degrees of freedom; MS= Mean Sum of Squares; η_p^2= Partial Eta Squared

Given the significant interaction between the year and the promotion type received, post hoc tests were conducted using paired t-tests. The analysis revealed that all of the promotion groups exhibited an increase in registrations. However, of the three promotion types, the schools that received the school promotions (n=9, $p < 0.01$) had the greatest increase in the G5AP registration rate with a 37.42% increase in children enrolling in the program. Figure 4.8 shows that the registration rates were on average lowest for the schools that received the in-class promotions in the pre-campaign year, but were highest on average in the campaign year. Additionally, the schools that received the general promotions had a 16.47% increase in children registered for the G5AP, a statistically significant increase (n=70, $p < 0.01$). The schools that received only neighbourhood promotions had the lowest increase in registration (14.49%), with this promotion type trending towards significance (n=15, $p= 0.08$).

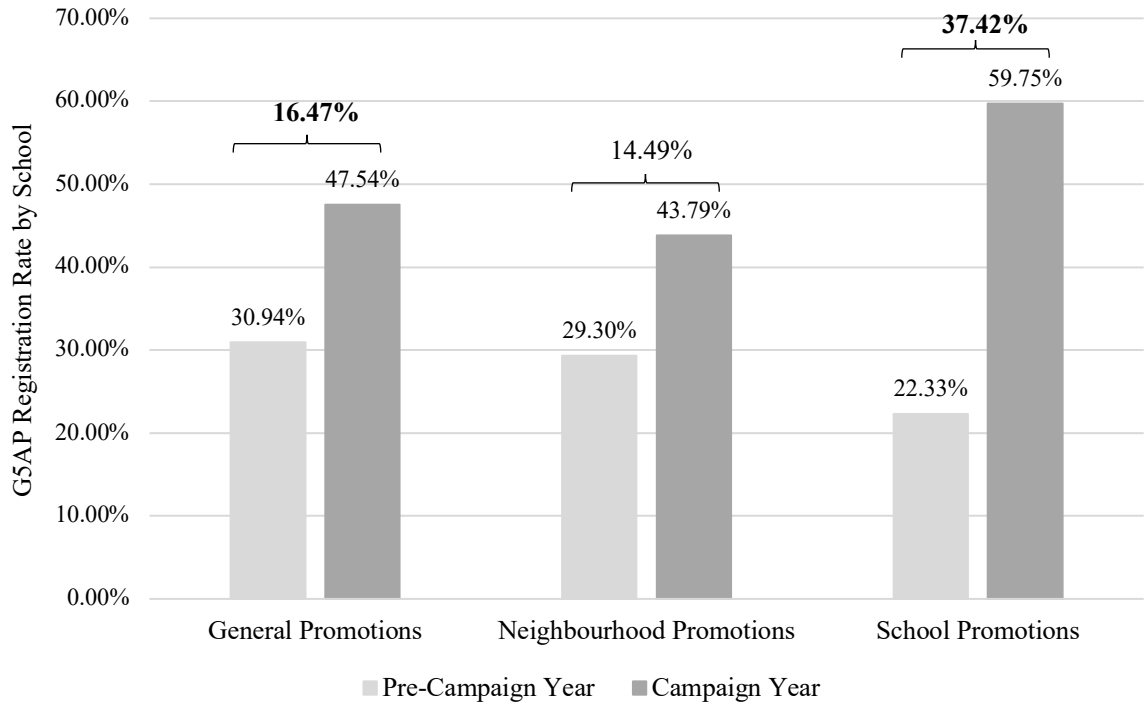

Figure 4.8 The differences in promotion type on the registration rate by school in the pre-campaign year and campaign year

Bolded p-values represent significant values ($p \leq 0.05$)

4.5 Discussion

This study examines the impact of a promotional campaign on the number of grade five children that registered for the G5AP, a community-based physical activity program in London, Ontario. This study also assesses the effects of various promotional types (i.e., spatially-targeted advertisements and presentations) and neighbourhood SES characteristics on the G5AP registration rate at the neighbourhood and school levels. The goal of the promotional campaign was to improve the information accessibility of the program by enhancing G5AP awareness throughout London, Ontario; specifically targeting low-uptake areas of the city. As illustrated in the physical activity accessibility model, providing an adequate quantity and quality of resources increases program awareness and comprehension, which results in greater access to community-based programs (Clark et al., 2019). Further, the model encourages the use of promotions as a method of improving program awareness, which can result in greater program uptake.

The findings from this study supported the physical activity accessibility model, indicating that the promotional campaign significantly increased program uptake from the pre-campaign year (2018-2019) to the campaign year (2019-2020). Additionally, fall was the only season that had a significant change in the registration rate, which is the time when the supplementary promotions (i.e., neighbourhood promotions and school promotions) were implemented. The findings from this study are consistent with the outcomes from other health promotion campaigns. For example, the VERB™ campaign, a multi-media physical activity promotion initiative in the United States, found that children who reported seeing VERB™ advertisements had higher physical activity than children who were unaware of the program (Huhman et al., 2010). Similarly, the HEALTHY study, a communication campaign targeting middle school children with the goal of reducing children's risk of type two diabetes, showed that the promotions were able to create positive health behaviour changes (Schneider et al., 2013). Thus, increasing program awareness using promotional materials can effectively encourage program uptake.

At the neighbourhood level, findings showed that the registration rate by DA significantly increased from the pre-campaign year to the campaign year. Additionally, the DAs that received the spatially-targeted neighbourhood promotions had a greater increase in the

registration rate compared to DAs that received general promotions. This difference may be due to neighbourhood promotions obtaining a greater quantity of promotions compared to the general promotion DAs, specifically the spatially-targeted promotions. Previous research suggests that utilizing a mixed-method approach to promotions is beneficial, as it provides various methods of reaching the target population and increases an individual's exposure to the campaign (Wong et al., 2004). For example, studies evaluating the effects of high-doses of promotions versus standard-doses found that high-dose areas had higher levels of program awareness and understanding, more sessions of leisure-time physical activity, and higher daily physical activity levels compared to children that received the general media plan (Berkowitz, Huhman, & Nolin, 2008; Schneider et al., 2013). As information accessibility is influenced by the quantity of materials available to the target population (Clark et al., 2019), children who received neighbourhood promotions may have been more aware of the program due to greater exposure to promotions, resulting in a higher registration rate.

Low median family income had a significant negative association with program uptake in the campaign year, which is consistent with previous findings (Clark et al., 2018). However, neighbourhoods with a higher proportion on lone parent families, recent immigrants and low parental educational attainment (i.e., no high school diploma) showed declines in program uptake compared to previous findings (Clark et al., 2018). Although some of the associations between the registration rate and the SES variables were significant, it is important to note that the relationships are weak; consequently, there may be additional variables that influenced G5AP registration rate. For example, intrapersonal (e.g., sex and visible minority status), interpersonal (e.g., parental and peer support), and environmental (e.g., local recreational facilities and neighbourhood size) can influence program uptake (Clark et al., 2018), and children's physical activity levels (Mitchell et al., 2016; Wilk, Clark, Maltby, Tucker, & Gilliland, 2018).

An interesting finding from the spatial analysis of G5AP neighbourhood registration rates showed clusters of significant low-uptake areas in the campaign year were predominantly located in low income areas of the city. The low registration rates in low-SES neighbourhoods may be due to individuals with higher incomes responding better to health-based promotions compared to individuals who live in low-income neighbourhoods (Aadahl, Von Huth Smith, Toft, Pisinger, & Jørgensen, 2011). Alternatively, some promotion outlets

can be more accessible to individuals with a higher income, resulting in a greater exposure to G5AP promotional materials. The 'digital divide' (i.e., unequal access to online resources) has mainly been attributed to income disparities (Chinn & Fairlie, 2007); thus, it is possible that low income neighbourhoods had less exposure to social media advertisements compared to higher income areas.

At the school level, the analysis found that school promotions (i.e., in-class presentations combined with neighbourhood promotions) had the greatest increase in the registration rate compared to neighbourhood promotions only and general promotions. The findings also indicated that neighbourhood promotions only had a significant impact on program uptake when they were paired with in-class presentations, which exemplifies the importance of active recruitment on program uptake. This finding reinforces the results from G5AP evaluations that showed presentations increased program uptake (Clark et al., 2018). Presentations may be the result of school promotions having greater influence on information accessibility, due to the heightened quantity of promotions. Previous studies have found that increasing children's exposure to promotional campaigns by implementing a combination of advertisements, messages and activities resulted in greater health behaviour changes (Huhman et al., 2010; Schneider et al., 2013). Alternatively, presentations can improve the quality of the promotions, as presentations can also increase children's understanding of the program. The question and answer period following the presentation allowed children to clarify aspects of the program they did not understand or wanted further details, such as the plus one and how to use the pass (Clark et al., 2018). Therefore, receiving presentations improved children's awareness and understanding of the G5AP, which may explain the greater increase in program uptake.

The findings from this study illustrate that program co-ordinators and policymakers need to ensure future community-based programs supply adequate information to potential participants due to the importance of program awareness on the accessibility of physical activity opportunities. Promotions can improve the community's awareness of physical activity opportunities, resulting in higher registration rates. As shown in previous studies, community-based programs, including the G5AP, can significantly increase children's physical activity levels (Smith et al., 2020); therefore, increasing program awareness can

provide children access to physical activity opportunities, which can positively influence their health.

Additionally, promotional campaigns should utilize multiple platforms and materials. The findings from the current study indicated that school promotions, the promotion type that received neighbourhood promotions and in-class presentations, had the largest change in the registration rate at the neighbourhood and school levels. Therefore, using a combination of active and passive forms of recruitment can increase the target populations' exposure to promotions, which can have a greater impact on program uptake. However, the use of multiple forms of promotions can be costly (Wong, Greenwell, Gates, & Berkowitz, 2008) and might not be a practical option for all promotion campaigns. Hence, it is recommended that programs implement an active form of recruitment, due to presentations having the greatest effect on program uptake in the current study. Active recruitment can be achieved through smaller presentations (e.g., presentations in grade five classes) or providing information in public spaces (e.g., information booths) depending on time constraints, and employee and/or volunteer availability.

Finally, community-based programs need to consider various SES characteristics when designing a promotional campaign. Although the promotional campaign for this study targeted areas of the city with significantly low and declining G5AP uptake in the pre-campaign year, it is important to note that neighbourhood registrations were significantly associated to the SES characteristics of the neighbourhoods, particularly with neighbourhood-level median family income. As G5AP participants who live in low-income neighbourhoods have been found to frequently use the pass (Clark et al., 2019), it is important that information is accessible in areas of the city that may need or utilize free physical activity opportunities. Future promotional campaigns may consider neighbourhood SES when developing the campaign resources and disseminating materials, to ensure promotions are accessible to all populations and are not creating greater health disparities in the community.

There are several strengths to the design of this study. First, the repetition of the analysis at the city, neighbourhood (DA), and school levels creates a comprehensive analysis on the effects of the promotional campaign on program uptake. Moreover, although the locations of

the neighbourhood promotions and the school promotions were determined based on areas with significantly lower or declining G5AP uptake in the pre-campaign year, the neighbourhoods that were spatially-targeted with supplementary promotions represent a diversity in terms of the SES factors. Additionally, the use of various promotional platforms improves the accessibility of the campaign. For example, to account for the portion of the target population that do not own an internet-accessible device and/or have a Facebook account, posters provide a paper version of the promotions to ensure all populations in the city could access promotions. Finally, one researcher (EO) conducting all the presentations for the campaign adds uniformity to the tone and language used throughout the presentations.

Despite these strengths, it is recognized that there are limitations to this study. For example, children and their caregivers' exposure to the promotions is unknown. Although parents/guardians were asked how they heard of the program, the types of promotions observed and the frequency of exposure to G5AP promotions is not specified. Moreover, it is not possible to control where children and caregivers spend their time outside of school; therefore, children or caregivers that lived in areas that received general promotion may have been exposed to supplementary promotions if they attended a school, worked and/or frequently visited locations within one of the spatially-targeted areas. As we do not know the target population's exposure of the promotions, there could be additional factors that increased program registrations in the campaign year (e.g., new teacher or principal champions for the G5AP in schools). However, due to the consistent temporal trends in registration over the past three G5AP years and promotions being the only change to the G5AP from the pre-campaign year to the campaign year, the significant increase in registrations is likely due to the promotional campaign. Finally, the length and timing of the promotional campaign may have limited the outcomes from the study, as the supplementary promotions were only implemented in the last six months of the G5AP year. Previous evaluations of promotional campaigns found that program awareness increased over time, and greater program awareness is associated with improved program outcomes (Huhman et al., 2010). As a result, there may have been greater impacts on G5AP registrations if the campaign was implemented at the beginning of the G5AP year.

4.6 Conclusion

In response to children's low physical activity levels, community-based physical activity initiatives have become a popular method of health promotion. During the implementation of community-based programs, information accessibility is an important aspect to consider, as increasing the quantity and quality of promotional resources can improve the target population's awareness and comprehension of the program. The goal of the promotional campaign is to increase program uptake by improving G5AP awareness amongst grade five children and caregivers. The findings from this study indicate that promotions are a beneficial method of encouraging program enrollment. The findings also suggest that combining passive and active forms of recruitment has a greater impact on program uptake compared to only distributing passive promotions. Therefore, future promotional campaigns should implement a form of active recruitment to increase program uptake, which can lead to increases in children's physical activity.

Although the findings from this study contribute to the knowledge on information accessibility and the impacts of promotional campaigns on program uptake, additional research is required. While the impact of promotions on program registration has been evaluated, promotions can act as a reminder to encourage children to use their local programming; therefore, further research measuring the influence of promotions on program use is needed. Additionally, studies evaluating the accessibility and effectiveness of promotions in relation to various SES factors are encouraged to establish if community-based programs are equitably engaging all groups in the population with their promotions. Finally, while this study found promotions positively influenced program uptake, future studies examining parents and children perspectives of promotion platforms and imagery can help inform program co-ordinators and public health officials on the ideal promotional content for this target population. Understanding techniques that improve children's accessibility to community-based programming can help increase their participation in programs, resulting in greater physical activity levels.

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Chapter 5

5 Synthesis and Conclusion

5.1 Summary of Studies

This thesis examined the factors that influence children's involvement in a free community-based physical activity program, the Grade 5 ACT-i-Pass (G5AP). There were two objectives of the thesis: (1) to determine the factors that influence children's perceived physical activity levels and participation in the program; and (2) to evaluate the impact of improved information accessibility on the G5AP registration rate. Community-based programs can increase children's physical activity levels (Benjamin Neelon et al., 2015; Smith et al., 2020; van Sluijs et al., 2011); therefore, ensuring children can access recreational facilities and programming is critical. Chapter 3 presented a qualitative analysis of focus groups with past G5AP participants to understand children's experiences and perceptions of the program. Chapter 4 examined a promotional campaign implemented in the 2019-2020 G5AP year to measure the impact of greater information accessibility on program uptake. While the two studies investigated different questions and used various approaches, combining the findings from both studies contributed to the objectives of this thesis.

First, this thesis investigated children's perceptions and experiences of the G5AP (Chapter 3). This study explored how the program influenced children's perceived physical activity levels, and the factors children believed positively or negatively influenced G5AP participation. A total of 28 focus groups (n=101) were conducted across 10 schools. Questions focused on children's experiences during the program, factors that facilitated or hindered program use, and suggested program changes that would encourage participation in the G5AP. A conventional content analysis of transcripts was used to explore children's perspectives of the program.

Five themes were identified during the analysis, with two themes relating to changes in perceived physical activity levels (i.e., additional physical activity opportunities, and well-being and self-efficacy) and three themes describing perceived barriers and enablers to G5AP programming (i.e., program structure and implementation, spatial accessibility of

programming, and social supports and constraints). The findings from this study indicated that participants believed the G5AP increased their perceived physical activity levels. The findings also found that girls, a demographic with lower physical activity levels, felt more active during the program, attributing their higher physical activity levels to trying new activities, developing physical activity-related skill sets, and engaging in activities with peers or family members. Participants highlighted free programming, lack of accessible service providers, limited program resources, and social support as the key factors that affected program participation. The discussions with focus group participants resulted in three recommendations children suggested for future program years: (1) greater activity selection, (2) additional program resources and promotions, and (3) improve accessibility to G5AP service providers. Implementing the suggestions provided by the focus group participants may encourage and enable a greater number of grade five children to take part in the G5AP.

Stemming from focus group findings that additional program resources and promotions may increase participation, a promotional campaign was implemented in the campaign year (i.e., 2019-2020). Chapter 4 examined the impact of the promotions on program uptake. The promotions were spatially-targeted and consisted of a variety of promotional types: (1) general promotions; (2) neighbourhood promotions; and (3) school promotions. The neighbourhood promotions and school promotions targeted low-uptake areas of the city. The findings from this study indicated that the promotional campaign significantly increased registrations for the G5AP in the campaign year. At the neighbourhood level, the spatial analysis showed that many of the spatially-targeted low-uptake areas in the pre-campaign year had an increase in registrations; however, clusters of low-uptake areas still existed in the campaign year and were in low-income areas of the city. Neighbourhood promotions and school promotions were found to significantly increase neighbourhood registration rates from the pre-campaign to campaign year. Neighbourhood socioeconomic factors were not significantly associated with the change in the neighbourhood registration rate, but there were significantly associated with the registration rates in the pre-campaign and campaign years. At the school level, all promotion types had an increase in registration; however, in-class presentations in addition to neighbourhood promotions were associated with the greatest increase in the registration rate. This study illustrated the importance of program awareness and information accessibility on the uptake of community-based physical activity

programs. This study also indicated that neighbourhood promotions (i.e., posters and social media advertisements) were not as effective without an active form of recruitment (i.e., presentations).

5.2 Research Contributions

The findings from this thesis provides a greater understanding of the factors that influence children's involvement in free physical activity programming. This thesis contributes five findings to the current literature: (1) applying the findings from qualitative studies to guide interventions; (2) using the socio-ecological model to guide physical activity research; (3) providing additional context to previous quantitative findings on children's physical activity participation; (4) utilizing the physical activity accessibility model when evaluating community-based interventions; and (5) assessing the relationship between information accessibility and program uptake.

First, this thesis uses the findings from a qualitative study (Chapter 3) to guide quantitative research (Chapter 4). Focus groups can act as the starting point for interventions by assessing the needs within the community (Stalmeijer, McNaughton, & Van Mook, 2014). Focus groups are also beneficial as they can determine how to improve current interventions, who the intervention is effecting, and the aspects of the intervention that need to be evaluated (Monaghan, Sanders, Kelly, Cogen, & Streisand, 2011). Although not a novel concept, this thesis reinforces the benefits of qualitative studies improving health promotion interventions. Implementing G5AP participants' suggestions led to increasing promotional materials for the program. After increasing promotions, the G5AP had a significant increase in the registration rate. As intervention studies are costly, future research should utilize qualitative studies with the target population to guide the design and implementation of interventions.

The findings from the qualitative analysis of children's experiences in the program (Chapter 3) exemplifies the benefit of using the socio-ecological to guide children's physical activity research. The themes generated from the analysis of the focus group discussions represents the varying levels of factors that influence children's health behaviours, including intrapersonal (i.e., well-being and self-efficacy), interpersonal (i.e., social supports and constraints), built environment (i.e., spatial accessibility of programming), and policy (i.e.

program structure and implementation). The findings also show interactions between the varying levels of determinants within each theme. For instance, the spatial accessibility of programming was affected by the location of the service provider (i.e., the built environment), service provider preferences (i.e., intrapersonal), the ability for a parent to transport their child to an activity (i.e., interpersonal), and transportation options (i.e., policy). Therefore, the findings from Chapter 3 support the levels and interactions proposed by the socio-ecological model. Additionally, the findings promote the use of a multi-level approach in future research to provide researchers the ability to consider the varying factors that children have highlighted as influential to their participation in physical activity opportunities.

This thesis also contributes additional context on the relationship between various health behaviour determinants and children's physical activity levels. For instance, girls are reported as having lower physical activity levels compared to boys (Colley et al., 2017; ParticipACTION, 2020; Roberts et al., 2017); however, the G5AP has a higher proportion of girls register for the program (Clark et al., 2018), and the program increases girls physical activity levels (Smith et al., 2020). Chapter 3 provided insight to these findings, with girls attributing higher physical activity levels to participation in new activities and learning new physical activity-related skills. The opportunity to learn new activities can help increase children's self-efficacy (i.e., confidence taking part in physical activity). Self-efficacy is a significant barrier to girls physical activity (Dishman et al., 2004), as low self-efficacy reduces girls confidence to partake in activities, and can intensify barriers to physical activity opportunities, resulting in lower physical activity levels (Motl, Dishman, Saunders, Dowda, & Pate, 2007). Therefore, providing girls opportunities to learn new activities and develop skillsets can increase their physical activity.

Similarly, participants provided additional explanations for the relationship between social support and children's physical activity participation. Previous research has shown that children are more likely to engage in programs when there is a form of support from a peer or a parent (Beets et al., 2006; Wilk, Clark, Maltby, Tucker, et al., 2018). The findings from Chapter 3 suggested that children required social support to enjoy activities, to participate in their activities of interest and/or to access recreational facilities (i.e., transportation from parent). It is encouraged that physical activity programs include a plus one option to

encourage parents and peers to engage in activities with children. Overall, understanding children's perceptions can help create strategies to encourage participation in community-based programs.

The findings from this thesis also illustrate the influence of the three forms of accessibility on children's use (Chapter 3) and enrollment (Chapter 4) in a community-based program. First, the locations of recreational spaces can affect the geographic accessibility of physical activity opportunities. As children are dependent on a parent for vehicular transportation, dispersing programming to various areas of the city and/or providing a form of transportation to recreational facilities can increase children's accessibility to physical activity opportunities (Sallis, Prochaska, & Taylor, 2000). Next, economic accessibility of community-based programs can result in children from low-income neighbourhoods not being able to utilize the available programming as they have greater difficulties accessing programming (Mckenzie et al., 2013; Yen & Kaplan, 1998). Providing free or low-cost programming options can either supplement children's current activities or offer affordable programming for children living in low-income neighbourhoods. If recreation facilities are not available, informal outdoor activities in parks, such as water balloon fights or tobogganing, are alternatives. Finally, informational accessibility can provide the target audience a greater understanding of available programming, as well as increasing the awareness of programs throughout the community. Providing the target audience with an adequate quality and quantity of information can encourage children and caregivers to engage in physical activity opportunities, which can result in improved health outcomes. Thus, the physical activity accessibility model provides a comprehensive framework to use when evaluating the accessibility of community-based programs.

Expanding upon the physical activity accessibility model, the findings from this thesis contributes to the understanding of informational accessibility and the influence of promotional campaigns on the registration rate of community-based programs. While the accessibility of community-based programs has been investigated, there is a lack of studies taking information accessibility into consideration. This thesis expanded upon the physical activity accessibility model provided by Clark et al. (2019) and illustrated a more thorough explanation of the factors that affect the information accessibility of community-based health initiatives, specifically the aspects of program awareness and program comprehension.

Chapter 4 reveals the impact of improved information accessibility on the community's awareness of the G5AP that resulted in greater program registration. Program awareness is imperative for creating accessible community-based programming, as children are unable to utilize programs they do not know exist. Additionally, the findings from Chapter 4 expanded beyond the previous studies that evaluated the influence of presentations on program uptake, use, and physical activity behaviours from Clark et al. (2018), Clark et al. (2019) and Smith et al. (2020) by demonstrating the effectiveness of varying types of promotions on program engagement. The findings from Chapter 4 suggested that a combination of active and passive forms of recruitment had the greatest influence on program uptake. Passive forms of recruitment did increase program uptake, but they had greater impact when combined with an active form of recruitment. Overall, the findings from this thesis signify the need for informational accessibility to be included in future research evaluating the accessibility of health promotion interventions.

5.3 Implications for Practice and Policy

Community-based physical activity initiatives are prevalent in health promotion as they can counteract the determinants of health by improving the availability and accessibility of resources for members of the community (Baker & Brownson, 1998). For children, providing recreational opportunities after school and on weekends can help encourage greater physical activity levels, as children spend a majority of their week outside of school (Beets et al., 2009). With the growing popularity in community-based approaches in health promotion, it is important to continually evaluate interventions to ensure they are effectively making healthy behaviour changes in the community. The findings from this thesis offers evidence that can be used to develop or improve physical activity interventions.

First, interventions should offer programming and resources that encourage physical activity participation in low physical activity populations. The findings provided recommendations for the types of programming that should be available in physical activity interventions. As mentioned in Section 5.2, interventions should provide lessons and classes for a variety of sports to empower girls to partake in physical activity. Girls attributed higher physical activity levels to the introduction to new activities and learning

new physical activity-related skills. Future community-based physical activity interventions should include activity lessons or classes in the programming options to improve girls' self-efficacy and to decrease the physical activity disparity between boys and girls. However, classes commonly require registration and limit programs to a select number of children. Interventions should supplement classes and lessons with drop-in programs, such as open swim and skate times, to provide additional options for children that cannot commit to weekly programs.

Alternatively, community-based interventions can facilitate physical activity by encouraging peer and parental involvement in recreational programming. Social support (i.e., companionship at activities and available transportation) is associated with children's physical activity participation. Interventions need to utilize strategies that can encourage family and peers to engage in activities, including allowing a plus one or organizing family activities, such as family swim times.

The findings from this thesis highlights the benefits of integrating children's thoughts and opinions into the creation of physical activity interventions. Listening to children's suggestions allows for interventions to consider demographic preferences for activities (De Craemer et al., 2014), and provides additional insights into the programs that are of interest to participants. Supplying the programs that children want can encourage participation in interventions, since children are more likely to take part in activities they enjoy (Resaland et al., 2019). Including children in the development of interventions can help make programs appealing to the target population and accessible to all populations in the community.

This thesis also provides recommendations for the implementation of future promotional campaigns. The findings from Chapter 4 suggest that promotional campaigns should utilize multiple platforms and materials. Promotion interventions should include a combination of passive forms of recruitment (i.e., advertisements and messages) and active forms of recruitment (i.e., presentations and activities) when developing a promotional campaign (Wong et al., 2004). Findings from this thesis support that passive recruitment, although beneficial, is not impactful without being supplemented with an active form of recruitment, such as presentations. The outcomes from the promotional campaign applied in Chapter 4 are

generalizable to similar populations (i.e., parents and children). The interventions can also be applied in similar settings, including mid-sized cities with a large number of resources (i.e., recreational facilities) and provincial average proportions of socio-economic status factors in the population. However, locations with different proportions of inequalities, population densities and quantity of resources may require alterations to the suggestions provided by this thesis in order for programs to be tailored to the target population and the resources available (e.g., funding, staffing, promotional outlets available).

Furthermore, the physical activity accessibility model should be utilized during the development of community-based interventions. For a target population to access recreational opportunities, the model suggests that community-based interventions must be geographically, economically, and informationally accessible (Clark et al., 2019). When one form of accessibility is lacking, this can result in children not utilizing recreation facilities and programming. For instance, the aim of the promotional campaign was to increase program registrations, particularly in low-uptake areas of the city (Chapter 4). Although the intervention improved the overall registration rate of the program, the low income neighbourhoods of the city appeared as the significantly low registration areas during the campaign year. This finding shows that the economic accessibility of the promotional campaign may have been lacking due to the resources not being accessible to lower income households. As a result, all three types of accessibility need to be considered when implementing interventions to provide accessible programming to all groups in the target population.

Policymakers should also consider the physical activity accessibility model when developing new policies. For example, policies can improve the economic accessibility of physical activity opportunities by providing subsidies and incentive to physical activity programming (Clemens & Lincoln, 2018), and by investing in better quality resources in low-income neighbourhoods (Ravensbergen, Buliung, Wilson, & Faulkner, 2016). Investing in outdoor spaces (e.g., parks and trails) can be beneficial, as local recreation opportunities can increase children's use of recreational spaces (City of London, 2019; Tucker et al., 2009). Multiple resources, including online activities or informal weekly activities in parks, can educate children and provide additional physical activity opportunities to alleviate difficulties with information and geographic accessibility. Thus, policymakers applying the physical activity

accessibility model can result in policies that improve the accessibility of recreational programming and spaces that can facilitate children's physical activity.

5.4 Strengths and Limitations

The research presented in this thesis has many strengths. First, a mixed methods approach was used, applying the findings from qualitative studies into practice. Listening to children's suggestions provided program improvements, which resulted in increased program uptake of the G5AP. Additionally, both studies had large study populations, with Chapter 3 consisting of 101 participants, and Chapter 4 examining all grade five children in London, Ontario, Canada (n=4,701). Finally, this thesis evaluated a community-based program, and the findings from the studies can benefit health behaviours at a population-level.

There were specific strengths associated with the two independent studies. For example, there were beneficial aspects of the participant recruitment and data collection of Chapter 3 that strengthened the study. The study included an analysis of gender and socioeconomic characteristics to explore how children's experience in the program differed between groups in the community. Moreover, the use of focus groups allowed children to interact with peers. Discussing experiences in a group can facilitate conversation between children and improve the quality of the data (Morgan et al., 2002).

There were limitations of the research presented in Chapter 3 related to the data collection strategies implemented in the study. First, schools were selected as the setting for focus groups, as it is recommended to provide children with a comfortable environment when partaking in a focus group (Longhurst, 2003). Children's comfort with the moderators (i.e., members of the research team) may have influenced participants' behaviour and/or their interactions with their peers; consequently, the focus group environment may have affected participants' responses. While this is a limitation, the impact of the moderators would have affected children in any location and school is the easiest location to meet focus group participants; therefore, it was the best setting for the study. There were also challenges categorizing participants into the appropriate groups for the analysis. Focus groups were organized based on (1) the school the child attended, and (2) if the child did or did not use their pass. User groups were determined based on a parent survey completed at the end of the

G5AP year. During the focus groups, a small number of participants indicated that they belonged in the alternative program user group. Due to the focus group guides differing between the two user groups, participants classified into the wrong user group would not have been able to answer certain questions.

Similarly, Chapter 4 provides valuable insight into the information accessibility of community-based programs, and this was facilitated by the strengths to the study design. The study utilized a city-level, neighbourhood-level, and school-level to analyse the effects of the promotional campaign on program uptake. This offered a more comprehensive understanding of the varying impacts of promotion types. The spatially-targeted neighbourhoods represented a variety of incomes and neighbourhood characteristics, providing greater context into the registration rates based on socioeconomic characteristics. To improve the accessibility of promotions to all populations in the city, the campaign used a combination of online (i.e., social media and G5AP website) and paper materials (i.e., posters and information packages). Finally, one researcher conducted all the presentations throughout the campaign, which added uniformity to the tone and language used throughout the presentations.

It is recognized that there are also limitations to the study design in Chapter 4. For instance, this study did not measure children's or their caregivers' direct exposure to promotions. Although parents/guardians were asked to report how they heard of the G5AP, children's and caregivers' exposure to the various promotion types or the frequency of exposure is unknown. It is also possible that individuals that reside in the general promotion neighbourhoods attended a school, worked and/or frequently visited locations within, one of the spatially-targeted areas, increasing their exposure to G5AP promotions. Another limitation was the length and timing of the promotional campaign. Previous evaluations of promotional campaigns found that program awareness increased over time, and greater program awareness is associated with improved program outcomes (Huhman et al., 2010). As supplementary promotions were only implemented in the last six months of the G5AP year, there may have been greater impacts on G5AP registrations if the full promotional campaign was implemented at the beginning of the G5AP year. However, the six months of the supplementary promotions was an adequate amount to time to examine the impact of the

supplementary promotions, as there was an increase the number of registrations during the fall and winter seasons.

5.5 Recommendations for Future Research

While both studies added insight into children's use and accessibility of community-based interventions, the studies highlight areas that require further research to improve the overall understanding of community-based interventions. First, future research needs to evaluate the accessibility and effectiveness of promotions on various socioeconomic factors to establish if community-based interventions are engaging all targeted groups in the population with their promotions. For instance, future studies should examine the effects of targeting health promotions to different SES and demographic groups to increase participation in physical activity opportunities, as well as determine who promotions affected and the types of promotions that were most effective for the varying groups. Socioeconomic characteristics have been associated with physical activity participation (Smith et al., 2020; Wilk et al., 2018); therefore, finding strategies that can improve the uptake of community-based health promotion interventions in at-risk communities can help decrease the health disparities that exist in the city.

Social interactions appeared to have a strong influence on physical activity participation, specifically in female focus group participants. Previous research has shown that peer and parental support can impact children's physical activity levels (Beets et al., 2006; Wilk, Clark, Maltby, Tucker, et al., 2018). Discussions with focus group participants highlighted that companionship at activities increased enjoyment and facilitated play. Expanding on the discussions provided in Chapter 3, future research into why social determinants influence children's participation in physical activity, including a comparison of gendered responses, will expand upon the understanding of how children associate social interactions with physical activity behaviours.

Further research into information accessibility of community-based interventions is also required. Chapter 4 contributed to the knowledge on information accessibility and community-based programs. This study explored the impact of program awareness on the uptake community-based programs; however, the influence of program awareness and program comprehension remained relatively unknown. Program comprehension is a key

aspect of information accessibility as children are unable to utilize programming if they are unable to understand program details (Clark et al., 2019). Further research should evaluate the different aspects of information accessibility and measure the impact of promotions and resources on children's program participation.

Finally, while Chapter 4 found promotions positively influenced program uptake, further information is needed on parents and children perspectives of promotion platforms and imagery. Previous studies have shown that an individual's reactions to imagery in promotional materials are dependent on their unique perceptions, feeling and behaviours (Branthwaite, 2002). Understanding the ideal promotional content for this target population can increase interest and awareness for programs throughout the community. Attracting a greater number of participants can in turn have a greater overall impact on physical activity levels.

5.6 Conclusions

The objective of this thesis was to examine the factors that influence children's involvement in the G5AP. Chapter 3 suggested that additional physical activity opportunities and improved well-being and self-efficacy resulted in increased physical activity levels. Children also described additional activities outside of their normal schedule and free programming increased children's physical activity levels. Further, children identified program structure and implementation, spatial accessibility of programming, and social supports and constraints as enablers and/or barriers to G5AP programming. Chapter 4 indicated that a promotional campaign significantly increased program uptake and emphasized the importance of combining active and passive forms of recruitment to have the greatest effect on the registration rate. Combining the findings from the two studies, this thesis highlighted the importance of accessibility on the uptake and use of community-based programs. Policymakers and program co-ordinators should consider social support and program accessibility when implementing new physical activity programs. Although this thesis contributed to the understanding of the accessibility of physical activity opportunities, further research on promotional campaigns and strategies to increase program use is required. Effective community-based programs can encourage children to engage in greater amounts of physical activity, improving the health and well-being of children in the community.

5.7 Reference

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Appendices

Appendix A Grade 5 ACT-i-Pass Introduction Letter and Registration Form (redacted).

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 (and for some programs, plus one friend, family member, or chaperone) ***FREE*** access for many of London's recreation centres and programs from July 2019 until June 2020**, including the City of London Recreation Programs, The Boys and Girls Club of London, The YMCA of Western Ontario, Children's Museum of London, SARI Therapeutic Riding, Palasad South, and Junction Climbing Centre.**

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 project has been endorsed by, and has passed the ethical standards of, your child's school board and Western University.

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
  - Return the ***registration form*** to your child's teacher by *May 17th, 2019*
- ☐ You may complete the ACT-i-Pass registration online at www.playeveryday.ca

If you register, before May 17th 2019, you will…

- ☐ Receive the ***ACT-i-Pass*** by mail in early July 2019; and
- ☐ Are able to use your pass to access recreational facilities and programs throughout London between July 2019 and June 2020.

You can also complete the **ACT-i-Pass Registration** online at any time throughout the year, at www.playeveryday.ca. Registration is open until the end of April 2020, but they will be receiving passes on a revolving basis if you register after May 17th 2019. Paper copies can only to be submitted to your teacher by May 17th 2019, however online registration is open for the entire year. Thank you for your interest in the program. To learn more about the program you can visit our website at www.playeveryday.ca.

Kindly,

London's Child & Youth Network

[redacted] [redacted]

ACT-i-Pass Registration Form

The following information will only be used 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 **online**, please visit playeveryday.ca . 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 print 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/Guardian First Name Parent/Guardian Last Name

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

_____@_____
Email Address

☐ Check here if you would like to receive the ***ACT-i-Pass monthly newsletter*** by email. This newsletter will provide you with information about the program, including schedule updates, service provider profiles, and other opportunities in the City of London.

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 child while on the premises of facilities or while engaged in any activities in the program.

_____ _____
Parent / Guardian Signature Date

Version: June 19, 2017

Appendix B Original Research Ethics Approval Form for Use of Human Participants in Grade 5 ACT-i-Pass Evaluations and Annual Continuing Ethics Approval (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.

Members of the HSREB 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 Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

[redacted]

Ethics Officer to Contact for Further Information

Erika Basile [redacted]	Grace Kelly [redacted]	Mina Mekhail [redacted]	Vikki Tran [redacted]

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

Western Research

Date: 22 July 2019

To: Jason Gilliland

Project ID: 103954

Study Title: Evaluation of a Physical Activity Intervention for Elementary School Children in London, Ontario

Application Type: Continuing Ethics Review (CER) Form

Review Type: Delegated

Meeting Date: 02/Aug/2019

Date Approval Issued: 22/Jul/2019

REB Approval Expiry Date: 31/Jul/2020

Dear Jason Gilliland,

The Western University Non-Medical Research Ethics Board has reviewed this application. This study, including all currently approved documents, has been re-approved until the expiry date noted above.

REB members involved in the research project do not participate in the review, discussion or decision.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Daniel Wyzynski, Research Ethics Coordinator, on behalf of Prof. Randal Graham, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Appendix C Focus Group Guide for G5AP Users.

Focus Group Question Guide for Children

(USED the ACT-i-Pass)

Welcome:

- Thank you guys for coming to talk about the ACT-i-Pass program with us. My name is _____ and (notetaker) my name is _____.

Overview of the Topic:

- Before we get started, does anyone remember what the ACT-i-Pass was?
    - What can you tell me about it?
    - What places could you use the pass at?

- Just as a quick refresher, the ACT-i-Pass was a card that allowed you to go to YMCA, Boys and Girls Club and City of London Spectrum programs for FREE when you were in grade 5. The goal of the program was to increase your physical activity and improve your health.

  To make the program better, we want to know about your experience with the ACT-i-Pass. There are no right or wrong answers we just want to hear what you have to say.

Guidelines:

- Our chat today will be audio recorded to make sure we don't miss any important information you tell us. Is everyone ok with that? We will keep everything we discuss in this group between us.
- (Notetaker's Name) will also be taking notes to make sure we don't miss anything. When we are finished, we will review what we've talked about and give you guys the chance to add anything before we go.
- I will be asking a few questions and we will be done in about 30 minutes. It's important that each of you **talk one at a time** and we would like to **hear from all of you**, however if there is a question you don't want to answer that's fine.

  We are just interested in your thoughts and opinions about the ACT-i-Pass program. I am sure you guys can help us to understand what you liked or didn't like about the program and how to make the ACT-i-Pass better!

Getting Started:

- To get started lets go around the group and I want each of you to say your name and your favourite thing to do in your spare time.
    - The moderator will start

Main Questions

1. Where did you learn about the ACT-i-Pass program?
    - Was there a presentation at your school about ACT-i-Pass program?
        i. Yes- How helpful was the presentation? What did you like about it?
    - Did you get a package to take home?
        i. What was in it? How helpful was it?

2. What made you want to sign up for the ACT-i-Pass program?
    - Were your friends going to sign up too? What did your friends say about it?
    - Were there fun activities that you wanted to try? Which ones?

3. What did you like about the ACT-i-Pass program?
    - What programs did you try?
        i. Where did you go for those programs?
        ii. Did anyone try a new program or sport? Which ones?
        iii. What was your favourite program that you tried?
    - Plus 1 – The ACT-i-Pass allows you to bring 1 friend or family member with you
        i. Did any of you bring someone with you? Who did you bring?
        ii. What did you like about having someone come with you?

4. What did you not like about the ACT-i-Pass program?
    - Is there anything that made the pass difficult or challenging to use?
        i. Were you too busy? What were you busy with?
        ii. What other sports or activities are you involved with? (How many times per week?)
        iii. Was it too difficult to get to the programs? What made it hard to get to the programs? (Mention the Boys and Girls Club bussing program)
        iv. Do you use programs in your neighbourhood or outside of your neighbourhood? How come? Where do you go?

5. What would you change about the program to make it better?
    - What programs do you want more of?
    - What new places would you like?
    - What would make this program more fun for you? (ANYTHING –let them get creative)

6. How did the ACT-i-Pass make you more active?

7. Have you continued to use any of the programs or sports that you tried in the ACT-i-Pass program?
    - Which ones?

8. Before we finish up, is there anything about ACT-i-Pass that you would like to say? Either good or bad?

I want to thank all of you for talking to us today. We really appreciate you guys helping us out.

Appendix D Focus Group Guide for G5AP Non-Users.

Focus Group Question Guide for Children

(NEVER used the ACT-i-Pass)

Welcome:

- Thank you guys for coming to talk about the ACT-i-Pass program with us. My name is _____ and (notetaker) my name is _____.

Overview of the Topic:

- Before we get started, does anyone remember what the ACT-i-Pass was?
    - What can you tell me about it?
    - What places could you use the pass at?

- Just as a quick refresher, the ACT-i-Pass was a card that allowed you to go to YMCA, Boys and Girls Club and City of London Spectrum programs for FREE when you were in grade 5. The goal of the program was to increase your physical activity and improve your health.

  To make the program better, we want to know about your experience with the ACT-i-Pass. There are no right or wrong answers we just want to hear what you have to say.

Guidelines:

- Our chat today will be audio recorded to make sure we don't miss any important information you tell us. Is everyone ok with that? We will keep everything we discuss in this group between us.
- (Notetaker's Name) will also be taking notes to make sure we don't miss anything. When we are finished, we will review what we've talked about and give you guys the chance to add anything before we go.
- I will be asking a few questions and we will be done in about 30 minutes. It's important that each of you **talk one at a time** and we would like to **hear from all of you**, however if there is a question you don't want to answer that's fine.

  We are just interested in your thoughts and opinions about the ACT-i-Pass program. I am sure you guys can help us to understand what you liked or didn't like about the program and how to make the ACT-i-Pass better!

Getting Started:

- To get started lets go around the group and I want each of you to say your name and your favourite thing to do in your spare time.
    - The moderator will start

Main Questions

1. Where did you learn about the ACT-i-Pass program?
    - Was there a presentation at your school about ACT-i-Pass program?
        i. Yes- How helpful was the presentation? What did you like about it?
    - Did you get a package to take home?
        i. What was in it? How helpful was it?

2. What made you want to sign up for the ACT-i-Pass program?
    a. Were your friends going to sign up too? What did your friends say about it?
    b. Were there fun activities that you wanted to try? Which ones?

3. What was your experience with the ACT-i-Pass program?
    - Never used it- How come you didn't use the pass?
    - Were you too busy with other stuff? What were you busy with?
        i. What other sports or activities are you involved with? (How many times per week?)
    - Is there anything else that made the pass difficult to use?
        i. Was it too difficult to get to the programs? What made it hard to get to the programs? (Mention the Boys and Girls Club bussing program)
        ii. Do you use programs in your neighbourhood or outside of your neighbourhood? How come? Where do you go?

4. Which ACT-i-Pass places have you been to before? (YMCA, Boys and Girls Club, City of London Spectrum programs, public swimming &skating)
    a. Are you still going to any of these places now? Which ones?

5. What would you change about the ACT-i-Pass program that would make you want to use it?
    - What new programs/ sports / physical activities would you want added?
    - What new places would you like?
        i. Places closer to your house?
    - What would make this program more fun for you? (ANYTHING- let them get creative)

Before we finish up, is there anything about the ACT-i-Pass that you would like to say? Either good or bad?

I want to thank all of you for talking to us today. We really appreciate you guys helping us out!

Appendix E Supplementary Quotes from G5AP Focus Groups.

Additional Physical Activity Opportunities

Additional Physical Activity Opportunities

- "I've always been active, but I feel like I got out a lot more, because of the G5AP." (Boy, G5AP user)
- "I do a lot of activities, but it kind of just adds to more activities." (Girl, G5AP user)
- "My parents were happy that there was a program to make me busy 'cause when I would come home there was nothing to do except video games or draw." (Girl, G5AP user)

Free Programming

- "Free is something that can get just any kid to probably do something" (Girl, G5AP User)
- "It came in handy one or two times. Like we wanted to do something then you couldn't do it, because there was no money then you could go do it." (Boy, G5AP user)
- "I mean we don't have as many uses, but a couple kids I know would probably like prefer those [the passes] then they wouldn't have to spend as much money or they could get in with a sibling." (Girl, G5AP user)
- "I liked that it was free, because like it offered programs, like the programs were already there, but it was free programs. Like that's why we went right? It was free." (Boy, G5AP user)
- "I once helped out my friend who, she was like out of money. I don't know why, but she just didn't have money with her, so I got her in with the G5AP. I found it really helpful and she was happy that I had it." (Girl, G5AP user)
- "Well I guess the whole part that it was free was really big thing so when it's free then, your parents think it's a good time for you to get out too, because you don't have to pay for it." (Girl, G5AP user)

Well-Being and Self-Efficacy

Enjoyment

- "I loved it! It was honestly, it was fun!" (Boy, G5AP user)

New Activities and Skillsets

- "[the G5AP] encouraged me to try more sports, 'cause they are more open to me" (Girl, G5AP user)
- "… So I got in [to the Boys and Girls Club] and I got to like try different activities at the gym. I got to do volleyball and dodgeball and everything." (Girl, G5AP user)
- I got in [to service providers] and I got to like try different activities at the gym, I got to do volleyball and dodgeball and everything." (Girl, G5AP user)

Program Structure and Implementation

Variety of Programming

- "I like the ones [the programs] where you could just walk in and do something." (Boy, G5AP user)
- "I liked the fact that it and like any sport you would want to play and the area that it was in. Like all the areas that you could do it at were very close to where we were." (Girl, G5AP user)
- "Because if you don't like, play a sport or do extracurricular activities, it's kinda nice if you can just kinda go, 'cause I know there's some drop-off things.'" (Girl, G5AP non-user)
- "You get the G5AP and you can go wherever you want like… Like skating because everyone wants skating." (Boy, G5AP user)

Time Constraints

- "I asked my parents if I could go to volleyball, but they explained that I have lots of activities throughout the week. Like Monday to Friday I always do things and I like spending time with my family." (Girl, G5AP user)
- "I was in my classes for dancing, and swimming and stuff and then I'd just have like um, kind of like school, like lessons, almost like a tutor kind of thing." (Girl, G5AP user)
- "Like I used it like twice or something. I definitely I did the breakdancing and then I went to a free skate ice at Stronach but like beside that I have bunch of other stuff I was doing like last year. I had hockey, lacrosse, and breakdance so it was kinda hard to fit that in" (Boy, G5AP user)

Increasing Activity Options

- "I think they should add a tennis place or something, 'cause I wanted to play tennis or badminton, but I wanted to try it out first, but I checked my G5AP thing and I was like 'oh, there's no places to go for that'." (Girl, G5AP non-user)
- "Yeah more open times. Like 'aw I can't do it that week, or I can't do it that day, but that's the only day they have it'." (Girl, G5AP user)
- "Maybe there could be like uh the most popular activities, you could do more of on the weekends 'cause nobody really has anything on the weekends." (Boy, G5AP non-user)
- "Well, there's also activities on the G5AP and since like in the summer some kids get really bored there could be more summer activities, not like skating, but maybe basketball, soccer anything like that. So, get kids more active during the summer." (Girl, G5AP non-user)

Pass Difficulties

- "Ya [I didn't use the pass], because I lost it in the first week." (Girl, G5AP non-user)
- "For a whole couple months I forgot all about it, and I lost my pass." (Girl, G5AP user)
- "Mine [my pass] came to me two months late." (Boy, G5AP Non-user)
- Give it to our parents instead of us, because I literally lost it in my backpack the first day I got it." (Girl, G5AP user)

Program Structure and Implementation cont.

Lack of Information

- "The only real problem I had is I didn't understand it much, so I thought there was more rules to it. So I was kind of like 'ok so I don't know if I can bring this person'." (Girl, G5AP user)
- Maybe make it a bit easier to like sign in 'cause when I did volleyball it was like really hard to get signed in." (Girl, G5AP user)
- "I'd personally think it would be a little better for them to get a presentation like our school just so the student understands what happens if you have it, if you get information at home parents read it they might think 'oh it's not interesting'. A student might say 'oh I don't want to go here', but when there's people coming in, talking about it, giving loads and loads of details, what's good about it, what's you know, okay about it" (Boy, G5AP user)
- "Yeah, email reminders. Maybe for the G5AP, sometimes I lost some information and I go searching through my room and then my room is a mess, so maybe there should be like, some like email kinda thing where it has all your information on there." (Girl, G5AP non-user)
- "They should have a thing on their desk, like if you use ACT-I-Pass, like SPC." (Girl, G5AP user)
- "I liked how they [the presenters] had details and talked about like what kind of sports you could do and activities… When I tried it, it was fun." (Boy, G5AP user)
- "I'd personally think it would be a little better for them to get a presentation like our school just so the student understands what happens if you have it, if you get information at home parents read it they might think 'oh it's not interesting'." (Boy, G5AP user)

Spatial Accessibility of Programming

- "Well, some of the G5AP programs were further away and the ones that were close to me, I already had a membership there, so I feel like I didn't get as much use out of it [the pass] ." (Girl, G5AP user)
- "It [the programs] was too far away, and it was only open from 3:30 to 6:30 and that's when the traffic was." (Boy, G5AP user)
- "I think we just never went there [the Boys and Girls Club] 'cause it's so far, like, it's not like really easy. I would rather just go swimming at the aquatic center instead of having to drive like all the way there." (Boy, G5AP user)
- "I asked my mom if I could come play a sport here and my mom and dad both said 'we aren't driving like an hour for you to play sports'." (Boy, G5AP non-user)
- "Well I think it would be cool to have a bus just picking you up, because my parents are usually busy. My dad has work almost like all day until six." (Boy, G5AP user)
- "Transportation. Back to that, even if you got a small something, like a taxi, that you just like drive around and take them places." (Boy, G5AP user)
- "Or the bus could just come pick you up, and you just call your parents, 'Um, yeah, I'm going to ACT-i-Pass, the bus is picking me up,' that would work, right?" (Girl, G5AP non-user)

Social Supports and Constraints

Family Involvement

- "I would usually go with my uncle. He likes to do a lot of sports as well like me and he has a lot of friends there, so me and him go together and play badminton, volleyball, stuff like that." (Boy, G5AP user)
- "My parents were happy that there was a program to make me busy 'cause when I would come home there was nothing to do except video games or draw, but my parents wanted me to be more active." (Girl, G5AP user)
- "My parents, even though I do activities throughout the week, they wanted me to be more active and do more sports." (Girl, G5AP user) "Not really [a problem getting to programs] because my mom, I live with her, my dad… he just lives like 2 minutes away from my mom's house, so he can drive." (Boy, G5AP non-user)
- "I didn't have any trouble [with transportation] because whenever my mom was at work, my dad would have the car here. Then he would just, he needed to take me." (Girl, G5AP non-user)
- "So if you wanted to go somewhere with you family, like with you mom or dad…You could actually do it, so you have more family time." (Boy, G5AP user)
- "I really like skating and finding out that I could just take my brother on the ice with me and he doesn't really like to skate, unless there's someone or somewhere with him… so it really made me happy to be able to be right beside him anytime." (Girl, G5AP user)
- "My whole family likes to be together. I could only bring one person, so two people would have to pay." (Girl, G5AP user)
- "I don't do much, 'cause we weren't allowed to sign up for anything with our reno, 'cause we have to go out and buy toilets and flooring and carpets every other day." (Girl, G5AP user)
- "Well my mom's a teacher and she has to plan her class 'cause a school age program, so she doesn't really get home very early." (Girl, G5AP non-user)

Companionship

- "Yeah like one of your friends is kinda hard to pick sometimes." (Boy, G5AP user)
- "Um I like how you can go up to your friend and say 'hey, want to come with me to the YMCA later. We can do some sports or whatever', instead of just doing it alone." (Girl, G5AP user)

Appendix F Grade 5 ACT-i-Pass Posters Used in Promotional Campaign.

ACT-i-Pass
Grade 5 students

ACT-i-Pass is a unique opportunity for grade 5 students to get ***FREE*** access to many of London's recreational centres and programs!

Your child can take part in ***FUN*** activities like:

- swimming
- skating
- recreationcal sports
- dance
- bowling

...and so much more!

Register your child today at:
www.playeveryday.ca

The pass provides free access to:

Palasaad games | restaurant | bar
JUNCTION LONDON'S CLIMBING CENTRE
Children's MUSEUM
Boys & Girls Club of London

**Registration is required for:*

SARI THERAPEUTIC RIDING | Changing Lives Stride by Stride
London CANADA

@g5actipass
Grade 5 ACT-i-Pass Program - @g5actipass

ACT-i-Pass Grade 5 students

Sign up for *FREE* access to:

- YMCA
- Boys and Girls Club
- City of London recreational centres and arenas

...and so much more!

Some locations even let you to bring a friend or family member for free!

Take part in ***FUN*** activities like:

- swimming
- skating
- basketball
- volleyball
- soccer
- dance
- bowling

...and so much more!

Let the adventures begin!

REGISTER TODAY AT:

www.playeveryday.ca

Grade 5 ACT-i-Pass Program - @g5actipass

@g5actipass

Appendix G Grade 5 ACT-i-Pass Spatially-Targeted Facebook Advertisements Used in Promotional Campaign.

Curriculum Vitae

Name: Emma Ostermeier

Post-secondary Education and Degrees:

University of Western Ontario
London, Ontario, Canada
2018-2020 M.Sc.

The University of Toronto
Toronto, Ontario, Canada
2013-2017 B.Sc. (Hons)

Related Work Experience

Teaching Assistant
The University of Western Ontario
2018-2020

Research Associate
Human Environments Analysis Laboratory
2018-2020

Publications

Wray A, Martin G, Ostermeier E, Medeiros A, Little M, Reilly K, Gilliland J. Physical activity and social connectedness interventions in outdoor spaces among children and youth: a rapid review. Health Promotion & Chronic Disease Prevention in Canada: Research, Policy & Practice. 2020 Apr 1;40(4).

Badawi A, Velummailum R, Ryoo SG, Senthinathan A, Yaghoubi S, Vasileva D, Ostermeier E, Plishka M, Soosaipillai M, Arora P. Prevalence of chronic comorbidities in dengue fever and West Nile virus: A systematic review and meta-analysis. PloS one. 2018;13(7):e0200200.

Presentations

Oral Presentation
Ostermeier, E., Reilly, K.C., Nelson Ferguson, K., Coen, S., & Gilliland, J.A. *"Ahh it's like paradise… but inside": Children's perceptions of a free physical activity program.* Canadian Association of Geographers Ontario. October 2019.

Oral Presentation
Guest presenter in 'Geography 3250'. *Assessing children's physical activity opportunities: the use of qualitative and quantitative methods in research*. Course Instructor: Dr. Carol Hunsberger. October 2019.