The Effects of an Intentionally Designed Physical Literacy Curriculum on Primary-Aged Children

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The Effects of an Intentionally Designed Physical Literacy Curriculum on Primary-Aged Children

by

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Abstract

Fundamental movement skills (FMS) are considered to be the foundation of life-long participation in physical activity (PA). Tied closely to FMS is an individual’s sense of self perception of competence and confidence. It is argued that feeling positive about your ability to acquire and apply FMS to a variety of contexts will result in a greater likelihood of continued participation. The development of FMS typically occurs in education and sporting environments however, the recreation sector is an alternate viable arena to enhance such skill development.

This thesis explores the creation of an intentionally designed PA curriculum, that is grounded in the philosophy of physical literacy (PL), and its’ influence on recreation programming including children’s motor proficiency and instructor behavior. Little scholarly research has been conducted in this area in the recreation sector. The literature that exists on children’s PA exertion and instructor behavior has primarily been conducted in the school and after-school environments.

A total of 57 children in grade one and grade two were invited to participate in this research study. Children were divided into two groups, PL and traditional recreation (TR) programming. Those children in the PL program experienced PA in the four environments of land, air, snow/ice and water. Children involved in TR programs self-selected PA programs and were taught by traditional recreation instructors. Both groups of children participated in PA programs twice a week at a recreation centre in North central Calgary from January to May 2014.

Motor proficiency testing, utilizing the Bruininks-Oseretsky Test of Motor Proficiency, identified a change over time for both groups and a statistical difference for participants in the PL program. Systematic observation revealed that group participation
influenced PA behaviors of children. Further, discriminant analysis determined that the criterion for instructor interaction variables (as determined by the System for Observing Fitness Instruction Time) can be used to distinguish amongst instructors.

The results of this research study suggest that purposeful, intentional recreation programming (in physical literacy) that is aligned with education outcomes and sport philosophy has the ability to influence PA behaviors in the recreation sector. It is suggested that further research in professional development and recreation curriculum continue to be explored to promote the development of FMS to contribute to an individual’s sustained participation in PA over the life course.
Acknowledgements

Firstly, I would like to express my gratitude to my supervisor, Dr. Larry Katz, for his wisdom, encouragement and ongoing support and patience throughout the entire PhD process. Larry is truly a special individual who really believes in supporting and encouraging student success. His optimistic and ‘110%’ attitude was greatly appreciated particularly during the final push to complete this dissertation.

Thank you also to my fellow committee members Dr. Daniel Balderson and Dr. Dwayne Sheehan. These gentlemen provided guidance and also challenged me academically.

The journey of this dissertation was not done alone. There are many friends who encouraged and supported me along the way and I will be forever grateful. Support for this project also came from Vivo, for Healthier Generations and from the visionary Cynthia Watson. Cynthia, from the outset of this project, believed that the recreation sector can and must do more to help people live their lives to the fullest.

My parents, Ron and Florence Deshayes, and my mother-in-law, Betty Van Wyk, have demonstrated such love and support along my educational journey. Words cannot express my sense of love and gratitude to them.

In the end, it is the unconditional love and support of my best friend and soul mate, my husband Mark that made this PhD possible. Throughout the tumultuous period of completing this dissertation he has remained my biggest fan and I am blessed to spend my life with him. Thank you to my three beautiful children Safford, Jaxon and Ava. I hope that I was able to demonstrate a love for learning and that if you believe in the work you are doing it is possible to make a difference.
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Chapter One: Introduction

1.1 Overview of the research area

The literature suggests that children and youth are not meeting the recommended guidelines of 60 minutes/day of physical activity (PA; Loprinzi, Cardinal, Loprinzi, & Lee, 2012; ParticipACTION, 2016; Tremblay et al., 2011). As a result, we are seeing an increase in the number of children and youth who are overweight and obese (Anis et al., 2010; Canning, Courage, & Frizzell, 2004; Roberts, Shields, de Groh, Aziz, & Gilbert, 2012; World Health Organization, 2016). To assist in curbing this trend, children should be provided with opportunities to acquire and develop a variety of fundamental movement skills (FMS) and fundamental sport skills (FSS) so that they can become proficient in their movement patterns, thereby increasing their competence and confidence to continue participating in PA.

FMS are considered to be the building blocks for continued participation. Such skills include the ability to execute movements that allow an individual to travel (e.g., skip, run), to move while stationary (e.g., twist, stretch, balance) and to control an object while stationary or traveling (e.g., dribbling a basketball). The importance of developing FMS for increased opportunities for life-long participation in PA is well documented in the literature (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2009; Fisher et al., 2005; Heitzler, Martin, Duke, & Huhman, 2006; Loprinzi et al., 2012; Lubans, Morgan, Cliff, Barnett, & Okely, 2010; Okely, Booth, & Patterson, 2001). Opportunities to acquire FMS occur in a multitude of settings including education, sport, recreation and unstructured situations.

The acquisition and application of FMS and FSS contributes to an individual’s likelihood of continued participation, however there is more to PA than these skills alone. The human body is capable of much more than simply acting as a vehicle to engage in physical movement. Rather,
the view of the body should be holistic recognizing that the body is not separate from our entire being and that the experiences we have influence both our body and our overall well-being (Whitehead, 2007). This perspective, coined by Margaret Whitehead, is referred to as physical literacy (PL). Physical literacy is the belief that the lived body, is the embodied dimension of the human experience and as such can be enriched through various experiences which allow us to live to our potential (Whitehead, 2007). This perspective suggests that a broader, holistic perspective of the individual will allow for a greater sense of understanding and development in regard to self-realisation, self-concept, emotion and the importance of social relationships (Whitehead, 2007, 2010).

Educators, coaches and all individuals working with children have an opportunity to provide meaningful experiences that will contribute to their understanding and sense of being. Intentionality, in program development and delivery, should allow children and youth to develop a sense of being rather than merely physical skills.

Many PA programs, such as those that exist in education and organized sport, are often created with a specific structure or purpose. The objective of the Alberta physical education (PE) curriculum is to have students “develop the knowledge, skills and attitudes to lead an active and healthy life” (Alberta Education, 2000, p.1). In order to do this, teachers are expected to deliver a PE program to accomplish this mission.

The Alberta Education curriculum endorses the Program of Studies (POS) which provides teachers with specific curricular objectives to educate students. These objectives are specific for each grade and transcend students in kindergarten through to grade twelve. It is the responsibility of each teacher to ensure that students acquire the necessary skills outlined in the POS. To assist teachers with this mandate, opportunities for multiple experiences are built into
the curriculum including; dance, gymnastics, individual-based activities, game activities and alternate environments (Alberta Education, 2000, p.4). This broad exposure to numerous PA experiences develops a multitude of FMS. One benefit of the education system is that all children are required to attend school. Therefore, school becomes an equalizer in providing many children with various PA experiences that some may not experience otherwise.

Sport Canada is tasked with a similar objective. Sport Canada, in conjunction with an expert group of individuals, has created a seven–stage sport model referred to as Canada’s Long Term Athlete Development (LTAD) model. This model encourages individuals to experience a range of PA experiences that occur on the ground, air, water, snow and ice (Higgs et al., 2008). This model also encourages individuals to experience PA on a continuum, from recreation through high performance competitive opportunities. The ultimate outcome of the model is for all individuals to be active for life.

Some children also have the opportunity to participate in organized recreation such as the sport-based activities of swimming, soccer and hockey. Within some of these activities, children are tested and evaluated on their skill level based on specific criteria relevant to that particular sporting activity. This allows, in theory, for the teacher or program leader to help individuals acquire the necessary skills to be successful in achieving a badge or moving onto the next level. Testing children to ensure that they are acquiring the minimum skills to continue to the next level (similar to education) requires instructors or coaches to deliver lessons that will allow the child to be successful.

1.2 Qualification expectation

In Canada, to work in the school system, teachers are required to have a Bachelor of Education degree. To work in the sport sector, individuals are often required to receive a
minimum certification through the National Coaching Certification Program (NCCP). NCCP is sport specific, meaning that coaches receive certification in a sport that they are interested in coaching, such as hockey. These educational requirements emphasize a minimum expectation of the coach to deliver a quality sporting experience. This standard does not exist to the same degree in recreation. To work within the recreation sector, many individuals simply hold experience as their credential. There is an opportunity within the recreation sector to do more to support the professional development of recreation leaders.

1.3 Purpose of research

The purpose of this research study is to determine the following:

1. Does an intentionally designed PL recreation program, which uses evidence-based lesson plans and is aligned with the Alberta Education POS, increase children’s motor competence?

2. Does an intentionally designed PL program in recreation, which aligns with Canada’s LTAD model, and values PA experiences on the ground, air, water, snow and ice, increase children’s motor competence?

3. Are those children who participate in an intentionally designed PL program more active during their class time when compared to traditional recreation programs?

4. Do parents recognize a difference between traditional recreation programs and the intentionally designed PL program?

1.4 Statement of the problem

Scholarly research in after-school and recreation programming is growing due to an influx of interest by researchers of programming that occurs during the peak time of day between 3-6 pm (Hirsch, Mekinda, & Stawicki, 2010; Howe, 1993; Rosenkranz, Welk, & Dzewaltowski,
The research that is occurring during this time focuses on many issues including nutrition, homework, physical activity and societal issues (e.g., drugs and alcohol). The after-school hours are an opportune time for communities and recreation centres to promote and encourage such programming (Cross, Gottfredson, Wilson, Rorie, & Connell, 2010; Gottfredson, Cross, & Soule, 2007; Hirsch et al., 2010; Lerner et al., 2005).

Typical recreation PA opportunities often exist due to program popularity, an appropriate cost and a convenient schedule (Cross et al., 2010; Hirsch et al., 2010; Howe, 1993; Sheldon, Arbreton, Hopkins, & Grossman, 2010; Weaver, Beets, Webster, Beighle, & Huberty, 2012). The problems that exist in recreation PA programs are a lack of purpose and intention throughout a recreation session. Many programs are offered out of convenience and the availability of an instructor. The instructor may or may not have experience in the activity they are teaching and are often left on their own to deliver a PA experience. As a result, children are often kept “busy” throughout the PA experience but program planning and intentionality often do not occur (Cross et al., 2010; Gottfredson et al., 2007; Lerner et al., 2005; Zarrett et al., 2008). Recreation has the opportunity to do much more toward providing quality program and staff development that are aligned with the concept of PL (Hallfors & Godette, 2002; Rajan & Basch, 2012). Such improvements may lead to health benefits (i.e., decrease in obesity and increased PA behaviours), as well as possible implications toward an individual’s social, emotional and mental well-being.

1.5 Thesis overview

This chapter has provided an overview of the scope and need for this research study. Chapter two begins with a review of the literature documenting the need to increase and sustain PA participation in children and youth for their overall health and wellness. This chapter also
highlights the importance of developing FMS, and motor competence for sustained participation, as well as motivational theory as it relates to participation. Evaluating PA and motor competency through product-based assessment and systematic observation are also discussed. Chapter three identifies the process the author went through to develop an intentional PL program for children in grades one and two in the recreation sector to address the gap in programming. Chapter four presents the methodological process used to conduct the study through a quantitative and qualitative lens. Chapter 5 highlights the results of the data collected through motor proficiency testing, systematic observation and the use of focus groups. The final chapter, Chapter six, synthesises the data collected and demonstrates how it contributes to the existing body of knowledge. This chapter also identifies some strengths and limitations of the research study as well as practical implications for future research.

1.6 Chapter summary

Children and youth are not meeting recommended guidelines for daily PA. The recreation sector can and must do more to curb this negative trend. It is suggested that a strong foundation in the acquisition and application of FMS is an important indicator for lifelong participation in PA. However, there is more to PA than FMS. This chapter has suggested that creating recreation programs that are designed with purpose and intention, that align and reinforce the objectives of the education and sport sector may provide a viable solution. Further, it was identified that a formal educational requirement, to work in the recreation sector, is not required. The PA experience and the role of the instructor may have implications for continued participant participation.
Chapter Two: Literature Review

The purpose of this thesis is to explore the development of fundamental movement skills (FMS) and physical activity (PA) programming in an intentionally designed physically literacy (PL) program in the recreation sector. The importance of developing FMS is well documented within the literature, particularly in the realm of sport and education. However, little scholarly research has been conducted in the recreation sector in the area of FMS and program evaluation.

A vast amount of research articles were collected to understand the strengths and limitations of recreation programming through a number of different databases including; Cumulative Index to Nursing and Allied Health Literature (CINAHL), SPORTDiscus, Education Research Complete, ProQuest, Elton B. Stephens Co. (EBSCO), Physical Education Index, PubMed, ScienceDirect, Academic Search Complete and ERIC. Specific terms were used individually and in combination in the search engines to gather relevant data. Such terms included but not limited to: recreation, leisure, after-school programs, physical activity, physical literacy, motor proficiency, barriers to motor proficiency, motor proficiency testing, Bruininks-Oseretksy Test of Motor Proficiency, systematic observation, motivation, motivational theory, self-determination theory, social cognitive theory, flow theory, qualitative and quantitative data collection, focus groups, determinants of health, and children. Relevant articles were utilized and further data sources were collected from reference lists.

This literature review is divided into sections to address the purpose of this thesis. The first section provides an overview of the benefits associated to PA including recommended guidelines for daily PA and sedentary behavior. The second section highlights how children and youth PA patterns have been measured, within a Canadian context (e.g., Active Healthy
Kids Canada Report Card). The third section identifies the importance of developing FMS and motor competence in developing PL. The fourth section explores research that has been conducted in the area of recreation, leisure and after-school programming. The next section then explores the implications of professional development on instructor performance. This is then followed by a description of motivational theory in relation to children’s participation in PA. The final section addresses tools used to assess motor proficiency and program evaluation. The literature review provides context and research linkages to inform the research questions.

2.1 Benefits of PA

Regular participation in PA is associated with many health benefits including the development of strong bones, a healthy heart and is also positively associated to an individual’s social, emotional and mental well-being (Ferreira et al., 2007; Janssen & LeBlanc, 2010; Lopes, Vasques, Maia, & Ferreira, 2007).

Guidelines for PA and sedentary behaviour exist to provide the public with recommendations for living a healthy lifestyle.

2.1.1 Physical activity and sedentary behaviour guidelines

The Canadian Society for Exercise Physiology has created guidelines for PA and sedentary behaviour (Canadian Society for Exercise Physiology, 2012). PA is defined as any activity that increases an individual’s heart rate and breathing as well as energy expenditure as the result of bodily movement (Beets, Beighle, Erwin, & Huberty, 2009; Canadian Society for Exercise Physiology, 2012; World Health Organization, 2016). In contrast, sedentary behaviour includes activities that require little bodily expenditure such as watching television and surfing the internet (Canadian Society for Exercise Physiology, 2012; Loprinzi et al., 2012; Tremblay et al., 2011). The guidelines were created with the purpose of improving the health and well-being of
Canadians in multiple age categories including; early years, child, youth, adult and older adult.

The age-specific guidelines are listed in Table 2-1.

**Table 2-1 Canadian Society for Exercise Physiology (CSEP) physical activity and sedentary behaviour guidelines**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Physical Activity Guideline</th>
<th>Physical Activity Example</th>
<th>Sedentary Behaviour Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Years (0-4)</td>
<td>Infants &lt;1 should be active several times a day</td>
<td>Tummy time, playing on floor (rolling and reaching)</td>
<td>Minimum amount of time should be spent in sedentary behaviour (e.g., sitting in strollers and high chairs)</td>
</tr>
<tr>
<td>Toddlers (1-4 years) should be active 180 minutes per day (this should build to energetic play of 60 minutes per day)</td>
<td>Climbing, crawling, walking, exploring environment. Examples of energetic play include; skipping, hopping and jumping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood (5-11)</td>
<td>60 minutes of moderate-to-vigorous physical activity daily. This includes vigorous activity and activity that increases muscles and bones 3 times per week</td>
<td>Playing on the playground as well as active games such as tag. Engaging in active modes of transportation to and from school.</td>
<td>Limiting recreation screen time to &lt; 2hrs/day as well as sedentary behaviour and time spent indoors</td>
</tr>
<tr>
<td>Age Group</td>
<td>Physical Activity Guideline</td>
<td>Physical Activity Example</td>
<td>Sedentary Behaviour Guideline</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Youth (12-17)</td>
<td>60 minutes of moderate-to-vigorous physical activity daily. This includes vigorous activity and activity that increases muscles and bones 3 times per week</td>
<td>Participation in structured activities such as fitness classes or organized programs. Engaging in active modes of transportation to and from school</td>
<td>Limiting recreation screen time to &lt; 2hrs/day as well as sedentary behaviour and time spent indoors</td>
</tr>
<tr>
<td>Adult (18-64)</td>
<td>150 minutes per week of moderate-to-vigorous physical activity. Activity is encouraged to occur in a minimum of 10 minute bouts. Also include activities that encourage muscle and bone strengthening 2 times per week</td>
<td>Join a walking group, try a fitness class</td>
<td></td>
</tr>
<tr>
<td>Older Adult (65+)</td>
<td>150 minutes per week of moderate-to-vigorous physical activity. Activity is encouraged to occur in a minimum of 10 minute bouts. Also include activities that encourage muscle and bone strengthening 2 times per week. Continuing to participate in physical activity will decrease the chance of injury after a fall</td>
<td>Join a walking group, walk the dog after dinner, try a new activity</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from “Canadian Physical Activity Guidelines; Canadian Sedentary Behaviour Guidelines,” by Canadian Society for Exercise Physiology, 2012.
The guidelines, first released in 2011, identified that children (5-11 years) and youth (12-17 years) should acquire a minimum of 60 minutes per day of moderate-to-vigorous PA (MVPA); adults (18-64 years) and older adults (64+ years) should achieve a minimum of 150 minutes of MVPA each week (Canadian Society for Exercise Physiology, 2012; Tremblay et al., 2011). MVPA is defined as activity that increases your heart rate through a combination of aerobic activities as well as bone and muscle strengthening activities (Canadian Society for Exercise Physiology, 2012; ParticipACTION, 2016). Individuals, as suggested in the guidelines, are encouraged to surpass the minimum recommended minutes of PA in order to achieve the greatest health benefit (Canadian Society for Exercise Physiology, 2012). According to new information from the 2012-2013 Canadian Health Measures Survey (CHMS), 13% of boys and 6% of girls (5-17 years) are meeting the daily recommended 60 minutes of MVPA (Roberts et al., 2012). The majority of children and youth are spending bulk of their time in sedentary behavioural pursuits. On average, children and youth, spend 8 hours and 27 minutes of their day being sedentary (Statistics Canada, 2013b).

The number of overweight and obese children worldwide has increased significantly (Doak, Visscher, Renders, & Seidell, 2006). Canada is not immune to this trend. The 2009-2011 CHMS identified that almost 32% of children and youth between the ages of 5-17 were overweight or obese (Statistics Canada, 2013a). Obesity was more prevalent for boys (15%) compared to girls (11%) but both were equally overweight (19%). There was not a significant difference between girls in the respective age categories. For girls aged 5-11, 19% were identified as overweight and 9% obese compared to girls aged 12-17 who were 18% overweight and 12% obese (Statistics Canada, 2013a).
2.1.2 Section summary

Canadian children and youth are not meeting the recommended guidelines for PA and sedentary behaviour. Low levels of PA are a contributing factor to childhood overweight and obesity. To further identify and address the issue, a report card has been created and is discussed in the next section.

2.2 Report card on Canadian children’s physical activity

The first annual report card for Active Healthy Kids Canada was published in 2005 by the Healthy Active Living and Obesity (HALO) Research Group at the Children’s Hospital of Eastern Ontario Research Institute with the intention to get Canadian children moving (Active Healthy Kids Canada, 2005). Now in its 11th year, it continues to be published under the ParticipACTION umbrella (www.participaction.com). Data is collected from 17 different indicators including pedometer data, self-reported data as well as various surveys such as Canada’s Physical Activity Levels Among Youth survey (CANPLAY), Health Behaviour in School-Aged Children survey (HBSC) and Opportunities for Physical Activity at Schools (Active Healthy Kids Canada, 2005). This information is combined into three distinctive categories:

1. Strategies and Investments (referring to policy implementation);

2. Settings & Sources of Influence (where activities are occurring, school & childcare settings, influence of family & peers, community & the built environment); and

3. Behaviours that Contribute to Overall Physical Activity Levels (such as active play & leisure, sedentary behaviour organized sport & physical activity participation; Active Healthy Kids Canada, 2005).
Data is measured against benchmarks that identify trends over time and allows for international comparisons (Active Healthy Kids Canada, 2005). Much like a school report card, the Active Healthy Kids Canada/ParticipACTION report cards provide a letter grade from A to F. To provide additional context to the data, a brief description of the standardized measures used follows.

CANPLAY is a combined effort between the Canadian Fitness and Lifestyle Research Institute, the Public Health Agency of Canada and the Inter-Provincial Sport and Recreation Council (www.cflri.ca/canplay). This national survey used pedometers to objectively measure child and youth (5-19 years) PA levels.

The HBSC survey is done in collaboration with the World Health Organization (WHO). This survey is conducted every 4 years in 44 countries across Europe and North America (http://www.hbsc.org/). The data includes measurement in three specific areas including:

1. A questionnaire on health behaviours (such as PA and active transportation), lifestyle factors and demographics;
2. An administrative questionnaire that is distributed to school principals to examine school demographics, policy, infrastructure and neighbourhood school settings; and
3. Geographic information systems (GIS) to measure the built and social features in the school neighbourhood (http://www.hbsc.org/)

Another survey used to inform the Active Healthy Canada Report Card is the Opportunities for Physical Activity and Schools survey (OPASS). This survey specifically explores the opportunities and composition of school physical education (PE) programming, opportunities and facilities that promote PA at school (including extra-curricular activities), as well as the physical and social environments of the school (www.cflri.ca).
The ParticipACTION 2016 report card identifies that only 9% of children and youth between the ages of 5-17 achieve the recommended 60 minutes per day of MVPA, resulting in a grade of D- for a third year in a row (ParticipACTION, 2016). In contrast, 70% of children between the ages of 3-4 are meeting the recommended 180 minutes of daily activity in any intensity (ParticipACTION, 2016).

New in the 2016 report card is a category on physical literacy (PL). PL, according to the report card, is defined as “skills that are necessary for a child to be active in multiple environments” (ParticipACTION, 2016, p. 31). The creation of this category is partially in response to the declining levels of PA and also to hold those responsible for teaching and overseeing PE programs accountable, similar to educators instructing core academic subjects (Lloyd, Colley, & Tremblay, 2010; Longmuir et al., 2015; Tremblay & Lloyd, 2010). The test created to measure PL is the Canadian Assessment of Physical Literacy (CAPL). CAPL is a valid, reliable and feasible tool that measures children’s PL in four specific domains: fundamental motor skills, physical activity behaviours, physical fitness and knowledge, awareness and understanding (Longmuir et al., 2015; Tremblay & Lloyd, 2010).

A summary of the PL scores from the 2016 ParticipACTION report card are highlighted in Table 2-2. Canadian children received a grade of D+ (ParticipACTION, 2016).
Table 2-2 Percentage of Canadian children and youth 8-12 years of age who meet or exceed the minimum level recommended as measured by the Canadian Assessment of Physical Literacy (CAPL)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Percent meeting goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Literacy</td>
<td>44%</td>
</tr>
<tr>
<td>Knowledge and</td>
<td>62%</td>
</tr>
<tr>
<td>Understanding</td>
<td></td>
</tr>
<tr>
<td>Daily Behavior</td>
<td>44%</td>
</tr>
<tr>
<td>Physical Competence</td>
<td>28%</td>
</tr>
<tr>
<td>Motivation and Confidence</td>
<td>44%</td>
</tr>
</tbody>
</table>

(ParticipACTION, 2016)

This holistic approach to assessment not only allows for comparisons of Canadian children but also provides possible insight to barriers of PA.

2.2.1 Section summary

Not achieving the daily recommended minutes of PA can have negative implications on children’s social, physical and emotional health. The magnitude of the issue is highlighted with additional data on high overweight and obesity rates and low PL scores. Providing opportunities to develop the necessary skills to be physically active is extremely important to the overall well-being of children (Barnett, Hinkley, Okely, & Salmon, 2013; Findlay, Garner, & Kohen, 2010; Hastmann, Bopp, Fallon, Rosenkranz, & Dzewaltowski, 2013). The opportunity to enhance such skills outside of organized sport and school is identified as a viable option in recreation, leisure and after-school programming in the following section.

2.3 Recreation, leisure and after-school programming

There are many opportunities to participate in PA beyond structured programs such as school and sport-type activities. Sport and recreation are referred to as organized physical and recreational activities (Beneforti & Cunningham, 2002). Leisure is described as discretionary
time that is left free from obligations (Brightbill, 1960). Recreational pursuits are opportunities for engagement that are freely chosen such as painting and gardening that provide intrinsically rewarding experiences (Iso-Ahola, 1980; Roberts, 1981). Regardless of the location of PA the outcome of all programs is to create a culture of activity so that individuals are healthy and well. Research on PA and instructor engagement has typically occurred in sport and education however a growing trend is to explore the after school hours particularly in recreation and leisure. In order to address the declining health and well-being of Canadians, a PA strategy and change agenda has been created called, Active Canada 20/20 (Active Canada 20/20, 2012).

2.3.1 Active Canada 20/20

In order to combat increased sedentary behaviour and decreased engagement in PA, a collaborative, coordinated initiative has emerged amongst various stakeholders to positively influence Canadian’s PA behaviours (Active Canada 20/20, 2012). A social-ecological approach was used in the development of this strategy, identifying that behavioural change is more successful when barriers from the multiple layers of influence are removed (Active Canada 20/20, 2012; Bengoechea, Sabiston, Ahmed, & Farnoush, 2010; Elder et al., 2007). Understanding that there are multiple indicators that may influence PA behaviours such as accessibility, cost and individual attitudes are important considerations when attempting to influence behavioural change.

2.3.2 After-school programming

School is intended to be an equalizer amongst children by providing them with daily opportunities to engage in PA. The school PE program should provide all children the chance to develop physical skills that will assist them in developing patterns so they can be active over their lifetime (Keating, Kulinna, & Silverman, 1999; McKenzie & van der Mars, 2015; Simons-
Morton, Taylor, Snider, Huang, 1993). Unfortunately, in some schools, children receive as little as 8% to 11% of the daily PA recommendations (Beets et al., 2009; Trost, Rosenkranz, & Dzewaltowski, 2008). Given this, great opportunities exist in after-school programming to enhance PA (Beets et al., 2009; Beets, Huberty, Beighle, & The Healthy Afterschool Program Network, 2012; Cross et al., 2010; Gortmaker et al., 2012; Weaver et al., 2012).

After-school programming is defined as:

…a program that a child regularly attends that provides a supervised enriching environment in the hours after the school day ends. These programs are usually offered in schools or centers and are different from individual activities such as sports, special lessons or hobby clubs (Weaver et al., 2012, p. 187).

The period after-school from 3-6 pm is a critical period for youth. An association between a lack of supervision (often as a result of two parents working), and an increase in criminal activity and undesired behaviours is recognized (Cross et al., 2010; Hastmann et al., 2013; Hirsch et al., 2010). Many opportunities exist in the after-school hours to positively develop and enhance children and youth’s social, physical and emotional well-being. The scope of research that has occurred in the after-school environment is vast and goes beyond the scope of PA alone. A study conducted by Trost et al., (2008) explored the PA levels of children during after-school programs while Hastmann and colleagues (2013) and Welk et al. (Welk, Wood, & Morss, 2003) (2009) explored the opportunity for increasing PA and nutrition amongst youth. Other studies, such as one conducted by Gottfredson et.al (2007) explore after-school programs and the potential to decrease delinquent behavior. Due to schools being constrained for time in achieving academic goals, the after-school setting has the potential to further foster the positive development of children and youth (Cross et al., 2010; Gortmaker et al., 2012; Hastmann et al., 2013; Hirsch et al., 2010; Trost et al., 2008).
Although after-school programs are viable options to address youth development, little research has been done in this realm (including recreation) in regard to exploring opportunities to increase children’s PA levels, program evaluation and professional development (Beets et al., 2009; Beets, Rooney, Tilley, Beighle, & Webster, 2010; Gortmaker et al., 2012). Evaluation is often anecdotal and does not provide richness to improve program outcomes (Beneforti & Cunningham, 2002; Simpkins, Fredricks, & Eccles, 2012). Customer satisfaction, for both parents and children, is significant in continued participation in recreation programs (Ko & Pastore, 2004; Witt, Crompton, & Baker, 1995). According to Ko and Pastore (2004), quality service is multidimensional and can be measured by; program quality (range of programs and time of programs); interaction quality (interaction that occurs between client and employee and inter-client); outcome quality (physical change, valence, sociability); and environment quality (ambiance, design, equipment).

In addition to the aforementioned measurement of quality service, a common program indicator used is “dosage response.” The dosage response explores attendance as a determinant of program quality and satisfaction (Hirsch et al., 2010; Simpkins et al., 2012). Attendance alone, however, does not provide insight into the integral components of program quality.

2.4 Professional development

An important component identified in much of the literature on intervention activities (i.e. in after school programs) is that of staff training. Professional development and training opportunities for educators and community/recreation practitioners is identified as one viable avenue (Beets, Huberty, & Beighle, 2013; Chow, McKenzie, & Louie, 2008; Parker & Curtner-Smith, 2005; Sheehan, 2015; Van Cauwenberghe, Labarque, Gubbels, De Bourdeaudhuij, & Cardon, 2012; Weaver et al., 2012). Providing additional training and support for leaders in best
practices for effective delivery of quality programs may assist in increasing MVPA while simultaneously decreasing sedentary behavior. There are simple adjustments that can be made to mitigate the amount of time in sedentary behavior including; having kids stand while giving instructions, the use of teaching cues to quickly get children on task, using name tags to eliminate much wasted time at the beginning of the program taking attendance. Such examples coincide with the conceptual framework created by Weaver et al., (2012) intended to create universal expectations of leaders in after-school programs (ASP). The model consists of 5 M’s, Mission (a focus on policies and competency-based training for leaders), Motivate (provide children with choice, opportunities to participate in developmentally appropriate activities that will allow them to feel success, as well as the positive role modeling of leaders), Manage (ensuring the safety children, a thoughtful lesson plan, effective leadership), Monitor (assessment of behaviors) and Maximize PA (Weaver et al., 2012).

In addition to training leaders to facilitate quality programming is the utilization of evidence-based approaches to improving program outcomes. The work done by Durlak et al., (2010) identify that success in interventions is due to sequential professional development but also the accountability in establishing specific program goals, creating activities to foster the development of goals and getting youth actively involved. Intention, purpose, quality staff and accountability, in combination, are key components in successful intervention activities (Cross et al., 2010; Durlak et al., 2010; Gottfredson et al., 2007; Martin & Kulinna, 2005; Sheldon et al., 2010; Weaver et al., 2012).

2.5 Section summary

Recreation, leisure and after-school programming are identified as possible avenues to develop personal and social skills in children and youth. Included in this, are PA skills. Creating
programs that have clear and specific outcomes with trained, competent staff appear to have the best opportunities to influence behavioral change. The next section will identify the significance of developing FMS for increased levels and sustained PA participation.

2.6 Fundamental movement skills

FMS are identified as the building blocks upon which more complex movement skills and patterns are built to promote later PA participation (Cliff, Okely, Smith, & McKeen, 2009; Higgs et al., 2008; Lubans et al., 2010; Robinson, 2011). Whitehead (2010, p. 53) refers to FMS as a “bank of movement skills”. FMS are often divided into three distinctive categories: locomotor, non-locomotor (stability skills) and object manipulative skills (Barnett, van Beurden, Morgan, Brooks, & Beard, 2008; Barnett et al., 2009; Okely et al., 2001).

Locomotor skills are movement or traveling skills that provide individuals with the opportunity to move freely and deliberately within space. The ability to move efficiently within a designated space, with or without equipment is a basic skill often required for small or large group activities (e.g., tag, soccer, basketball). These skills often include, but are not exclusive to, the ability to hop, skip, jump and dodge (Foweather et al., 2008; Higgs et al., 2008).

Non-locomotor skills are sometimes referred to as stability skills (Barnett et al., 2008, 2009; Foweather et al., 2008). These skills often include bodily movement done in a stationary position such as twisting, turning and stretching.

Object manipulation is inclusive of receiving, retaining and traveling with equipment (Barnett, van Beurden, et al., 2008; Foweather et al., 2008). These skills are often the most difficult for children to acquire as they involve the manipulation of equipment while traveling. Activities such as basketball, soccer and floor hockey are representative of object manipulation skills.
The ability to utilize these various movement patterns and skills in isolation or in combination leads to the development of fundamental sport skills FSS (Higgs et al., 2008). A strong foundation in FMS will provide children with a broad exposure to skill development which will increase the opportunity to engage in multiple activities over their life course (Loprinzi et al., 2012).

Table 2-3 Canadian Sport for Life FMS identified skills

<table>
<thead>
<tr>
<th>Locomotor and Body Skills</th>
<th>Sending Skills</th>
<th>Receiving Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>Throwing</td>
<td>Catching</td>
</tr>
<tr>
<td>Running</td>
<td>Kicking</td>
<td>Trapping</td>
</tr>
<tr>
<td>Balance</td>
<td>Striking</td>
<td></td>
</tr>
<tr>
<td>Skating/Skiing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jumping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skipping</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(http://www.cansportforlife.ca 2013)

2.6.1 FMS and continued participation

Participation in PA is often attributed to the skills that children have acquired. Those children who are more proficient in their motor skills and abilities demonstrate increased levels of PA participation (Cliff et al., 2009; Okely et al., 2001; Poulsen et al., 2011; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006). Motor competence has been referred to as a person’s movement coordination quality when performing different motor skills, ranging on a continuum from gross motor skills to fine motor skills (Dondt et al., 2009). In a study conducted by Lopes et al. (2011), children who had higher levels of motor proficiency at a young age showed very little change in their participation levels in PA three years later. This study also demonstrated that at
baseline testing those children who exhibited lower levels of motor proficiency declined in PA over time compared to those children with higher levels of proficiency (Lopes et al., 2011).

This information provides insight into the significance of introducing children to the development of FMS at an early age. Much of the literature demonstrates a positive association between early introduction to FMS, the development of motor proficiency and later participation in PA (Barnett et al., 2013; Barnett et al., 2009; Findlay et al., 2010; Lopes et al., 2011; Okely et al., 2001). Acquiring a strong foundation of motor skills in early development will enhance children’s opportunities for continued development and participation.

The overarching perceived benefit of motor proficiency is its association with continued life-long participation in PA (D Hondt et al., 2009; Higgs et al., 2008; Logan, Robinson, Wilson, & Lucas, 2012; Trost et al., 2003; Wrotniak et al., 2006). The literature demonstrates that those children who are confident and competent in their physical skills will participate more often in vigorous healthy play compared to those children who are less skilled (Higgs et al., 2008; Logan et al., 2012; Robinson, 2011; Wrotniak et al., 2006).

This becomes a cyclical process where children who do not have the physical skills do not participate, and, therefore, have fewer opportunities to enhance their skill performance (Higgs et al., 2008). Often, as a result of their limited skill ability, those children who are less skilled tend to withdraw from participating in PA (D Hondt, 2009; Logan et al., 2012; Robinson, 2011; Trost et al., 2003). Furthermore, those children who have movement difficulties see themselves as less competent compared to other children and as a result tend to be less physically active and demonstrate a preference for sedentary activities (Fisher et al., 2005). This highlights the importance of skill development as it relates to participation in organized and unorganized activity (Okely et al., 2001).
In contrast, those children who have a strong sense of motor competency are more likely
to participate in a variety of activities because of their ability to draw from a strong repertoire of
FMS and FSS (Wrotniak et al., 2006). It is also suggested that these children are more involved
in organized structured types of PA compared to those with limited proficiency (Okely et al.,
2001).

2.6.2 Proficiency barrier

Children who lack motor competence are met with a barrier to later participation in PA
(Cools, De Martelaer, Samaey, & Andries, 2009; Goodway, Crowe, & Ward, 2003; Lubans et
al., 2010). There is a hypothetical proficiency barrier, which suggests that there is a “critical
threshold” of motor skill competence (Clark, 2007; Seefeldt & Nadeau, 1980; Stodden, True,
Langendorfer, & Gao, 2013). Seefeldt (1980) suggests that motor skill competence is a precursor
to providing a foundation for individuals with the skills for participation in various activities
throughout life. Many individuals do not achieve this critical threshold and, therefore, they are
less likely to be involved in PA (Clark, 2007; Lubans et al., 2010; Seefeldt & Nadeau, 1980;
Stodden et al., 2013).

Perceived competence, according to Stuntz and Weiss (2010, p. 435) “refers to how good
individuals think they are in a specific domain (e.g. school, PA, social relationships) or
subdomains (e.g., math, swimming, friendships).” The development of one’s perception of
competence and confidence is often in relation to that of their peers and affects their perceptions
on their motivation to participate in PA (Kirk, 2005; Lee, Carter, & Xiang, 1995). An important
component to an individual’s sense of competence is a child’s understanding of the relationship
between effort and ability (Kirk, 2005; Lee & et al., 1995). Until the age of 10, a child often
associates their ability to the effort they put forth in executing a task (Kirk, 2005). It is not until
the ages of 8-12 that children become cognizant that their abilities are not solely related to the effort they put forth (Kirk, 2005; Lee et al., 1995).

The ability to become proficient is a result of practice, encouragement and reinforcement (Logan et al., 2012). It is essential for children to develop motor proficiency and develop foundational movement skills in order to break through the hypothesized “proficiency barrier,” which is suggested to limit potential future participation (Clark, 2007; Higgs et al., 2008; Logan et al., 2012; Stodden et al., 2013). Specifically, this barrier implies that if children miss opportunities to develop basic foundational skills, the likelihood of engaging in various future physical activities will be limited. Therefore, the importance of developing a strong foundation of FMS is crucial to increased opportunities for later participation in PA. This development will also contribute to health across the lifespan as regular PA is associated with maintaining a healthy weight, reduced blood pressure and positive psychosocial benefits (Barnett, van Beurden, et al., 2008; Okely et al., 2001).

2.6.3 Movement education

Rudolf Laban (1879-1958) was a pioneer in exploring human movement. The application of Laban’s movement analysis has influenced PL by establishing the importance of elementary PE and advocating for the holistic development of children. The analysis and understanding of movement principles theorized by Laban are transferable to all observable human motion and are applicable to all elements of PA in structured or unstructured activities.

Laban’s principles of movement education are widely adopted in the education system: educators can assist children in their ability to understand the concept and applicability of movement to a variety of contexts. To evoke understanding of movement concepts, elementary PE teachers often encourage students to move their bodies in various ways (e.g., levels,
pathways, directions). The ability to understand how the body moves in multiple contexts (with others, equipment and in space) provides a foundation that children can expand upon to engage in more complex, sophisticated tasks.

One of Laban’s principles is the awareness of one’s body and is focused primarily on what the body is doing. This includes the basic actions of the body (e.g., bend, stretch, curl), actions of the body parts (e.g., supporting your body mass, sending and receiving objects), the activities of the body (e.g., locomotor, non-locomotor and manipulation) and shapes the body can make (Laban, 2011). These basic skills become the prerequisite for game play.

Space awareness is about where the body is moving in relation to personal space and the general space shared by others. Fostering opportunities for natural movement (unplanned/unstructured movement) occurs when children are given moments to move creatively at different levels, through unique pathways and on different types of equipment and in many environments. Moving in a multitude of directions at different heights with limited guidance helps broaden space awareness in children. Developing an understanding of personal space and moving safely within space is difficult for young (toddlers and pre-school aged) children, therefore, developing a sense of space is best done individually in early stages of motor development (Laban, 2011).

Once children can move safely and independently, they are encouraged to work together. This becomes the relationship aspect of Laban’s movement framework. Relationships occur with others (in small and large groups), with or without equipment and with the possibility of external stimuli such as music. The ability to manipulate equipment or their body, individually or in groups, is an instrumental skill necessary for game play and for expressive movement (Laban, 2011).
Children are capable of performing similar tasks in very distinct, yet skillful, ways. Functional or expressive motion is an example of how the body is moving and is described by Laban as effort. Effort is also known as the quality of movement or the way the body is used (Colvin, Egner-Markos, & Walker, 2000; Laban, 2011). There are four factors pertaining to effort that include time, weight, space and flow (Laban, 2011). Having children demonstrate movements at varying speeds or in a continuous or abrupt fashion fosters the notion of effort which accentuates an understanding of bodily control.

Time is the speed of motion and the amount of time used in a movement action (Colvin et al., 2000; Laban, 2011). The abilities to move quickly or slowly in a continuous or abrupt fashion are qualities needed for game type activities. Laban’s elements of weight efficiency and flow are consistent with, and related to, Whitehead’s description of a physically literate individual who moves with poise, economy and confidence in a wide variety of physically challenging situations (Whitehead, 2007). Providing opportunities to help children discover the way movements flow together is a vital factor in enhancing natural, skilled movement.

2.7 Section summary

Providing movement opportunities for young children to explore and understand how their bodies can be manipulated through various actions in different environments assists in their becoming physically literate. The next section explores the development of the concept of PL through the education and sport perspectives, and achieving a consensus statement.

2.8 Literacy

Literacy is a broad concept and is often associated with an individual’s ability to read and write. The United Nations defines literacy as:
... the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potential and participate fully in community and wider society. (UNESCO, 2016. P.21).

Literacy is enshrined in the Universal Declaration of Human Rights and considered a right that all individuals are entitled to literate affords individuals opportunities to make informed decisions about their personal context and the broader social context in which they live (UNESC), 2016). The term literacy is often aligned with concepts involving reading, writing or numeracy, but literacy is far more inclusive. Literacy is about our ability to communicate with others, understanding the social practices of others (such as language and culture), it also includes the ability to build relationships and to share knowledge with others (UNESCO, 2016).

2.8.1 Development of physical literacy

The creation of the term PL is important as it relates to an individual’s level of engagement, motor competency, and sense of competence and confidence in PA. The term was coined by Margaret Whitehead and is defined as “…the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for maintaining purposeful physical pursuits /activities throughout the lifecourse” (Whitehead, 2010, p.7).

Whitehead’s (2007, p. 282) short definition of PL includes four key elements:

1. Physical literacy can be described as the ability and motivation to capitalize on our motile potential to make a significant contribution to the quality of life. As humans we all exhibit this potential; however, its specific expression will be particular to the culture in which we live and the motile capacities with which we are endowed.

2. An individual who is physically literate moves with poise, economy and confidence in a wide variety of physically challenging situations. Furthermore the individual is perceptive in “reading” all aspects of the
physical environment, anticipating movement needs or possibilities and responding appropriately to these, with intelligence and imagination.

3. A physically literate individual has a well-established sense of self as embodied in the world. This, together with an articulate interaction with the environment, engenders positive self-esteem and self-confidence. Furthermore, sensitivity to and awareness of our embodied capacities leads to fluent self-expression through non-verbal communication, and to perceptive and empathetic interaction with others.

4. The individual has the ability to identify and articulate the essential qualities that influence the effectiveness of his/her own movement performance, and has an understanding of the principles of embodied health, with respect to basic aspects such as exercise, sleep and nutrition.

PL is a capacity that everyone can achieve within their own sphere of being (Whitehead, 2007). Whitehead (2007, p. 287) argues that “no matter how limited an individual’s capacities, such as in respect of those with embodied impairment, any increase in physical literacy will have a marked effect on quality of life”. This definition of PL provides an inclusive perspective of the many elements that are influential in the development of children’s movement patterns.

One weakness of the definition is the failure to identify the significance of social and cultural components when acquiring movement skills (Wright & Burrows, 2006). Wright and Burrows (2006) suggest that other components such as gender and race are influential in the way we learn and incorporate movement. The environmental and social contexts in which individuals are raised are important elements to consider when identifying components that may hinder or advance individual progress. Cultural practices or environmental considerations can influence the types of activities children and youth participate in.
Since the creation of the term PL, many individuals and organizations have adopted the terminology, particularly in the sport and education sectors.

2.8.2 Physical literacy in the sport sector

2.8.2.1 Sport for Life

Sport for Life (S4L) endorses PL. S4L is a Canadian initiative to improve the quality of sport and physical activity opportunities for all individuals (Higgs et al., 2008). In order to provide such opportunities, a seven-stage Long-term Athlete Development (LTAD) model was created. The LTAD model recognizes the importance of developing PL in stages. Through individual (and possible team) experiences, children and youth develop competence and confidence (Higgs et al., 2008). The first three stages of Canada’s LTAD include; Active Start (0-6 years of age), FUNdamentals (6-9 years of age) and Learning to Train (8-12 years of age) and comprise windows of opportunity to develop PL. The stages of the model are identified in Figure 2.1
PL has been defined by Higgs et al. (2008) as

…the development of fundamental movement skills, and fundamental sport skills that permits a child to move confidently and with control, in a wide range of physical activity, rhythmic (dance) and sport situations. Physical literacy also includes the ability to “read” what is going on around them in an activity setting and react appropriately to those events.” (p. 5).

According to Canada’s LTAD plan, PL should include the development of FMS and FSS in a variety of environments including on the ground, in the water, on snow and ice as well as in the air (Higgs et al., 2008).

1. On the ground – Solid surfaces (indoors/outdoors) including: gym floors, grass, sand, courts and cement. Many activities occur in this environment including dance and organized/unorganized game type of activities.
2. In the air – Activities in the air require spatial awareness which is the ability to understand where one’s body is in space. This is a very difficult concept to teach young children and requires a great deal of reinforcement. Participating in various airborne activities like jumping on trampolines, diving or gymnastics will help increase an individual’s spatial awareness.

3. In the water – The ability to safely participate in the water is an important life skill for all children to acquire. This includes safe participation in rivers, lakes, oceans and swimming pools. Participation in the water is not only important for safety reasons but to increase opportunities for participation in water activities such as surfing, paddling, water skiing as well as synchronized swimming and diving. In order to participate in these types of activities individuals must be confident in their basic abilities.

4. On the snow/ice – Our North American climate dictates that much of our time must be spent in winter-type activities. Winter activities often include a great deal of balance and agility such as skating and skiing. There are also many more opportunities for snow/ice activities such as snowboarding, cross country skiing and speed skating.

Exposure to as many environments as possible will increase the transferability of skills to different contexts providing more opportunity for physical development. A strong foundation in FMS and FSS will provide children and youth with opportunities to participate in a variety of activities in childhood which will transcend into adulthood (Kirk, 2005; Higgs et al., 2008).

One of the criticisms to the LTAD model is the lack of PL evaluation (Tremblay & Lloyd, 2010). The S4L group created a series of tools that can be used in isolation or in combination to measure PL. The tools include PLAYfun (running, locomotor, object control –
upper and lower body control, balance, stability and body control), PLAYself (self-evaluation of environment, PL self-description, relative ranking of literacies and fitness), PLAYcoach (PL, visual analog scale, cognitive domain, environment, motor competence, and fitness), PLAYparent (PL visual analog scale, cognitive domain, environment, motor competence and fitness) and PLAYinventory (leisure time activities that child has regularly participated in throughout the past year) (ParticipACTION, 2016; Sport for Life Society, 2016). These tools are easily accessible and user friendly; however no evidence was located to demonstrate that PLAY tools have been subjected to a rigorous peer review validation. These tools are, therefore, best used as advocacy tools for PL and should not be considered reliable for purposes of establishing policy or making institutional decisions until such validation takes place.

In addition to this criticism, Canada’s LTAD model has also been scrutinized for its lack of longitudinal empirical evidence to support the notion that children acquire skills during critical “windows of opportunities” or future athletic potential will be jeopardized (Lloyd & Oliver, 2012). In contrast to this theoretical perspective is an evidence-based approach to athlete development called the Youth Physical Development Model (YPD). YPD suggests that children have the opportunity over the course of their biological development to train multiple fitness components at various stages of development, and that a ceiling to potential does not exist (Lloyd & Oliver, 2012). This model is scientifically informed, identifying biological differences between males and females, suggesting that an approach to designing physical development and PA programs should take gender into account.

It can be argued that some children will learn physical skills on their own through trial and error. Logan et al. (2012) suggest that children will experience greater success if the skills are taught by a qualified individual who has an understanding of the mechanics of the physical
skills and values the importance of developing such skills (Logan et al., 2012; Petrunoff, Llyod, Watson, & Morrisey, 2009; Weaver et al., 2012).

2.8.3 Physical literacy in the Canadian education sector

2.8.3.1 Physical Health Education (PHE) Canada

Physical Health and Education (PHE) Canada is a professional organization for physical and health educators. PHE defines PL as “Individuals who are physically literate move with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person.” (Physical & Health Education Canada, 2016)

PHE Canada elaborates the definition with;

- Physically literate individuals consistently develop the motivation and ability to understand, communicate, apply, and analyze different forms of movement.
- They are able to demonstrate a variety of movements confidently, competently, creatively and strategically across a wide range of health-related physical activities.
- These skills enable individuals to make healthy, active choices that are both beneficial to and respectful of their whole self, others, and their environment’ (Physical and Health Education (PHE) Canada, 2009, p.7).

PHE Canada (2009) identifies several skills believed to be fundamental to children’s future success in lifelong PA participation (Table 2-4)
Table 2-4 Fundamental movement skills identified by PHE Canada

<table>
<thead>
<tr>
<th>Skill</th>
<th>Stork stand</th>
<th>Overarm throw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dodge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hop</td>
<td>Jump</td>
<td>Catch</td>
</tr>
<tr>
<td>Skip</td>
<td>Kick</td>
<td>Run</td>
</tr>
<tr>
<td>Log roll</td>
<td>Dribble</td>
<td>Sidearm strike</td>
</tr>
</tbody>
</table>

(PHE Canada, 2009)

These skills are a representation of basic skills required for participation in organized game activities. However, there is ambiguity amongst different sport bodies and policy makers (i.e., CS4L and PHE Canada) as to which FMS are most important for children to acquire. What remains consistent, however, is that children require numerous skills in order to be active for life. Exposing children to multiple skills in different settings will increase the likelihood of later continued participation. The education system, specifically within the PE curriculum, possesses a significant opportunity to foster motor development.

2.9 Alberta Education

School-based PE is the most widely available opportunity for promoting PA among children and adolescents (McKenzie, 2010; McKenzie, Marshall, Sallis, & Conway, 2000; Trost et al., 2003). The aim of the Alberta PE curriculum is “…to enable individuals to develop the knowledge, skills and attitudes necessary to lead an active, healthy lifestyle” (Alberta Learning, 2000, p. 1). In order to assist children and youth in achieving the curricular aim, four general outcomes guide student success; considered the ABCD’s of PE:
• Activity (A) – acquire skills through a variety of developmentally appropriate movement activities, dance, games, types of gymnastics, individual activities and activities in alternative environments (e.g. aquatics and outdoor pursuits).

• Benefits of Health (B) – understand, experience and appreciate the health benefits that result from physical activity.

• Cooperation (C) – interact positively with others.

• Do it Daily (D) – assume responsibility to lead an active way of life (Alberta Learning, 2000).

The intended outcomes outlined in the Alberta Program of Studies (POS) are to provide children with a solid foundation for participation in multiple physical activities. The POS also provides educators with a framework of developmental characteristics of children and youth (Alberta Education, 2000). The outcomes of the POS act as a guide for educators to ensure that the activities selected by the teachers develop children’s physical, social and intellectual abilities. Table 2-5 provides an example of the developmental characteristics of children between the ages of 5-8.
Table 2-5 Developmental characteristics of children

<table>
<thead>
<tr>
<th>Physical Characteristics</th>
<th>Emotional and Social Development</th>
<th>Intellectual Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand-eye coordination not fully developed (lack precise focus and spatial judgment)</td>
<td>May show intense and variable emotions (may sometimes be judgmental and critical of others)</td>
<td>Learn from direct experience</td>
</tr>
<tr>
<td>Large muscles may be more developed than smaller muscles</td>
<td>Learning to cooperate with others for longer periods of time (friendships may change frequently)</td>
<td>Continue to expand their understanding and use of language to clarify thinking and learning</td>
</tr>
<tr>
<td>Continue to develop climbing, balancing, running, galloping and jumping abilities (may have trouble skipping)</td>
<td>Continue to develop feelings of independence and may begin to define themselves in terms of what they have or own</td>
<td>May understand concepts like tomorrow or yesterday but are still unsure about length of time</td>
</tr>
<tr>
<td>Develop an awareness of safety with guidance</td>
<td>Begin to develop the ability to share possessions and take turns</td>
<td>Assert personal choice in decision making</td>
</tr>
<tr>
<td>Usually show enthusiasm for most physical activities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Alberta Education, 2000)

Although the outlined developmental characteristics of children are very broad in scope, they provide teachers with a point of reference from which they can make informed decisions in their program planning.

The Alberta POS is similar to that of other provinces across the country, with the overall objective to ultimately be active for life (Ministry of Saskatchewan Education, 2010; Ministry of
Ontario Education, 2010; Newfoundland Ministry of Education, 2015). The congruence amongst provinces is reflected in Table 2-6 below.

**Table 2-6 Provincial program of studies**

<table>
<thead>
<tr>
<th>Province</th>
<th>Vision/Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>Knowledge and skills acquired in the program will benefit the students throughout their lives and help them to thrive in an ever-changing world by enabling them to acquire physical and health literacy and to develop the comprehension capacity and commitment needed to lead an active and healthy lifestyle.</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>Aim of physical education curricula is to support students in becoming physically educated individuals who have the understanding and skills to engage in movement activity and the confidence and disposition to live a healthy lifestyle.</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>Physical education fosters personal and community wellness by empowering students to attain healthy lifelong living attitudes and behaviors through physical activity as part the total educational experience.</td>
</tr>
</tbody>
</table>

Many sectors endorse the development of PL, particularly education and sport; however, ambiguity persists. To address this, collaboration amongst Canadian leaders led to the creation of a consensus statement on PL.

**2.10 Physical literacy consensus statement**

In recent years there has been much ambiguity over the term PL and has often been interchanged with words such as “physical activity”, “physical education”, “fundamental movement skills” or “motor skill development” (International Physical Literacy Association, 2014, http://www.physical-literacy.org.uk). In order to provide clarity for the purpose of policy,
practice and research, Canadian stakeholders collaborated to identify a common definition for PL (International Physical Literacy Association, 2014, http://www.physical-literacy.org.uk). The purpose of the PL statement is to:

Promote – the value and integrity of the concept;
Advocate – the use of one common definition;
Facilitate – encourage the alignment of the term to multiple sectors;
Improve – the communication of the definition so that it is consistent and clear; and
Inform – delivery of PL tools and resources for consistency amongst stakeholders. (Sport for Life, 2014)

The International Physical Literacy Association defines PL as, “the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life (https://www.physical-literacy.org.uk/).

Within this definition of PL, there are four essential and interconnected components that are significant for the development of PL the throughout life course.

- Motivation and confidence (Affective) – this signifies an individual’s excitement and desire to participate in PA throughout their life.
- Physical competence (Physical) – the opportunity to develop a variety of skills and movement patterns (in multiple settings) so that they can experience different intensities and duration of PA.
- Knowledge and understanding (Cognitive) – the ability to understand how to perform various movement skills, the applicability of these movement skills to other physical activity contexts while understanding the benefits of participating in PA.
• Engagement in physical activity for life (Behavioural) – the free choice of individuals to be active regularly in pursuits that are challenging and meaningful to the individual

http://www.physicalliteracy.ca/resources/canada%E2%80%99s-physical-literacy-consensus-statement

In addition to the definition and essential components, there are five core principles:

• PL is inclusive and available for all;
• PL is a unique journey for each individual;
• PL can be developed and fostered through multiple experiences and environments;
• PL needs to be encouraged and valued through an individual life;
• PL develops the whole person

(http://www.physicalliteracy.ca/resources/canada%E2%80%99s-physical-literacy-consensus-statement)

2.11 Section summary

The development of a common definition of PL for the use of the various stakeholders and sectors will allow for the cohesive development of policy, research and implementation of PL into practice (http://www.physicalliteracy.ca/resources/canada%E2%80%99s-physical-literacy-consensus-statement). Being physically literate, however, is not the only factor that contributes to being active for life. Exploring correlates that directly influence PA participation is also important to address. Participation is dependent upon multiple factors as suggested by self-determination and social cognitive theories. There are many external components that are influential to children’s participation in PA. Such opportunities include exploring motivational theories as correlates for engagement.
2.12 Motivational theory as a determinant for participation

2.12.1 Self-Determination Theory

Various theoretical frameworks have been developed to assess attitudes and motivation towards PA. One of the most common theoretical frameworks is Self-Determination Theory (SDT). This framework explores elements that contribute to an individual’s level of motivation for participation. SDT identifies the motivation and natural or intrinsic inclinations of an individual that bring out healthy and effective behaviour (González-Cutre & Sicilia, 2012).

In order to increase children’s participation in PA, it is important to explore elements that will facilitate engagement. SDT is an approach to understanding human motivation in social contextual conditions, accepting that levels of autonomy (self-determination) are directly related to motivation (Boiche, Sarrazin, Pelletier, Grouzet, & Chanal, 2008; Deci & Ryan, 2000; González-Cutre & Sicilia, 2012; Ryan & Deci, 2000). Understanding motivation, what inspires individuals to act, is an essential concept to consider when exploring opportunities that promote positive change in behaviour. This understanding may help determine what factors are influential in motivating individuals to participate in PA. It is important to understand that motivation and being motivated are influenced by a multitude of factors (Ryan & Deci, 2000).

There are multiple forms of motivation and individuals are motivated for different reasons (Boiche et al., 2008; Deci & Ryan, 2000; González-Cutre & Sicilia, 2012; Ryan & Deci, 2000). A continuum of motivational behaviours exists ranging from controlling to autonomous behaviours. Motivation is often thought of in three dimensions: amotivation, extrinsic motivation, and intrinsic motivation.

Amotivation is the least self-determined in that it is often characterized by a lack of interest (Boiche et al., 2008; González-Cutre & Sicilia, 2012; Ryan & Deci, 2000). It typically is
a result of an individual’s lack of confidence in their ability to effectively perform or complete a task successfully (Boiche et al., 2008; Ryan & Deci, 2000; Standage, Duda, & Ntoumanis, 2005). Individuals who experience amotivation are often not able to make associations between their behaviors and the outcomes as a result of participation. Therefore, these individuals do not see the value inherent in participation and become indifferent (Standage et al., 2005).

Extrinsic motivation characteristically occurs as a result of an ulterior motive (Boiche et al., 2008; González-Cutre & Sicilia, 2012; Ryan & Deci, 2000). In this type of motivation, there is a specific outcome or goal that the individual strives to achieve as a result of participating in the activity. It is often a result of external forces to the individual that ranging from non-autonomous (controlled) to autonomous. The individual participates in a particular activity for the potential benefits of engagement, or the avoidance of negative consequence, not because of enjoyment (Boiche et al., 2008). Elements of extrinsic motivation include; external regulation, introjected regulation, identified regulation and finally integrated regulation.

External regulation is characterized by a lack of autonomy. Participation in the activity is a result of individuals being poised with either a reward or threat for participation (Edmunds, Ntoumanis, & Duda, 2006; Standage et al., 2005; Tessier, Sarrazin, & Ntoumanis, 2010). This type of participation is a result of ulterior motives, rather than a sense of personal desire.

Introjected regulation continues to be regulated by external forces but with this type of extrinsic motivation individuals begin to accept the value of the activity although struggle with making a personal connection of the activity to themselves (Edmunds et al., 2006; Standage et al., 2005; Tessier et al., 2010). Recognizing the value of the activity tends to make participation easier although this does not lend itself to a desire to participate.
Identified regulation evolves when individuals recognize the activity as having personal value, however, the activity continues to be performed for ulterior motives (Edmunds et al., 2006; Standage et al., 2005). This form of motivation is often seen as a means to an end.

Integrated regulation is the most autonomous and final form of motivation that falls underneath external motivation. Autonomy stems from the belief of congruency between the activity and the values and beliefs of the individuals (Standage et al., 2005; Tessier et al., 2010). The alignment of the individual beliefs to the activity allows for the individual to make connections and therefore participation becomes easier. Integrated regulation is still considered external because the action of participation is to achieve a personal goal (Standage, Duda, & Ntoumanis, 2003).

The final form of motivation is intrinsic motivation. Intrinsic motivation is best described by individuals participating in an activity due to the inherent satisfaction and enjoyment they receive (Boiche et al., 2008; González-Cutre & Sicilia, 2012; Ryan & Deci, 2000; Ryan, Williams, Patrick, & Deci, 2009). This type of motivation may result from the pleasant sensations that individuals receive as a result of participation or from the desire to explore new things (Boiche et al., 2008; Standage et al., 2005; Tessier et al., 2010). Those who are intrinsically motivated, or self-determined, are more likely to achieve positive outcomes (Boiche et al., 2008).

For intrinsic motivation to flourish however, it is suggested by Dimmock, Jackson, Podlog and Magaraggia (2013) that certain conditions must exist. Such conditions are identified as postulates that are essential to an individual’s growth and innate psychological needs and in turn relate to their intrinsic motivation; these include competency, autonomy and relatedness (Deci & Ryan, 2000; Dimmock et al., 2013; Ryan & Deci, 2000; Ryan et al., 2009).
Competency, according to Ryan et al., (2009), is described as the ability of a person to experience some level of success in a task as well as increased confidence. The belief in an individual’s ability to interact with the environment and develop a sense of mastery are elements that demonstrate competency (Adie, Duda, & Ntoumanis, 2008; Standage et al., 2005). Feeling competent increases individual’s sense of vitality in sport participation.

Autonomy in PA is a conscious decision made by the individual to participate in an activity that meets their needs and specific interests (Boiché et al., 2008; González-Cutre & Sicilia, 2012; Ryan, et al., 2009). Although it is the individual who determines participation, their experience is directly influenced by the environment in which they participate. The role of the coach, officials and peers have a significant impact on an individual’s opportunity to self-regulate and to be in control of their decision (Ryan et al., 2009). Autonomous support from the program leader has been found to be positively associated with self-determined motivation (Edmunds et al., 2006; Tessier et al., 2010). Elements that facilitate self-determination include; leaders demonstrating respect, allowing freedom of expression and encouraging children to accept themselves (Standage et al., 2005; Tessier et al., 2010).

The third postulate is relatedness or relatedness support. Relatedness is the sense of inclusion, belonging and feeling supported or connected with others (Ryan et al., 2009). This is an individual’s ability to create and be involved with others in their environment (Edmunds et al., 2006; Standage et al., 2005). Relatedness is attributed to a sense of connection to other individuals and the sense of belonging to the group.

SDT is based on the premise that these three psychological needs (competency, autonomy and relatedness) are essential to the development and well-being of all individuals (Ryan & Deci, 2000). When these needs are met, the self-determined individual feels more
intrinsically motivated and participates in PA on their own accord (González-Cutre & Sicilia, 2012; Ryan et al., 2009). The alignment of these psychological needs allows individuals to be more self-determined often resulting in individuals participating in activity for the inherent satisfaction they receive as a result of participation.

2.12.2 Social Cognitive Theory

Social Cognitive Theory (SCT) originally stemmed from Social Learning Theory and was modified in the early 1970’s by Albert Bandura who adopted this model to include the notion of self-efficacy as an important determinant influencing behaviour (Bandura, 2001; Martin & Kulinna, 2005). SCT stems from the idea that individuals learn in an active, dynamic process where the individual acts as an agent of change (Bandura, 2001; Martin & Kulinna, 2005). The theory revolves around a dynamic process, which includes the interplay between personal factors, environmental influences and behavioral aspects (Bandura, 2001; Martin & Kulinna, 2005). As active agents of change, individuals continually learn from their own experiences but also from observing the actions of others and the implication of those actions (Bandura, 2001; Martin & Kulinna, 2005). Individuals are seen as having immense control over their lives, particularly with how social factors influence behaviour (Bandura, 2001; Martin & Kulinna, 2005).

This view is one that advocates for self-efficacy, allowing the individual to exert influence over their own thoughts, goals and behaviours. Bandura (2001) was the first to postulate that behavioural change largely occurred as a result of self-efficacy: the belief that one can successfully perform a desired behaviour. It has been found that feelings of self-efficacy are often positively associated with exercise behaviours (McKenzie, Alcaraz, Sallis, & Faucette, 1998; McKenzie et al., 2000).
Recognizing children as active agents of change provides the opportunity to incorporate elements of social learning to foster change in PA behaviour. Within this theory there are several elements that are encouraged for promoting positive health behaviour as well as strategies to promote change (see Table 2-7)

Table 2-7 Components of Social Cognitive Theory

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Potential Change Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reciprocal determinism</td>
<td>The dynamic interaction of the person, behaviour and the environment in which the behaviour is performed</td>
<td>Consider multiple ways to promote behaviour change, including making adjustments to the environment or influencing personal attitudes</td>
</tr>
<tr>
<td>Behavioural capability</td>
<td>Knowledge and skill to perform a given behaviour</td>
<td>Promote mastery learning through skills training</td>
</tr>
<tr>
<td>Expectations</td>
<td>Anticipated outcomes of behaviour</td>
<td>Model positive outcomes of healthful behaviour</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Confidence in one’s ability to take action and overcome barriers</td>
<td>Approach behaviour change in small steps to ensure success; be specific about the desired change</td>
</tr>
<tr>
<td>Observational learning (modeling)</td>
<td>Behavioural acquisition that occurs by watching the actions and outcomes of others’ behaviour</td>
<td>Offer credible role models who perform the targeted behavior</td>
</tr>
<tr>
<td>Reinforcements</td>
<td>Response to a person’s behaviour that increase or decrease the likelihood of reoccurrence</td>
<td>Promote self-initiated rewards and incentives</td>
</tr>
</tbody>
</table>

(Bandura, 2001; Martin & Kulinna, 2005)

2.12.3 Theory of Planned Behavior

SCT is an overarching theory to other theories including the Theory of Planned Behavior (TPB). TPB identifies the important role of intention when predicting behaviour. This theory states that an individual’s intentions are important in influencing behaviour (Martin & Kulinna, 2005). When it comes to PE and inspiring children to be physically active, teachers are major determinants of children’s PA levels (Martin, Kulinna, Eklund, & Reed, 2001). This becomes extremely important because if a teacher’s intention is for the PE class to be active, then they
will be active. However, an individual’s intention to act are often impacted by social influences and individual attitudes (Martin & Kulinna, 2005). Martin and Kulinna (2005) suggest that if individuals perceive that what they are doing is important to them personally and socially, then they will develop stronger intentions as they begin to value the importance of their work. The important role of the instructor, leader or teacher in their ability to influence children’s participation in PA has been identified in the literature and is also recognized by SDT (Martin & Kulinna, 2005; Martin et al., 2001; Riethmuller, Jones, & Okely, 2009). It is suggested that children have an increased likelihood of being physically active when they have positive interactions with their teachers and peers in supportive encouraging environments (Behrens, Miller, Schuna, & Liebert, 2015; Riethmuller et al., 2009).

2.12.4 Motivational theory and PA

The connection between motor proficiency and PA participation is well documented in the literature (Barnett et al., 2013; Fisher et al., 2005; Loprinzi et al., 2012; Wrotniak et al., 2006). There is also evidence to support a connection of motivational theory to PA behaviours. Motivational theories suggest that how individuals perceive their physical abilities (competence) influences their participation in PA (Dewar, Lubans, Morgan, & Plotnikoff, 2013; Kimiecik & Horn, 2012; Okely et al., 2001). It is the postulates that exist within motivational theory including; goal orientation, perceived competence and value of participation that are important variables influencing PA. Goal orientation refers to either task involvement, which emphasizes the learning; enjoyment and mastery, which occur through participation; or ego-involvement entailing an emphasis on social or peer comparison (Harter & Pike, 1984; Kimiecik & Horn, 2012; Simpkins et al., 2012). In addition, if an individual feels confident and competent in their abilities, a greater likelihood of sustained participation is likely (Harter & Pike, 1984; Higgs et
Both boys and girls with motor difficulties tend to perceive themselves as less competent and as a result are less likely to engage in PA and demonstrate more sedentariness (Cairney, Hay, Faught, Corna, & Flouris, 2006; Cairney, Hay, Faught, & Hawes, 2005). Girls, with motor impairments typically display lower levels of athletic competence and tend to have lower levels of participation in free play and organized activity (Cairney et al., 2006; Cairney et al., 2005). Further, if individuals see the value and benefit of participating in PA, then they are more inclined to continue to participate as aligned with Eccles’ expectancy-value model (Eccles & Harold, 1991; Eccles Parsons, Adler, & Kaczala, 1982; Simpkins et al., 2012; Yee & Eccles, 1988).

2.12.5 Influences of participation

There are several other indicators that are identified as influencing PA participation including the social support (the influence of friends, family and instructor/coaches) as well as an individual’s level of enjoyment.

2.12.5.1 Parental, friend and instructor/coach influence

The parental role of socializing young children is extremely important and is identified as a key determinant of influence on PA participation (Barnett, Morgan, van Beurden, & Beard, 2008; Edwardson & Gorely, 2010; Gustafson & Rhodes, 2006; Moore et al., 1991; Trost et al., 2003). The role of the parent is of particular importance primarily in the early stages of child development through to adolescence. Parents are the first agents of socialization and as a result, have the opportunity to influence behaviour (Edwardson & Gorely, 2010; Gustafson & Rhodes, 2006; Trost et al., 2003). As children grow older, the role of influence shifts from parents to friends, peers, coaches and teachers (Alderman, Benham-Deal, & Jenkins, 2010; Bois, Sarrazin, Brustad, Chanal, & Trouilloud, 2005).
The ability to influence PA behaviour can occur in several ways including role modeling, parental belief systems, parental support, parental participation in PA, and parent and youth shared PA (Bois et al., 2005; Dzewaltowski, Ryan, & Rosenkranz, 2008; Ornelas, Perreira, & Ayala, 2007; Trost et al., 2003; Zecevic, Tremblay, Lovsin, & Michel, 2010). These variables are identified as common components of parental influence; however, the level of significance of these components on PA behaviours has received mixed reviews in the literature.

In 2008 and 2010, the Raising Healthy Eating and Active Living (REAL) Kids study was conducted in Alberta to measure parental beliefs and support for children’s PA and body weight. It found that there was a positive association between children’s PA participation and parental beliefs and support. Those children who believed their parents were interested in their activities and supported them were more involved in PA (Ploeg, Maximova, Kuhle, Simen-kaifu, & Veugelers, 2012).

Results from the REAL kids study are similar to that of research specifically exploring the influence of parental support. Davison et al. (2011) is responsible for creating an Activity Support Scale to measure the level of support parents provide their children. This scale examines logistic support (e.g., enrolling children in activities and transporting them to and from) and the modeling behaviours of parents (e.g., engaging in PA for themselves, or being involved in PA with their child). The results from this tool suggest that logistic support and modeling are positively associated with children’s PA participation.

Establishing a sense of competency occurs as a result of relationships with others, and the social environment (Harter, 1994). The benefit of acquiring self-competence tends to result in greater motivation to participate and to sustain participation with effort, in a variety of contexts (Bois et al., 2005). Perceived competence and continued participation in PA was positively
correlated in a longitudinal study conducted by Davison et al. (2011). A cyclical association was evident between perceived competence, parental support and continued participation where parents influenced children’s perceived competence and behaviours towards PA and this in turn influenced parental supportive behaviour (Davison et al., 2011; Edwardson & Gorely, 2010). The perceptions that we have of ourselves, and that of others, tends to influence the decisions we make to become engaged in an activity.

The shift in influence from parents to peers and then teachers as children age has important implications to the design of PA interventions. Ensuring that the needs and interests of participants are met through positive social relationships has implications to PA participation. Attributes amongst peers that are associated with PA behaviour include positive communication amongst peers about PA, friends participating in PA and friends participating in PA together (Kjønniksen, Fjørtoft, & Wold, 2009; Maturo & Cunningham, 2013).

It is suggested that friends have influence over PA behaviour in the following ways; if they encourage others to participate in PA, if they themselves participate in PA and if there is an opportunity for friends to engage in PA together (Maturo & Cunningham, 2013). Friends are considered to be one of the most important socializers over the life course (Berndt, 1982; Maturo & Cunningham, 2013; Waldrip, Malcolm, & Jensen-Campbell, 2008).

Further, the role of the instructor or coach as a determinant of PA behaviour is also demonstrated in the literature. Proper training, a strong understanding of program philosophy and an ability to modify pedagogical practice to meet the individual needs of program participants are other elements of program success and are critical to delivery (Beets et al., 2012; Durlak et al., 2010; González-Cutre & Sicilia, 2012; Mandigo, Francis, Lodewyk & Lopez, 2009; Petrunoff et al., 2009). The literature suggests that instructor or coach professional development
is an opportunity to improve quality instruction (Huberty, Balluff, Beighle, Berg, & Sun, 2009; Petrunoff et al., 2009; Pugliese & Tinsley, 2007; Weaver et al., 2012). The SAFE model created by Durak et al. (2010) and the 5 Ms designed by Weaver et al. (2012) are two models of sequential staff training.

SAFE suggests that skill training interventions should follow the steps of sequence, active, focused and explicit (SAFE) (Durlak et al., 2010). Competency-based training is advocated as another type of professional development. As cited in Weaver et al. (2012), competency-based training is defined as “any individual characteristic that can be measured and that can be shown to differentiate significantly between superior and average performers or between effective and ineffective performers” (p.187). This type of training moves beyond to the ability to relay theoretical knowledge by applying that theory and skills in practical environments. The 5 Ms competency-based training approach consists of: Mission (a focus on policies and competency-based training for leaders), Motivate (provide children with choice, opportunities to participate in developmentally appropriate activities that will allow them to feel success, as well as the positive role modeling of leaders), Manage (ensuring the safety of children, a thoughtful lesson plan, effective leadership), Monitor (assessment of behaviours) and Maximize PA (Weaver et al., 2012).

2.12.5.2 Level of enjoyment

In addition to feeling competent and confident in one’s ability, and the aptitude to recognize the value of PA participation, is recognizing the importance of the enjoyment of participation. A great deal of literature identifies that when individuals experience fun, choice, challenge and excitement while participating in an activity, a positive relationship to sustained participation occurs (Beets et al., 2012; Dimmock et al., 2013; Stuntz & Weiss, 2010; Weiss,
2013). Providing an environment that is conducive to facilitating a sense of enjoyment by providing choice, challenge and opportunities to build social relationships are important considerations for program planning.

2.12.6 Section summary

The three behaviour change theories outlined identify that a myriad of variables influence action. Key components to creating environments of change are fostering self-efficacy, competence and confidence within children. If children are provided a positive and conducive environment that fosters their confidence and abilities, there is a greater likelihood of PA participation. All three theories make reference to the significant role that teachers and leaders play in influencing behaviour and motivation in children (Boiche et al., 2008; Martin & Kulinna, 2005; Ryan et al., 2009).

2.13 Measurement of motor proficiency

Assessment and evaluation are fundamental components to the fields of health and education (Tremblay & Lloyd, 2010). Providing evidence is also beneficial for resource allocation and for policy decision-makers (Tremblay & Lloyd, 2010). Assessing motor proficiency and current programming can assist in the development of intervention strategies and targeted PA programming to increase PA expenditure and decrease sedentary behaviours.

Measurement of motor proficiency is conducted through process- or product-oriented physical testing. Process-oriented tests focus on the execution and technical mastery of performing certain skills (Barnett et al., 2013; Barnett, van Beurden, et al., 2008). Such types of tests require an individual to demonstrate their physical abilities to an evaluator. The evaluator has an itemized checklist of technical items that the individual performing the skill is expected
to demonstrate. An example of a process-oriented test is the Test of Gross Motor Development (TGMD). In this test, children are given a visual demonstration of the task before they are asked to perform it. Children are then given two opportunities to demonstrate their abilities (Barnett et al., 2013). For each skill that is assessed there are a number of components that the evaluator is assessing and the sum of the trials are then added together to attain a raw score for each skill (Barnett et al., 2013). The skills scores are then totaled into subsets to provide total scores for children’s overall score providing information on the individual’s level of motor proficiency.

Product-oriented tests focus on an individuals’ ability to successfully complete a task as opposed to the technical execution of the task. In this type of test it is the final outcome, not the execution that is most important. Often in this test the individual is evaluated on their ability to execute a task correctly in a certain amount of time or within a particular number of attempts. The Bruininks-Oseretsky Test of Motor Proficiency (BOT) is a standardized, norm referenced example of a product-oriented test (Bruininks & Bruininks, 2005). This test is used for individuals between the ages of 4 and 21 and evaluates individuals’ fine and gross motor skills. This long or short form of this can be used for assessment. The long form provides a robust assessment of gross and fine motor skills; the short form is often used to provide a snapshot of a child’s motor performance (Bruininks & Bruininks, 2005; Poulsen et al., 2011).

When conducting physical tests on children (such as the BOT-2 or TGMD), it becomes apparent that those children who struggle on motor proficiency tests have lower levels of motor proficiency (Lopes et al., 2011; Okely et al., 2001; Poulsen et al., 2011; Wrotniak et al., 2006). Furthermore, research has identified that children who are overweight perform significantly lower on motor proficiency tests compared to children of normal weight (Poulsen et al., 2011).
Those individuals who performed poorly on motor performance tests also scored lower on tests that measured perceptions of self-concept (Poulsen et al., 2011).

Measuring motor proficiency provides educators, child care providers and health care practitioners with valuable information regarding individuals’ physical development. The information collected is often used to help identify physical impairments in motor abilities which are often then used to design and create intervention strategies.

### 2.14 Systematic observation

The utilization of systematic observation (SO), according to McKenzie and van der Mars (2005), exceeds other measures of PA with the ability to identify both physical and social contexts of PA. PA happens with varying degrees of energy expenditure. Variability comes in intensity, frequency, duration, mode as well as differences that exist amongst different individuals (McKenzie & van der Mars, 2015). SO of PA by trained individuals can take all of these variables into account and produce valid data. Multiple forms of SO exist including: event recording (ER), duration recording (DR), interval recording (IR) and momentary time sampling (MTS; McKenzie, Sallis, & Nader, 1991; McKenzie & van der Mars, 2015). The observation tactic employed depends on the type of research being performed and the questions being asked. If the objective is to produce a depiction of PA in regards to its frequency, duration and intensity, then typically the ER or DR are used (McKenzie & van der Mars, 2015). However, some researchers may want to explore a number of factors simultaneously; in this instance IR and/or MTS provide more detailed information (McKenzie & van der Mars, 2015). Table 2-8 provides a summary of the basic features of the multiple tactics for SO.
Table 2-8 Basic features of systematic observation

<table>
<thead>
<tr>
<th>Focus</th>
<th>Event Recording</th>
<th>Duration Recording</th>
<th>Interval Recording</th>
<th>Momentary Time Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of occurrence of behaviour</td>
<td>How long individuals are engaged in the behaviour</td>
<td>Behaviour is recorded in a specified time frame</td>
<td>Records behaviour at the end of the predetermined “record” cue</td>
<td></td>
</tr>
<tr>
<td>Data collected</td>
<td>Raw data converted to rate/minute or percent of total or ratios</td>
<td>Collected as minutes or percentage of time individuals engaged in a particular behaviour</td>
<td>Raw data converted to percent of intervals. Done in either partial or whole interval recording. Whole-interval recording must see the behaviour demonstrated during the duration of the recording process. Partial-interval recording is recorded even if the behaviour occurs for a short period of time. These observations are recorded at a “record” cue</td>
<td>Frequency of participant behaviour is categorized typically to provide a sample of participant physical activity expenditure, the focus of the class lesson as well as the behaviour of the teacher. This can be used beyond the education sector</td>
</tr>
<tr>
<td>Interval length</td>
<td>Between 3s-10s</td>
<td>1min – 60 min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(McKenzie & van der Mars, 2015)
The System for Observing Fitness Instruction Time (SOFIT) is a multi-factor observation system designed to record several variables (PA intensity, lesson context and instructor interaction) during a PE class in 20-second intervals (McKenzie, Sallis, & Nader, 1991). MTS is an innovative way to measure PA in children as they are active intermittently rather than in sustained bouts. Twenty-second intervals (10 second observation and 10 second record periods) were found to be the most accurate when compared to 60s, 90s, 120s and 180s intervals (McNamee & van der Mars, 2005). The reliability and validity of SOFIT has been rigorously evaluated among several age groups ranging from preschoolers through high school students (McNamee & van der Mars, 2005; Pope, Coleman, Gonzalez, Barron, & Heath, 2002; Rowe, Schuldheisz, & Van der Mars, 1997; Rowe, van der Mars, Schuldheisz, & Fox, 2004; Sharma, Chuang, Skala, & Atteberry, 2011). PA levels are associated with how the lesson is delivered (lesson context) and with what the teacher is doing throughout the lesson (teacher behaviour) and the environment of the PA experiences (Chow et al., 2008; McKenzie et al., 1998; Van Cauwenberghe et al., 2012)

SOFIT has been adapted for and validated in several environments: C-SOFIT (computerized version); SOPLAY (optional leisure time PA such as during school recess); SOPARC (PA in parks and playgrounds); and SOFIT-P (preschool aged children). SO is well documented in the literature, particularly in the education context (Chow et al., 2008; Ferdinand, Sen, Rahurkar, Engler, & Menachemi, 2012; McKenzie, 2010; McKenzie et al., 2000). Despite the multiple variations of the measurement tool, until recently it has not been adopted in the recreation sector (Sheehan, 2015).

Quantitative data has the ability to provide objective information. However, one of the downfalls of quantitative data is its inability to explain the contextual conditions that may
contribute to the results. In order to gain this understanding qualitative measurements are often employed. Overall, SO provides meaningful information in an unobtrusive fashion. The triangulation of data by utilizing multiple tools including qualitative and quantitative measures assists in the generalizability of the data collected.

2.15 Section summary

This section provided an overview of the importance of assessment when exploring motor proficiency, FMS and PA program content. Multiple tools can be used for assessment; however, product-oriented testing and SO were highlighted as a comprehensive and unobtrusive means to collect PA data in children.

The next section explores types of research design including qualitative and mixed methods. This section highlights the importance of utilizing multiple forms of data collection to capture the true essence of the phenomenon being explored.

2.16 Qualitative evaluation

There are three approaches to conducting research: quantitative, qualitative and mixed methods approach (Creswell, Plano Clark, Gutmann, & Hanson, 2003). A quantitative approach is one that relies on evidence to inform how knowledge is described (Creswell & Plano Clark, 2011). With this type of research, the phenomena is reduced using empirical indicators to identify the truth (Sale & Brazil, 2002). This scientific or ontological perspective believes that only one truth or reality exists and is independent of human perception (Sale, Lohfeld, & Brazil, 2002). The most common form of quantitative research design is pre test-post test due to its strength in controlling threats to internal validity (Levy & Ellis, 2011). Within this type of research, participants are randomly assigned into two groups: experimental or control. The experimental group receives the prescribed treatment and the control group receives no
treatment, therefore, acting as a benchmark for comparison (Levy & Ellis, 2011). Within this design, a measure or test is done to the experimental and control group prior to the treatment and then repeated after treatment (Levy & Ellis, 2011). The researcher hopes to identify a statistical difference between pre- and post-testing, either between or within groups to measure the influence of the intervention (Levy & Ellis, 2011).

One of the strengths of quantitative research is the ability to ensure that elements are measurable and repeatable (Streubert & Carpenter, 2007). This type of research often seeks to explore cause and effect in an objective, non-biased manner (Allan, 1998) where the researcher is an external agent without a bias toward the research findings. A significant benefit in conducting quantitative data collection is the high degree of validity, reliability, replicability and ability to generalize findings (Creswell & Plano Clark, 2011). However, there are limitations to using this approach such as, the inability to provide meaningful understanding to the phenomenon being studied (Creswell & Plano Clark, 2011; Creswell et al., 2003).

An alternative to quantitative data collection is qualitative research. Qualitative research provides an understanding to an individual’s, behaviours, attitudes and perceptions on a particular subject matter often through subjective, narrative dialogue (Creswell & Plano Clark, 2011; Creswell et al., 2003). This approach to research is one that collects information on an individual’s attitudes, perceptions and behaviours and is collected in a various environment that allows the researcher to gather meaningful and in-depth understanding of the phenomenon being studied (Creswell & Plano Clark, 2011; Creswell et al., 2003). The strength of qualitative research is the ability to collect data from individuals immersed in natural settings with the intent to explore the perceptions and meaning of their experience. Interviews, focus groups and ethnographies are examples of data collection methods used in qualitative research.
There are limitations within qualitative research. Often, the information collected is based on the interpretations of the researcher. Determining the influence of the researcher on the findings can make interpreting the findings challenging (Alhojailan, 2012; Creswell & Plano Clark, 2011; Creswell et al., 2003). The possibility of subjectivity in the analysis of qualitative data may present a bias related to reliability, validity and objectivity (Creswell & Plano Clark, 2011; Creswell et al., 2003). Another limitation of this research methodology is that qualitative research can be very time consuming. It takes a great deal of time and effort to coordinate interviews and/or focus groups including analyzing data. Qualitative research, particularly the use of focus groups, often involves thematic analysis and may take multiple meetings with participants to reach a point of saturation. A limitation of the information collected in focus groups is that it is representative to the unique group of participants and may not be generalizable to the larger population (Creswell & Plano Clark, 2011; Creswell et al., 2003).

A third type of research is a mixed methods approach to data collection. This approach is one that does not believe that quantitative or qualitative research alone has the ability to capture all of the elements of the research question (Creswell & Plano Clark, 2011; Creswell et al., 2003; Johnson & Onwuegbuzie, 2004). Rather, when quantitative and qualitative work collaboratively they have the opportunity to complement each other and provide a more holistic and comprehensive analysis of data and research findings (Creswell & Plano Clark, 2011; Creswell et al., 2003; Johnson & Onwuegbuzie, 2004). Mixed methods has been defined as “the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson & Onwuegbuzie, 2004, p. 17).
2.17 Research questions

Due to the limited literature that exists in the recreation sector this research study will address the following questions;

1. What is the impact of an intentionally designed PL curriculum, on the motor proficiency of children in grades 1 and 2 compared to children involved in traditional recreation (TR) programming as measured by Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form (SF)?

2. What is the relationship between PA levels (in multiple environments) and Lesson Context variables between PL and TR programming for boys and girls in grades one and two as measured by the System for Observing Fitness Instruction Time (SOFIT)?

3. What is the relationship between PA levels and Instructor Interaction variables between PL and TR programming, for children in grades one and two as measured by SOFIT?

4. What are parental perceptions of recreation PA programs, as identified through focus group conversations? Are parents in the PL program able to distinguish between traditional recreation programming and intentionally designed programming?

2.18 Section summary

This final section provided an overview of different types of research methodologies. The strengths and limitations of three methodologies were identified and it was suggested that a combination of data collection tools may enhance the information gathered from conducting research.

2.19 Conclusion

This chapter identified that participation in PA is influenced by numerous variables. To encourage life-long participation in PA, it is important to develop and foster individual’s feelings
of competence and confidence with their own physical abilities. In order to do this, we must provide an environment that is encouraging and has individuals who will enhance children’s feelings of autonomy and relatedness. There are a myriad of variables that influence PA and addressing them all is important if we hope to assist children and youth in leading an active, healthy lifestyle.

What emerged as significant in this chapter is the connection between early development of FMS and later PA participation through increased motor proficiency. Early opportunities for motor development provide children with an increased ability to develop the attributes (confidence and competence) associated with lifelong PA participation.

The next chapter will outline the process undertaken to create an intentionally designed physical literacy curriculum to promote the development of children’s FMS in a variety of environments.
Chapter Three: Curriculum Design

This chapter highlights the development process undertaken to create an intentionally designed physical literacy (PL) curriculum. Included is a high level overview of the curriculum design process including the alignment to the education and sport sectors and to a social-ecological model. A logic model to identify resources, interventions and goals to assist in the curriculum development is provided.

3.1 Curriculum design

The intentionally designed curriculum (referred as physical literacy [PL] programming) was created to provide guidance to the recreation sector in its obligation to deliver high quality programs that have clear, purposeful objectives. The idea of intentionally designed versus intuitive programming is based on the premise that intentionally designed programs are based in research and intuitive-based focuses on theories and principles (Felder & Silverman, 1988). To enhance program delivery, the atmosphere should be one that is fun, supportive and engaging where children have the opportunity to acquire or apply skills in a multitude of settings. This is with the understanding that a large part of the reason individuals participate in activities is because of a sense of enjoyment they receive through participation (Cothran & Ennis, 1998). If disparity exists with the objectives of the instructor and the participants then less enjoyment is likely to occur (Cothran & Ennis, 1998).

Existing practice within the recreation sector is to hire people to teach physical activity (PA) programs that have experience in a particular sport (i.e., basketball) and are referred to, in this document, as traditional recreation instructors. Once hired, individuals are responsible for creating their own lesson plans to deliver to participants over the duration of the program session. However, the primary investigator (PI) argues that these instructors should be held
accountable for the learning and social experience the participants have over the duration of the program.

Bloom’s theory (which focuses on three learning domains of cognitive, psychomotor and affective) suggests that individual’s go through a typical progression of acquiring mastery which begins with a playful and supportive environment and as individuals become more proficient then instruction shifts to be more technical and specific (Bloom, 1985; Ericsson, 1986; Wall, 2003). Further, Ericsson and colleague’s (1986) argue that for effective learning to occur the elements of deliberate practice must be present: “a well-defined task with an appropriate level of difficult for the particular individual, informative feedback, and opportunities for repetitive and corrective errors” (p.21-22). As identified by Bloom, Ericsson and the Sport for Life group to become proficient in movement requires a great deal of practice, instruction as well as opportunities for feedback (Bloom, 1985; Ericsson, 1986; Sport for Life Society, 2016).

In order to deliver quality programming an intentionally designed physical literacy program was created. The curriculum creation was intended to build upon the wealth of existing knowledge from other sectors and apply it within the recreation context. This includes elements of the physical education (PE) curriculum, particularly the Provincial-specific education learning outcomes, and the philosophical underpinnings of Canada’s Long-Term Athlete Development (LTAD) model. Such alignment is well-suited from a social-ecological perspective.

3.2 Social-ecological model

The provision to design a holistic curriculum was aligned with a social-ecological perspective. This theoretical perspective states that there are many elements that influence an individual’s behavior (Elder et al., 2007; Glanz & Viswanath, 2008; Sallis et al., 2006; Salmon et al., 2005). Influencing an individual’s behavior occurs through internal and external sources.
Internal variables consist of an individual’s knowledge, beliefs and attitudes as well as the interpersonal relationships that exist amongst individuals (Elder et al., 2007; Glanz & Viswanath, 2008; Sallis et al., 2006). There are also elements of the organization and workplace, as well as the community that have opportunities to influence individual behaviour. Public policy is the ultimate avenue for providing direction in influencing shifts in behaviour. Public policy occurs at a much higher level of influence, affecting the collective impact of decision making (Elder et al., 2007; Glanz & Viswanath, 2008; Sallis et al., 2006). This theoretical perspective reinforces the notion that in order to make sustained change, multiple components must work collaboratively.

The intention of the recreation sector PL curriculum is to influence positive PA behaviours that are reinforced through program participation while valuing the importance of interpersonal relationships. In continued alignment with the social-ecological model, working with organizations and communities collaboratively has the ability to reinforce positive individual behaviours.

There is an opportunity within recreation to do more to shift individual behaviour to lead a healthy lifestyle. The development of a recreation curriculum, which aligns beyond the walls of recreation to other sectors, is one small step in that direction. Identifying the multiple synergies between other sectors in support of the development of curriculum is necessary. Already mentioned are the education and sport sectors. The Alberta Education Program of Studies (POS) grade-specific PE outcomes for all school-aged children was used for the information derived from content experts utilising developmental science. The second immediate alignment included adherence to the philosophy of the Canadian Sport for Life model. This philosophy advocates and promotes children to participate in a variety of PA experiences. The sport model encourages
participation through the life-course in both recreational and competitive experiences with the ultimate objective to be active for life.

In addition to these alignments several other links were made. The first was the use of evidence-based lesson plans from Sports Play and Active Recreation for kids (SPARK), which is grounded in research that promotes the facilitation of PA for children through the use of specific lesson plans created primarily for the education sector. The SPARK resource was developed with the intention to aid the generalist teachers in delivering quality PA programs and has been demonstrated in the literature to be effective in the school system (Herrick, Thompson, Kinder, & Madsen, 2012; Sallis et al., 1997). The lesson plans are designed with the objective to be user-friendly for leaders with specific objectives that identify all necessary materials to engage in learning activities including teaching tips (McKenzie et al., 2009; Sallis et al., 1999; Sallis et al., 1997).

In addition to the use of evidence-based lesson plans a compilation of resources and materials were used to assist in the delivery of best practice to instructors leading the programs. This information was acquired from the Alberta Education POS, the user guide of the SPARK resource and the National Coaching Certification Program (NCCP) Gymnastics Foundation module.

3.3 Professional development

The importance of professional development is well documented in the literature (Beets, Huberty, Beighle, Healthy, & Program, 2012; Beets, Beighle, Erwin, & Huberty, 2009; Sallis et al., 1997; Weaver et al., 2012). Front line staff is often under trained in delivering quality programs in after-school programs (ASP; Beets et al., 2012). To further this, it is argued that packaged professional development programs are not effective in increasing PA level of
participants (Beets et al., 2012; Sharpe, Forrester, & Mandigo, 2011; Wilson et al., 2009). In addition, the literature has demonstrated that packaged professional development programs, where individuals are instructed on how to deliver the curriculum, prove to have little effectiveness on improved PA (Beets et al., 2013; Sharpe et al., 2011; Wilson et al., 2009). In contrast, developing core competencies within staff has demonstrated increased levels of PA participation amongst participants as well as a greater likelihood of achieving program objectives (Beets et al., 2009; Beets et al., 2013; Weaver et al., 2012). Core competencies refer to the idea that an individual’s performance can be distinguished between superior and average performance (Weaver et al., 2012).

3.4 Play

The final connection, for the curriculum design, included the incorporation of play at the beginning and end of each lesson. There is an influx of literature on the importance of play in children’s development (Bergen & Fromberg, 2009; Herrington & Brussoni, 2015; Huisman, 2014; Lester & Russell, 2008; Milteer et al., 2012).

Opportunities to facilitate play by adults have been identified by Bergen and colleagues (2009) and Huisman (2014). Many of these suggestions were incorporated into the PL programming. Bergen et al. (2009) suggest the following to encourage play;

1. Time – provide children with time to play rather than focussing on delivering structured activities. The PL program included play opportunities during the first and last five-seven minutes of each lesson.

2. Provide play resources – ensure that children have material that promotes open-ended opportunities for creativity. In all PA environments, within the PL program, children were provided with multiple pieces of equipment to choose from to play. Examples of resources on the
ice included, building blocks and balloons, the water incorporated beach balls as well as objects that float and sink.

3. Environment – creating an environment that is safe assists in promoting creativity and problem solving. This is similar to another element to promote play, added by Huisman (2014) that suggests that adults engaging in play interaction are important to children’s play. Adults providing children with choices builds trust and assists children in their ability to problem solve (Huisman, 2014). Children in the PL program experienced a consistent leader throughout the duration of the program and built relationships amongst their peers developing social connections.

The creation of the curriculum incorporated the following components outlined in Table 3-1 below.
Table 3-1 Curriculum components incorporated in curriculum design

<table>
<thead>
<tr>
<th>Alignment/Connection</th>
<th>Rationale for inclusion</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Sport for Life</td>
<td>Adherence to the value of diverse PA experiences</td>
<td>Inclusion of multiple environments for PA participation (land, air, water, ice/snow)</td>
</tr>
<tr>
<td>Alberta Education program of studies</td>
<td>Reinforcement of PA objectives that are taught to children</td>
<td>Alignment of curricular objectives with individual lesson plans</td>
</tr>
<tr>
<td>SPARK</td>
<td>Use of research/evidence-based lesson plans to increase PA levels and further promote skill/game type play</td>
<td>Inclusion of lesson plans that were relevant to activities</td>
</tr>
<tr>
<td>Best practice resources</td>
<td>To ensure leaders have the necessary tools to deliver high quality programs</td>
<td>Compiling the resources from SPARK and NCCP Gymnastics Foundation module</td>
</tr>
<tr>
<td>Professional development</td>
<td>To deliver necessary information to the instructors working with the children</td>
<td>Meetings with the instructors on what best practice in recreation instructor looks like</td>
</tr>
<tr>
<td>Play</td>
<td>The social, physical, mental and emotional benefits of play</td>
<td>Brainstorming with program instructors of what play looks like PA lesson plans</td>
</tr>
<tr>
<td>Ongoing professional development support</td>
<td>To ensure high quality program delivery</td>
<td>Conversations with staff immediately after programs</td>
</tr>
</tbody>
</table>

3.5 Logic model

A logic model sometimes referred to as theory of change, is a process often used to evaluate the effectiveness of a program. Although this model is typically used at the end of an
activity or program to measure success, it can be used during the planning or implementation phase as well (Taylor-Powell, Jones, & Henert, 2003). The logic model serves as a visual roadmap, which provides an opportunity to plan, evaluate and communicate change (Anderson, 2005; Taylor-Powell & Henert 2008; Taylor-Powell et al., 2003). The process allows organizations to examine where they are and where they want to go (Anderson, 2005; Taylor-Powell & Henert 2008; Taylor-Powell et al., 2003). As an evaluation tool the model is used to determine if a causal relationship exists between the activities implemented and the results of those activities. The logic model, as a visual tool, provides a point of reference that identifies the links between the available resources, the activities implemented to evoke change, and the results of the actions taken.

Logic models can vary in form and complexity based on the scope of the organization and the level of expectation of the model. Simple logic models focus on inputs, outputs and outcomes;

1. Inputs – what is invested
2. Outputs – the action that is taken to evoke change
3. Outcomes/impact – the results of the outputs (Anderson, 2005; Taylor-Powell & Henert 2008; Taylor-Powell et al., 2003)

The process used within the logic model is one that determines if a causal relationship occurs between the inputs, outputs and outcomes (Anderson, 2005; Cato, 2007; Cato, Chen, & Corbett-Perez, 1998). Inputs identify the needs and resources that are available within a given context that can be incorporated in a logic model. The inputs may include such elements as accessibility to facilities, staff, collaboration amongst different organizations and experts in the field. Outputs are identified elements that are available to initiate change. Examples of outputs
include compiling resources such as evidence-based lesson plans for program delivery or number of children enrolled in a program. Outcomes to identify the change or benefits to the program or situation as a result of the intervention adopted (Taylor-Powell & Henert 2008).

Logic models can become much more specific to include six main components;

1. Situation/priorities
2. Inputs
3. Outputs
4. Outcomes
5. Assumptions
6. External factors

The complete form is much more robust in scope. Before outlining necessary inputs identifying the problem/situation environment and establishing priorities for action takes place (Taylor-Powell et al., 2003). At this stage, pinpointing who is involved, why it is a problem and what is known about the problem takes place. Further additions to the complete logic model include identifying assumptions and external factors. Assumptions refer to beliefs that we have about the program, the people involved and the expectations that may occur as a result of the activities (Anderson, 2005; Taylor-Powell & Henert 2008; Taylor-Powell et al., 2003). External factors are elements that are beyond the control of the individuals initiating change such as economics, family dynamics and demographics (Anderson, 2005; Taylor-Powell & Henert 2008; Trost et al., 2003). Such factors have the ability to influence the program positively or negatively and affect the final results.

An example of a complete logic model is identified below, in Figure 3-1. This logic model, created for this research study, is a starting point to question the current practice of
program planning and delivery in the recreation sector. The logic model presented identifies the assets, barriers and opportunities to develop purposeful and intentional PA programs to increase PA. This model suggests that in recreation there is a lack of alignment of program planning to philosophy and evidence-based lessons. Itemized lists of resources are identified to assist in promoting change as well as specific intervention activities that will help facilitate the desired outcome. To measure success, short, intermediate and long term objectives have been established. As mentioned earlier, assumptions and external factors have also been considered in this visual roadmap. A few of the basic assumptions identified include the desire to increase PA time in typical programs and a general desire by community members to want to lead an active and healthy lifestyle. There are also external factors to consider such as cost of programs, interest and willingness of members to participate in activities and the buy-in of staff to incorporate a new model of programming.

![Figure 3.1 Logic Model](image-url)
3.6 Limitations of the logic model

The logic model tends to have an optimistic perspective in its desire to create a positive outcome. A criticism of logic models in general, according to Taylor-Powell et al., (2003, 2008), is that the logic model represents only intentions of action and not the reality of the situation and the possibility of outcomes that might occur. There is the potential that the interventions created may not have the desired outcomes, and, in fact, negative consequences may emerge rather than positive ones. Another criticism of the logic model is that it simplifies the complex nature of the problem rather than addresses that there may be a multitude of contributing factors that will affect the process and ultimately the outcomes (Taylor-Powell & Henert 2008).

3.7 Chapter summary

This chapter identified the process the author went through to create an intentionally designed PL curriculum in the recreation sector. This included the incorporation of elements that exist in education and sport sectors, as well as utilizing a social-ecological model as an underpinning.

Further, the strengths and limitations that have been identified with the use of logic models, they have proven to be a valuable tool in guiding research or systematic change. Logic models provide individuals who are interested in soliciting change with the opportunity to evaluate their existing assets and determine what is needed in order to achieve short, medium and long term goals.

The following chapter will identify how this curriculum was adopted within this research study. It will also describe the evaluation of children’s motor proficiency and recreation programming through multiple media including process-oriented physical testing and SO. In
addition to quantitative measures, focus groups were used to capture the parental perceptions of children’s PA programs.
Chapter Four: Methodology

The purpose of this chapter is to discuss the research design used to explore the effect of an intentionally designed physical literacy (PL) program for children in grades one and two compared to similar children participating in traditional recreation (TR) programming. The PL program was designed to provide children the opportunity to experience four different types of physical activities, with one registration. The research study included the development of a purposefully designed curriculum (aligned with Alberta education Program of Studies and Canadian Sport for Life philosophy), the recruitment of participants, delivery of a PL program, as well as baseline and post testing measurements of motor proficiency. Systematic observation, via momentary time sampling, was used to measure physical activity (PA) activity levels, lesson context and instructor behavior within PA programs. In addition, families were invited to participate in focus groups to gain an understanding of parental perceptions of recreation programming. A mixed methods design including quantitative and qualitative data analysis was used to foster a deeper understanding of the research questions.

The next section will outline the procedures taken in order to conduct the study including; recruitment, selection of group participation, parent meetings and program delivery. The chapter closes with the hypotheses for the research study and discussion of data management procedures and ethical considerations.

4.1 Research design

The focus of this research study was to develop empirically derived evidence to educate the programming and staffing of regional recreation centres. The information acquired was intended to enhance the development of children’s motor proficiency and to increase the PA levels and experiences among children and youth during recreation programming. This research
study also sought to understand parental perceptions of PA programs in the recreation sector. Finally, this research was intended to demonstrate and develop best teaching practices in recreation instructors.

Due to the nature of this study a mixed-method approached was employed. This approach, as identified in a previous chapter, allowed the researcher the opportunity to determine if a statistically significant finding was present through quantitative analysis, while qualitative methodology provided the researcher with the opportunity to capture the perception of the parents, thus providing a more holistic approach to the data analysis.

The primary investigator (PI) argues that an evidence-informed program that is intentionally aligned with physical education curricular outcomes, and grounded in principles that foster the development of physical literacy, as discussed in previous chapters, will result in a high quality recreation experience that is diverse and inclusive. The research project was designed for children in grades one and two and was deliberate in introducing a wide variety of physical activity experiences in different environments (ground, air, water, snow and ice) during a critical stage of psychomotor readiness.

This research study involved the recruitment of children into two distinct physical activity programs that involved the participation of children in physical activity programming two times per week for four months. The first program included recruitment of children into the PL program where children participated in gym-based activities, swimming, skating and gymnastics. Children selected for TR programming self-selected physical activities that were of personal interest to them. Both groups were physically active for the same amount of time. All activities were conducted indoors. The information provided below outlines the specific components of the research study.
4.2 Research study

This study took place at Vivo for Healthier Generations, formerly known as Cardel Place, a recreation facility in North Central Calgary, Alberta, Canada from January 2014 through to April 2014. Vivo is a typical recreation centre with amenities that include a swimming pool, gymnasiums, multipurpose rooms, climbing wall and skating rinks. Vivo is one of the leading regional recreation facilities in Calgary and has nearly 1.5 million visits each year and services a catchment of 156,000 people in North Central Calgary. The organization has a great opportunity with its strong community connections and the direction from the community to do more to ensure North Central Calgarians are happy, healthy and connected. The catchment area has a very diverse population with a high percentage of immigrants and nearly 30% of individuals self-identifying as a visible minority (Vivo, 2016).

This project is an extension of the Child + Youth Action Research Project. The Child + Youth Action Research Project is a 10-year partnership between Vivo and Mount Royal University (MRU) to create curriculum and education resources for children grades K-6 and their families (http://calgaryherald.com/entertainment/local-arts/cardel-place-raises-the-bar-for-healthy-living, http://letsraisethebar.ca). The extension of this program, and curriculum development, is being continued and is demonstrated in an online version of Today’s Parent (http://www.todaysparent.com/kids/school-age/physical-literacy/).

4.3 Recruitment

The recruitment for this research study occurred at Vivo due to a previous relationship with Mount Royal University’s (MRU) Department of Health and Physical Education who were collecting baseline measurements of motor proficiency on children and youth in North Central Calgary. The information collected was intended to help the recreation facility personnel assist...
children and their families to be active and healthy for life (http://letsraisethebar.ca). The participants of this research study were selected using convenient sampling. Recruitment, for this study, occurred through the use of existing membership and affiliations of Vivo. A total of two stages of recruitment occurred. The first stage included a mass email invitation to clientele who had children between the ages of six-and-seven and likely to be registered in grade one or grade two in the 2013-2014 academic school year and who were yearly pass holders to the facility (Appendix A). To further increase the sample size, stage two of recruitment included a second round of email invitations to families with similar qualifications, were not pass holders to the facility but had previously enrolled their child in a program at Vivo (Appendix A).

If families were interested in having their child participate in the research study, they were asked to contact the PI via email as described in the email invitation. Once families contacted the PI expressing interest in participating in the study the families received an email response asking them to complete an eligibility form (Appendix B & C). The eligibility form identified the availability of the participants to participate in the research study and was used to randomize participants into the respective groups. Participant availability determined whether individuals were eligible to participate in TR or PL programming. Table 4-1 identifies the sequential process used for the recruitment of participants.

All children were asked to be free of any mental, neurological or physical disabilities.
### Table 4-1 Recruitment process

<table>
<thead>
<tr>
<th>Step One</th>
<th>First round of emails sent to existing yearly pass holders with children aged six-to-seven year olds (Appendix A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Two</td>
<td>Second round of emails sent to families who had previously registered a child in a program at Vivo who were six-and-seven years of age (or registered in grade one and two) (Appendix A)</td>
</tr>
<tr>
<td>Step Three</td>
<td>PI responded via email to all families who expressed interest with an eligibility form (Appendix B &amp; C)</td>
</tr>
<tr>
<td>Step Four</td>
<td>Based on the results of the eligibility form, participants were divided into two groups; Group 1 – PL program and Group 2 – TR program (self-selected activities)</td>
</tr>
<tr>
<td>Step Five</td>
<td>Email sent to families selected for PL program (Appendix D)</td>
</tr>
<tr>
<td></td>
<td>Email sent to families selected for TR program (Appendix E)</td>
</tr>
<tr>
<td></td>
<td>Emails included information confirming participation and program registration</td>
</tr>
<tr>
<td>Step Six</td>
<td>Email sent (Appendix F) to those families not selected to participate in the research study, thanking them for expressing interest</td>
</tr>
</tbody>
</table>

#### 4.3.1 Randomization

Upon receiving the completed eligibility forms, all children were divided into two groups. A total of 121 families expressed interest. Group one included children who were available to participate in the PL program, scheduled on Tuesday and Thursday evenings from 4:30-5:30 pm.

The second group included children selected for TR programming and were available on other days and times. To determine the groups the PI manually went through each of the eligibility forms and divided the participants into the two respective groups.

Group selection was then done through randomization. All interested participants names were put into a randomizer software program (https://www.random.org/lists/). A total of 57 children were invited to participate in the study. This sample size is consistent with existing literature with similar objectives (Foweather et al., 2008). The first 28 names to appear in each of the respective randomized groups were invited to participate in the research study. Those
families not selected were sent an email thanking them for their expression of interest (Appendix F). In total, 28 children participated in the PL program on Tuesday and Thursday evenings and 29 participated in the TR program. Once children were divided into their respective groups, an email (Appendix D & E) was sent to each family confirming their enrolment and participation in the research study. The flow chart below provides a visual representation of the recruitment process.
Recruitment flow chart

Child & Youth Action Research Study
Recruitment Strategy

First email invitation to existing Vivo membership

Second email to all families who had registered their child (grade one and two) in a physical activity program at Vivo

Eligibility forms sent to those individuals that expressed interest

Eligibility forms divided into two groups based on availability (1st group = PL program, 2nd group = TR program)

Randomization of participants into specific groups

Email to participants about participation into program

Email to participants in TR program

Email reminder to TR parents about parent meeting

Parent meeting TR program

TR physical activity program

Email to participants in PL program

Email reminder to PL parents about parent meeting

Parent meeting PL program

PL physical activity program

Email to parents not selected for program participation
4.3.2 Confirmation of participation

In order to confirm participation in the research study, families were asked to pay a $100 registration fee and enrol their child using the Vivo registration system. The program was valued at $400/participant. This value was based on the average cost of children participating in physical activity programming two times per week over four months at the recreation centre. The actual cost of the research study (facility booking, registration and instructor costs) was funded by Vivo and an anonymous donor.

Table 4-2 identifies the familial commitment of all selected individuals participating in the research study. If families completed the program requirements, as listed below, the registration fee of $100 was returned to the family in the form of a credit to Vivo. To provide further clarity regarding the research study all parents, of those selected were invited to attend an information session.

Table 4-2 Research study requirements for all selected participants

<table>
<thead>
<tr>
<th>Research Study Requirements</th>
<th>Pay $100 registration fee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participate in two motor proficiency tests (December and April)</td>
</tr>
<tr>
<td></td>
<td>Participation in physical activity programs 2x/week for approximately 1 hour</td>
</tr>
<tr>
<td></td>
<td>Participate in focus group</td>
</tr>
<tr>
<td></td>
<td>Attend a minimum of 80% of scheduled physical activity programs</td>
</tr>
</tbody>
</table>

4.4 Parent meetings

Once the two groups were formed and families registered their child, parents were asked to attend a parent meeting to further explain the details of the research study. In an attempt to accommodate as many families as possible, one meeting was offered during the day on the weekend and the other on a weekday evening. In total, four parent meetings were offered (two for each respective group). To encourage attendance at the parent meetings childcare was
provided by Vivo staff. Children who attended the parent meeting were entertained with play dough, building blocks and puzzles.

4.4.1 Parent meeting email reminders

Prior to the parent meetings, an email reminder was sent out to all families (Appendix G & H). The winter program brochure (Appendix I) was sent to those families invited to participate in the TR program as well as a physical activity request form (Appendix J). The families of the TR program were asked to select a total of four physical activity programs they wanted their child to participate in during the four months of the research study. Parents were asked to select the activities prior to the parent meeting.

4.4.2 Parent meeting objectives

There were several objectives of the parent meetings, including the introduction and purpose of the research study, introduction of the PI and research assistants (RA), reviewing the role and commitment of the families in the research study, distribute and collect completed consents forms (Appendix K) and, finally to ensure that each participant had selected a day and time for baseline motor proficiency testing. It was important to separate the parent meetings into two groups (i.e., PL and TR group) in order to speak specifically about the details of each of the respective programs and this is described in detail in the table below.
Table 4-3 Parent meeting objectives

<table>
<thead>
<tr>
<th>Common Parent Meeting Objectives</th>
<th>Specific Meeting Objectives (TR Group)</th>
<th>Specific Meeting Objectives (PL Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduce PI and RA’s</td>
<td>• Describe that families may select any physical activity program that is offered in the facility brochure</td>
<td></td>
</tr>
<tr>
<td>• Introduce objective of research</td>
<td>• Ensure each family has selected a total of four programs for their child to participate in</td>
<td></td>
</tr>
<tr>
<td>• Discuss commitment by researcher</td>
<td>• Describe philosophy of new recreation programming</td>
<td></td>
</tr>
<tr>
<td>• Discuss family commitment</td>
<td>• Describe evidence-based curriculum physical activity program (particularly specifying each of the environments/activities that children will be participating in)</td>
<td></td>
</tr>
<tr>
<td>• Ensure collection of all consent forms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Schedule date and time for baseline motor proficiency testing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.5 Traditional recreation program parent meeting

Parents and children were greeted and introduced to the PI and RA’s. At this time parents were asked to select a day and time for their child to perform baseline motor proficiency testing. Consent forms were distributed and then collected at the end of the meeting (Appendix K). The PI prepared a power point presentation for the families to provide context to the components of the research study (Appendix L). Children involved in this group were afforded the opportunity to register for physical activity programs of their choice. Parents of this group were given the winter program brochure in advance of the parent meeting, in the email reminder, and were asked to come to the meeting with their selection of physical activity programs determined in advance (Appendix I & J). Families in this group had priority registration (over the public including Vivo members) into programs of their choice.
Participants within this program were taught by traditional recreation instructors. For the purpose of this research study these instructors are defined as instructors who have specific experience related to a particular activity (i.e. basketball). As a result of their experience they are often hired to teach PA programs. The instructors need to be a minimum of 16 years of age to teach a PA program. Often these instructors do not receive formal training through a recognized certifying body but rather they receive in-house training. There are exceptions such as swimming that require instructors to receive training through the National Coaching Certification Program.

In order to mirror the PL program, families were asked to select a total of four activities of their choice. The program was divided into two sessions, winter session A and winter session B. Parents were asked to select two activities for their child to participate in during winter session A which ran for two months, January and February, and two activities for winter session B, which ran for two months in March and April. Table 4-4 identifies the breakdown of the program selection for participants in the TR group.

### Table 4-4 Traditional recreation PA program selection

<table>
<thead>
<tr>
<th></th>
<th>Number of physical activity programs selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Session A (January – February 2014)</td>
<td>• Two/participant</td>
</tr>
<tr>
<td>Winter Session B (March – May 2014)</td>
<td>• Two/participant</td>
</tr>
</tbody>
</table>

To assist in program selection, a staff member from Vivo was in attendance at the parent meetings to help facilitate with the registration process. This staff member did not favor or encourage the enrolment of children into any particular program; rather program selection was determined by the family. The staff member was able to answer all questions specifically related to recreation scheduling. One of the benefits to participating in this research study was that the
families received priority registration into the programs of their choice prior to public registration. This allowed for a wide variety of program selection. Typical program registration in a recreation facility is often difficult due to the high demands for certain programs (i.e., swimming). This research study provided some families with the opportunity to have their child participate in programs that they had not previously been able to register in.

As the meeting drew to a close, parents were given the opportunity to ask questions about the research study including elements such as; time commitment and testing tools.

4.5.1 Traditional recreation program PA scheduling

Upon completion of the TR group parent meeting all PA program request forms were collected and compiled into an excel spreadsheet. The PA programs for each child were organized into a spreadsheet to ensure that a total of four physical activities were selected by each family. This spreadsheet also facilitated the coordination and scheduling of the systematic observation and assisted in recording participant attendance. Upon completion of the spreadsheet and entry of the PA programs into the registration database, parents received an email confirming their child’s PA program selections (Appendix M).

4.5.2 Traditional recreation program delivery

The TR group was asked to attend a minimum of 80% of their self-selected programs. These families were reminded of their program selections via email and were referred to the program guide for any particular equipment needs (i.e., bathing suit for swimming).

4.6 Physical literacy parent meeting

The second set of parent meetings was offered for those families whose eligibility form identified their availability to participate in the PL program offered on Tuesday and Thursday evenings. All parents were welcomed and introduced to the PI and RA’s, consent forms were
distributed and collected at the end of the meeting. A power point was created for this parent meeting to highlight the components of this specialized physical activity program (Appendix N). Questions were welcomed.

There were several differences between the TR and PL parent meetings. Children in the TR group had the opportunity to select physical activities of their choice, whereas children in the PL group were prescribed activities. The activities in the PL program were selected to be diverse and inclusive providing a variety of experiences and environments. This group participated for a total of 8 classes in each of the following activities/environment including; gymnastics (air environment), gym-based activities (land environment) focusing on the development of fundamental movement skills, swimming (water environment) and ice skating (snow/ice environment).

Many parents seemed pleased that their children were able to experience a number of different activities however; there were a few that expressed concerns. Apprehensions included their child’s lack of ability and experience in certain activities, particularly skating and swimming. Other concerns seemingly stemmed from religious/cultural beliefs (girls swimming). The PI discussed each particular circumstance with individual families to alleviate concerns.

Another difference between the parent meetings included sharing the philosophical underpinning of the PL program which included the use of evidence-based lesson plans, a multitude of physical activity experiences and incorporating best teaching strategies/practices. Furthermore, this select group of children acted as a cohort and experienced each activity/environment as a group. The uniqueness and intentionality of the new programming is outlined below.
4.7 Physical literacy program

The intentionally designed PL program was deliberately aligned with the objectives of the Alberta Education Curriculum, including the adherence to diverse activity experiences as promoted by sport models, while using evidence-based lesson plans and best practices of teaching delivery. This was done to ensure that each lesson experienced by children was intentional and purposeful in achieving specific objectives.

4.7.1 Alberta Education curriculum alignment

The Alberta Education Curriculum outlines specific outcomes that instructors are expected to teach in each subject area for each grade level. The physical education curriculum is divided into four general outcomes; Activity, Benefits of Health, Cooperation and Do it Daily (ABCD’s). In order to enhance children’s motor development and acquisition of fundamental movement skills in the recreation sector, the PI believed it was important to reinforce and embed the objectives of the education curriculum into the PL programming. For each physical activity lesson the children experienced, specific curricular objectives were reinforced (Appendix O). The creation of the program was intended to enhance the school based objectives in the recreation environment.

4.7.2 Canadian Sport for Life (CS4L)

The alignment of the PL curriculum to the sport sector occurred in two different ways. The first is the philosophical belief that children should have a diverse experience in a variety of different physical activities (education also promotes diverse experience in dance, gymnastics, game activities, individual activities and alternative environments). As a result of this perspective, children within the PL program participated in gymnastics, swimming, skating and gym-based activities. The second alignment to sport is the belief in developing fundamental
movement skills as a foundation to later learning sport specific skills. The activities selected for children were developmentally appropriate while simultaneously allowing children to have fun and experience success.

4.7.3 Sports, Play and Active Recreation for Kids (SPARK)

The SPARK resources and lesson plans were primarily used to teach the gym-based physical activities based on their evidence-based ability to increase physical activity within the physical education classroom (McKenzie et al., 1998). The teaching strategies outlined in this resource were also used for effective program delivery (Appendix P).

In addition to aligning the PL program to curricular objectives, sport model philosophy and best teaching practice, there were several other notable differences amongst the PL and TR group. Such differences included encouraging play during activity lessons, intentionally increasing the amount of physical activity time within the program and finally, a consistent instructor that would interact with parents and children over the duration of the four month program.

4.7.4 Play

The concept of play was encouraged at the beginning and end of each class of the PL program, across all environments. Children were given the first and last five minutes of each class to play in the PA environment in a safe manner. Examples of this included providing children with a variety of equipment with which to explore. Equipment, depending on the physical activity environment included; beach balls, various shaped balls, hula hoops and such. Kids explored the environment and equipment individually, in small groups or with the instructors of the program.
4.7.5 Increased physical activity time

Another unique element to the PL program included an intentional effort to increase the amount of time children spent in moderate to vigorous physical activity. Previous research (Sheehan, 2015) identified that children in a recreation program spent as much as 60% of class time in sedentary behavior. The PI examined each individual lesson and discussed with the program instructors about opportunities to increase physical activity. Children are often stationary while listening to instructions or when waiting their turn. To curb this, each program instructor was challenged to think of ways to increase physical activity time. Elements of best practice were shared and encouraged with the program instructors to foster maximum activity time.

4.7.6 Consistent instructor

In typical recreation programming one instructor is responsible for teaching a specific program that runs for an eight-week session. In this new PL program one consistent instructor was identified to work with the children in each of the four different activities that the children participated in. It is unrealistic to think that any given individual has the experience or confidence to teach multiple forms of physical activity. The constant presence of a consistent instructor in each of the environments was intended to help children feel comfortable, to enhance the social connections between children, instructors and parents and finally to be a consistent and reliable point of contact for communicating with parents.

The PI of the research study was the consistent instructor and taught the gym-based and gymnastic activities and acted as an assistant to swimming and skating. To ensure high quality and consistent program delivery in all environments the PI delivered professional development opportunities to staff involved in the PL program.
4.7.7 Staff training

In order to maintain the integrity of the PL program it was important to share the philosophy with the staff hired to teach the swimming and skating programs. For each program environment (i.e., swimming and skating) a separate program meeting was organized in order to speak to the diversity of each activity.

Each meeting began with the PI welcoming and thanking the staff for agreeing to participate in a new format of program delivery. An overview of the new philosophy to recreation programming was shared followed by a discussion of the implications to existing programming.

Informal professional development occurred between the PL specialist (also the primary investigator (PI) and the trained (TI) instructors. In total there were four trained instructors in the water and three in the ice environment that received additional training. The program philosophy was discussed and relevant tools and resources were distributed amongst these instructors. In addition to the training the PI provided ongoing support throughout the duration of the study. Prior to each program lesson the PI had conversations with the instructor regarding the upcoming lesson.

4.8 PL program delivery

A visual representation of the activities and timeline for the PL program is demonstrated in Figure 4.1 below. The first and last day of the program were designed to be unique activities. The first day focused on the development of social relationships among the children and instructors. Activities for this day focused on cooperative and team building activities. The final day was a celebration of participation in the program. Parents and siblings were invited to participate in a fun-filled class where families played some of the children’s favorite physical
activities from the program. Families received a handout at the end of the event to help foster physical literacy and family engagement outside the confines of a recreation facility (Appendix Q).

Figure 4.1 Physical literacy program outline

4.9 Data collection instruments

As identified in chapter two, there are many measurement tools that have been used in the literature (Bruininks & Bruininks, 2005; Cliff et al., 2009; Venetsanou, Kambas, Aggeloussis, Fatouros, & Taxildaris, 2009) to evaluate motor proficiency and PA levels of children and youth. However, selecting appropriate instruments for this study was determined by the following: the appropriateness of the tools for the age of participants, the type of data and information collected from the measurement tools and the use of standardized measures with proven reliability and validity. Combinations of quantitative and qualitative measurements were used within this study.

The Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form (SF) was used to measure motor proficiency, and the Systematic Observation of Fitness Instruction Time (SOFIT) was employed to measure PA levels, lesson context and instructor engagement. Focus groups were also used to assist the PI in acquiring parental perceptions of recreation programming.
4.9.1 Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form (SF)

Baseline and post test data were collected using the BOT-2 SF, which is a test that assesses motor ability in children. Motor proficiency test data was collected at two different periods: 1) prior to the commencement of the PA programs to collect baseline data; and 2) during the final weeks of the PA programs to collect follow-up data. The data collection of the BOT-2 was done by trained RA’s. The RA’s were not informed of which participants were in the TR or PL program.

4.9.2 Administering the BOT-2

Each individual participant has their own individual recording form when conducting the BOT-2 test. On the recording form pertinent information was collected including the date of physical testing, examinee and examiners name, chronological age, preferred drawing hand, throwing hand and kicking foot. On this form the examiner also identifies which norms are selected for computing results (male, female or combined). After the administration of the test the examiner recorded specific observations regarding the performance of the examinee in the area of attitude, effort, comprehension and behavior (Bruininks & Bruininks, 2005). This information was later used when examining the validity of the data set. Poor performance in a child’s comprehension or behaviour may influence the results of the physical test.

4.9.3 Information collected from the BOT-2

The SF BOT-2 is a quick, easy to administer tool used to assess children’s motor proficiency, with the ability to provide a single score of motor proficiency. When reporting the motor proficiency result the researcher identifies the standard score, the confidence interval, the corresponding percentile rank as well as the relevant descriptive category (Bruininks & Bruininks, 2005). Further, an option to select sex-specific norms is available, when computing
the results, to remove the natural gender difference that occurs between males and females (Bruininks & Bruininks, 2005).

4.9.4 Standard score

The standard score is used to describe the individual’s level of motor proficiency in each of the 4 motor-area composites which range from 20–80, with a mean of 50 and standard deviation of 10 (Bruininks & Bruininks, 2005).

4.9.5 Confidence intervals

Confidence intervals are a range of scores around an individual’s standard score that is most representative of the individual’s true score (Bruininks & Bruininks, 2005). The higher the confidence level, the wider the confidence interval will be (Bruininks & Bruininks, 2005). The confidence interval can be set to either 90% or 95% and demonstrates the reliability of a subtest or composite (Bruininks & Bruininks, 2005).

4.9.6 Percentile ranks

Percentile ranks are often used to deliver the message of an individual’s performance due to the ease of interpretation. Specifically, sharing the result as a percentage identifies how the individual compared or outperformed other individuals relative to their chronological age group (Bruininks & Bruininks, 2005).

4.9.7 Descriptive categories

Another way to communicate the results is through 5 descriptive BOT-2 categories that describe the level of motor proficiency in the subtests and composites using broad ranges of standard and scale scores (Bruininks & Bruininks, 2005). The descriptive categories describe, in words, the approximate distance of the score range from the age-group mean and are identified in Table 4-5 (Bruininks & Bruininks, 2005).
Table 4-5 Descriptive categories to scale scores, standard scores, percentile ranks and standard deviations from the mean

<table>
<thead>
<tr>
<th>Descriptive Category</th>
<th>Scale Score</th>
<th>Standard Score Range</th>
<th>Percentile Rank Range</th>
<th>Standard Deviations from the Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-Above Average</td>
<td>25 or greater</td>
<td>70 or greater</td>
<td>98 or greater</td>
<td>2.0 or greater</td>
</tr>
<tr>
<td>Above Average</td>
<td>20-24</td>
<td>60-69</td>
<td>84-97</td>
<td>1.0-2.0</td>
</tr>
<tr>
<td>Average</td>
<td>11-19</td>
<td>41-59</td>
<td>18-83</td>
<td>-1.0-1.0</td>
</tr>
<tr>
<td>Below Average</td>
<td>6-10</td>
<td>31-40</td>
<td>3-17</td>
<td>-2.0 to -1.0</td>
</tr>
<tr>
<td>Well-Below Average</td>
<td>5 or less</td>
<td>30 or less</td>
<td>2 or less</td>
<td>-2.0 or less</td>
</tr>
</tbody>
</table>

(Bruininks & Bruininks, 2005)

4.9.8 Scoring the BOT-2

Objectively scoring and adhering to the administrative procedures outlined in the BOT-2 protocols is vital to the data collection process. Careful adherence to the protocols allows for direct comparison of one individual's test scores to other individuals in the same age category (Bruininks & Bruininks, 2005). There are several steps that need to be undertaken in order to compare the results of the BOT-2 test and these are outlined in Table 4-6 below.
Table 4-6 BOT-2 scoring

<table>
<thead>
<tr>
<th>Step</th>
<th>Scoring Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Record raw scores on individual testing sheet</td>
</tr>
<tr>
<td>2</td>
<td>Convert raw score to total point score</td>
</tr>
<tr>
<td>3</td>
<td>Total point scores are summed and provide the subtest point score</td>
</tr>
<tr>
<td>4</td>
<td>Subtest total point score are converted to scale scores (mean = 15, standard deviation = 5)</td>
</tr>
<tr>
<td>5</td>
<td>Converting scale scores to composite standard scores and percentile ranks</td>
</tr>
<tr>
<td>6</td>
<td>Standard of motor-area composites converted into a total motor composite score</td>
</tr>
<tr>
<td>7</td>
<td>Determining confidence intervals</td>
</tr>
<tr>
<td>8</td>
<td>Obtaining age equivalents for point scores</td>
</tr>
<tr>
<td>9</td>
<td>Scale and standard scores converted to descriptive categories</td>
</tr>
</tbody>
</table>

(Bruininks & Bruininks, 2005)

4.9.8.1 Step 1: Recording raw scores

The individual recording form captures the performance of each individual on each of the test items. The recording form is designed in such a way to ensure that the examiner tests each specific test item in a sequential manner which helps avoid missing or skipping a test items. For each of the individual test items performed the examiner records a raw score on the recording sheet in the column defined as Raw Score column. A raw score can be the number of points, correct number of activities or the number of seconds it took an individual to complete a task (Bruininks & Bruininks, 2005).

4.9.8.2 Step 2 Converting raw scores to point scores

Once raw scores have been collected the scores must then be converted into point scores. Point scores are a type of standard score that allows the examinee’s performance to be evaluated on a graded scale (Bruininks & Bruininks, 2005). Once the raw score has been collected the examiner must look at the point score conversion table to locate the corresponding point score. If a test item allows two trials, the better of the two raw scores is converted and thus calculated (Bruininks & Bruininks, 2005).
Once all raw scores have been converted to point scores the point scores are then added to provide a total score of that particular subtest (Bruininks & Bruininks, 2005). This score provides an overall summary of the examinee’s performance in a particular subtest. Before converting point scores into derived scores the examiner must determine which norms to use (either sex-specific or combined) (Bruininks & Bruininks, 2005). Sex-specific norms remove the consistent sex performance differences in performance that have been found to occur in certain subtests (Bruininks & Bruininks, 2005).

4.9.8.3 Converting subtest total point scores to scale scores

The subtest total point scores are then transferred to corresponding lines on the cover page of the recording sheet. Depending on the norm selected, and the chronological age of the examinee, the examiner then selects the appropriate tables to interpret the scores. Once the appropriate tables have been identified the examinee’s total point score for each subtest is identified and then is corresponded to a scale score (Bruininks & Bruininks, 2005). The scale score is then recorded in the appropriate box and put on the cover of the recording form in the Scale Score column. The scale score provides normative data for the examinee based on age and the norms selected for each of the specific subtests. The scale scores have a mean of 15 and standard deviation of 5 (Bruininks & Bruininks, 2005). When looking at the tables for scale scores it is important to ensure that the correct tables are being used. There are a few instances where the examinee has an option on how they perform the test (i.e. push ups can be done from knees or with straight body) and therefore there will be different corresponding tables.

4.9.8.4 Converting scale scores to composite standard scores and percentile ranks

For each of the motor-area composites the examiner adds the individual subtest scale scores to provide a sum of that particular measurement area. The examiner must then select the
appropriate norm tables, for each motor-area composite, for age and sex-norms (Bruininks & Bruininks, 2005). Each motor-area composite score will then translate to a standard score and corresponding percentile rank.

4.9.8.5 Standard of motor-area composites converted into a total motor composite score

In the Long Form version of the BOT-2 test is the ability to calculate a total motor composite score (TMS). To achieve this score the sum of the standard scores in each of the 4 motor-area composites is tabulated and is then corresponded to a table that provides a percentage of TMS score based on the sum of standard scores achieved (Bruininks & Bruininks, 2005).

4.9.8.6 Determining confidence intervals

Confidence intervals provide an interval range of scores that will identify the examinee’s true score with 90%-95% confidence (Bruininks & Bruininks, 2005). The intervals are determined by using the norms selected by the examiner and by finding the band of error of the examinee’s age (Bruininks & Bruininks, 2005). Once the band of error is determined that value is subtracted from the standard score and that number provides the lower confidence interval (Bruininks & Bruininks, 2005). To determine the higher end, of the confidence interval, the error of band number is added to the standard score (Bruininks & Bruininks, 2005).

4.9.8.7 Obtaining age equivalents for point scores

Using sex-specific or combined norms allows the examiner to determine age equivalents based on each of the subtest total point scores (Bruininks & Bruininks, 2005). This information provides the examiner with comparative information about the examinee’s performance compared to the performance of other individuals.
4.9.8.8 Converting scale and standard scores to descriptive categories

To assist with the interpretation of the research findings the BOT-2 test provides the opportunity to communicate an individual’s results in a descriptive format that is easy to interpret. The descriptive categories identifies the examinee’s scale and standard score and compares them to the normative sample (Bruininks & Bruininks, 2005). The descriptive category identifies an individual’s performance in the categories of; well below average, below average, average, above average and well above average (Bruininks & Bruininks, 2005).

The SF of the BOT-2 is a condensed version of the LF where only 1 or 2 items from each of the motor-area composites are tested to provide an overview of motor composition. A similar process of computing scores is used in the SF including the conversion of raw scores into point scores and tabulating a total point score. A standard score is determined utilizing the table with the appropriate norms selected. Determining confidence intervals and descriptive categories is similar to that of the LF.

The SF of the BOT-2 has been considered to be a valid and reliable tool in the area of measuring motor proficiency in children. The SF has been validated against the LF for children between the ages of 8-14 and has attained agreement between .90 and .91 (Bruininks, 1978; Bruininks & Bruininks, 2005; Lucas et al., 2013; Wuang & Su, 2009). Although this test does not provide an in depth analysis of motor proficiency it provides an assessment of overall motor functioning (Lucas et al., 2013; Spironello, Hay, Missiuna, Faught, & Cairney, 2010; Venetsanou et al., 2009).

Examining children’s movement skills is often performed for the purposes of understanding an individual’s movement pattern, for assessing neurological disorders as well as
serving as an indicator for continued participation in PA. It is argued that a high degree of motor proficiency equates to an increased opportunity to participate in a multitude of activities.

Motor proficiency is only one component to consider when exploring opportunities to increase PA. Examining the details of PA programming (activity levels of participants, the focus of the lesson and the role of the instructor) may provide a different perspective to enhance PA. Direct observation has been used to further explore PA expenditure, lesson context and instructor behavior.

In addition to collecting baseline and post testing data on motor proficiency, a comparison of programming was done throughout the duration of the study between TR and PL programming utilizing systematic observation (SO).

4.9.9 System for Observing Fitness Instruction Time (SOFIT)

SOFIT is a SO tool that provides a validated measure (McKenzie et al., 1991) of three areas specific to program evaluation, including: (1) activity engagement level, (2) lesson context, and (3) instructor behavior.

Data collection for this tool is used by following the protocols outlined in the SOFIT manual, a brief description follows (McKenzie et al., 1991). Observers are required to have a pen, clipboard, recording and summary sheets for data collection, headphones and a portable audio player with the pre-recorded prompts. Observers randomly select four participants, two boys and two girls, to observe throughout the duration of the class. In addition, a fifth participant is identified in case one of the original participants has left the program or cannot be located during the observation period. Each participant is observed for a total of four minutes in 20s intervals (10s observe, 10s record). Upon completion of the four minutes observation the focus shifts to the next selected participant, via prompt, eventually returning to the first participant to
repeat the pattern. During the observation period the RA observes and records, simultaneously, physical activity expenditure, class context and instructor behavior. SOFIT gathers activity data on PA engagement, lesson context and instructor interactions.

4.9.10 **SOFIT PA evaluation**

PA is measured on a five-point hierarchical scale: 1) *lying down*, 2) *sitting*, 3) *standing*, 4) *light PA*, and 5) *moderate-to-vigorous PA* (MVPA; more energy expenditure than an ordinary walk). PA is measured on a hierarchical scale meaning that lying has the lowest value and vigorous activity has the highest value. The activity which takes place within the observation period with the highest value is recorded (for example, if sitting and standing were both observed during the 10 second interval, it would be coded as standing). The SOFIT tool records data by utilizing a prompt that signals to the researcher when to observe and record. In the instance of recording PA expenditure the individual being observed is recorded based on the activity they were performing at the record prompt. This first category of observation focuses on the behavior of the individual being observed.

4.9.11 **SOFIT lesson context evaluation**

Lesson context consists of three non-hierarchical categories: *general content* (transition, management and instruction time); *knowledge content* (primary focus is on the acquisition of knowledge related to PA); and *PA motor content* which is itself divided into *fitness* (such as endurance, strength or flexibility); *skill practice* (primary goal is skill development, such as drills); *game play* (application of skills with little instructor involvement); and *free play* (instruction is not intended and children may choose to participate or not) (McKenzie et al., 1991). Instructor interactions can receive one of six hierarchical codes: 1) *promotes fitness* (prompting or encouraging PA participation); 2) *demonstrates fitness* (models fitness
engagement); 3) *instructs generally* (lectures, describes, prompts or provides feedback); 4) *manages* (participants or the environment in non-subject matter tasks, such as set-up); 5) *observes* (monitors the group or an individual); and 6) *other task* (attends to events not related to the responsibilities of the class) (McKenzie et al., 1991).

The focus of the lesson context is on the actions of the class being observed. This is not specifically observing the selected individual rather is observing the behaviors/focus of the class activity.

**4.9.12 Instructor interaction evaluation**

For the final category of observation the SOFIT tool allows the researcher to select from either instructor interaction or instructor involvement. The coding for instructor interaction is primarily done to evaluate if the instructor provides specific verbal or non-verbal interactions to students that will encourage and promote the students to participate in PA skills, motor skills or fitness (McKenzie et al., 1991). In this observation category the interactions of the instructor are coded into 3 categories;

I - Instructor promotes in-class PA, motor skills or fitness

O- Instructor promotes out-of class PA, motor skills or fitness

N- Instructor does not promote PA, motor skills or fitness

The other category that is available for exploring the behavior of the instructor is referred to as instructor interaction. This observation category is recorded on a hierarchical scale of performance and is recorded at any point throughout the 10s observation. The observation codes are as follows;

P – Promotes PA behaviors (praise, encouragement)

D- Demonstrates (models/demonstrates the physical activity)
I – Instructs (lectures, provides feedback and gives information)
M – Manages (sets up equipment, takes attendance)
O – Observes (monitors children)
T – Other task (participates in activities unrelated to the program; McKenzie et al., 1991)

If for example during the observation period the RA hears the instructor praises a child’s effort they do not have to wait until the record prompt, they may record a ‘P’ right away. The intention of this observation code is to capture the behavior of the instructor within the 10s observation.

4.9.13 SOFIT summary evaluation

Upon completion of the observation the researcher adds all of the data points for each column in each of the three observation categories; PA expenditure, Lesson Context and Instructor Interaction (Appendix R). The researcher then ensures that for each observation category that a correct total number of observations have been recorded. This information is then transferred onto a summary sheet which captures the data onto one sheet (Appendix S). At this point the researcher summarizes the percentage of observations classified into each coding category. The summary data is then averaged to provide aggregate percentages for each of the categories (Behrens et al., 2015; McKenzie et al., 1991). The recording and observation summary sheets were modified slightly by the PI from the original forms. The modifications accounted for gender differences in the category of PA expenditure.

SO is an alternative method used for evaluating PA expenditure and programming. This form of measurement is often employed to record a phenomenon of interest across settings with the opportunity to observe over multiple periods of time. This form of measurement is an indicator of an individual’s behavior in a ‘real’ context. In other words observation is done in a
non-clinical environment. The information that is collected from observation is often used to
generalize the behaviors identified to a larger context. Although there are several benefits to SO,
there are limitations.

One of the largest limitations is the cost associated to training and conducting SO. In
order to gather rich, valuable data that is representative of the community/population, it is
imperative to train individuals to collect the data according to the established protocols. Training
individuals, conducting observation and analyzing data require a significant financial
commitment. Another limitation is the possibility of observer reactivity (hawthorne effect). This
refers to the possibility of an individual, not behaving in their typical manner (McKenzie et al.,

4.9.14 Focus groups

In order to gain an understanding of parent’s perceptions of recreation programming,
parents of all participants, were invited to attend a focus group to share their opinions. Focus
groups were used to engage individuals in conversation on their thoughts of physical activity,
specifically recreation programming.

Once the design of the research study had been created and the measurement tools
identified the recruitment for participation began.

4.10 Measurement tools

In order to determine an effect of the PL program compared to TR programming, it was
important to utilize reliable measurement tools. A multitude of tools were used and discussed
below.
4.10.1 Baseline motor proficiency testing

Prior to the commencement of physical activity programs, the BOT-2 SF was administered to all invited participants.

4.10.1.1 Scheduling of baseline motor proficiency

The scheduling of motor proficiency testing was done on a first come first serve basis. As parents walked into their specific parent meeting, the PI introduced herself, ensured consent forms were completed and asked parents to select a day and time that worked for them to have their child perform the motor proficiency test. A large poster board identified individual time slots that were available for testing (Appendix T). For each time slot, there was a sticky note with the day and time on it. Once families selected a day and time, they placed their name and email address on the specific time slot and removed the sticky note which served as a reminder.

4.10.1.2 BOT-2 SF training

The PI had previous experience conducting a modified version of the BOT-2 SF test as well as the training of RA’s to administer the test. To administer the motor proficiency test for this particular research study, two RA’s were hired and trained using the BOT-2 protocols. The training of the RA’s took several steps. The first step began with a meeting in early November to supply each RA with the BOT-2 training manual (Bruininks & Bruininks, 2005) as well as training DVD’s. Each RA was asked to review and understand the training material for the next meeting at the end of November. The meeting at the end of November was the first of three practice trials in administering the test. The first practice trial involved the PI administering the test to the RA’s demonstrating the testing procedures. The second practice trial involved the RA’s administering the test to the PI and two other individuals (friends of the PI) through the protocols. The third practice trial involved bringing in eight children for the RA’s to administer
the testing protocols (children of the PI and PI friends). Once the PI felt confident in the RA’s ability to conduct the test they were allowed to administer the test on the children involved in the study.

To ensure quality of motor proficiency testing both RA’s and the PI were present for the administration of both baseline and post testing of each individual test. This also maintained consistency of data collection utilizing the same individuals for all tests. Having three adults in the room also ensured the safety of the children. The two research assistants conducted the motor proficiency test while the PI answered parent’s questions. The RA’s were given a list of participant names but were unaware of which PA program children were involved in. Both RA’s and the PI had a valid police check. Table 4-7 identifies the training steps involved in training the RA’s to help administer the test.

Table 4-7 Training of research assistants of BOT-2 SF

<table>
<thead>
<tr>
<th>Training Steps</th>
<th>Training Action</th>
</tr>
</thead>
</table>
| Step One       | • PI meets with RA’s to discuss the tool and provide the overview of why the tool is being used and the information that will be collected  
|                 | • Distributed the BOT-2 manual and training DVD’s  
|                 | • RA’s expected to review protocols and to become familiar with testing items. |
| Step Two       | • First Trial – PI coordinates a testing space and runs RA’s through test  
|                 | • Questions are answered from RA’s |
| Step Three     | • Second trial – RA’s lead the PI and two other adults through the testing procedures  
|                 | • Feedback from PI provided |
| Step Four      | • Third trial – RA’s perform motor proficiency test on 8 children between the ages of 7 and 12  
|                 | • ‘Real’ experience of testing protocols  
|                 | • Debrief of experience reviewed by PI and RA’s |
4.10.1.3 Baseline motor proficiency email reminder

At the parent meetings each family signed their child up for a particular day and time for motor proficiency testing. Each individual was assigned a 30 minute slot to conduct the test. After the meetings the information collected from the poster board (dates and times of physical testing) were compiled into a spreadsheet. Beside each motor proficiency time slot the respective families email address was included. Families received an email reminder two days prior to their child’s motor proficiency testing date, reminding them of the test and to ensure that children wore runners, comfortable clothing and brought a water bottle. Baseline data was collected three to four weeks prior to the commencement of physical activity programs.

4.10.1.4 Children’s assent

Parents were asked to drop their child off and return 30 minutes later. The testing room door was kept open and tables and chairs were provided outside the room for parents.

Once children arrived for their scheduled motor proficiency test the PI and RA’s were introduced. At this time children’s assent, to participate in the research study and physical testing, was collected (Appendix U). All children agreed to participate.

4.10.1.5 Baseline post-test scheduling

An integral component to this study was to determine if a change in children’s motor proficiency occurred as a result of program participation. In an attempt to answer this question, both baseline and post-testing measurements were taken. To schedule post-testing, families were invited to participate through Doodle which is an online scheduling system (http://doodle.com/). Parents were informed that this schedule would be on a ‘first come first served’ basis. Parents were asked to select a day and time by clicking a box that worked best for them and that had not already been selected by another family. Post-testing of motor proficiency occurred the final two
weeks of the research study, prior to the completion of the physical activity programs. The timeline for conducting pre and post testing was consistent between the two groups.

4.10.1.6 Post-testing email reminder

An email reminder was sent to each family two days prior to their final motor proficiency test. Similar information that was sent to parents for baseline testing was included in the email such as children’s attire and a reminder of the duration of the test.

Upon completion of the post motor proficiency test parents received a personal summary of their child’s results (Appendix V). The results were mailed to all families with their registration fee returned, in the form of a credit to Vivo. Parents were provided with the opportunity to meet with the PI to discuss their child’s results.

In addition to motor proficiency testing this research study explored the physical activity levels of children, lesson context and instructor behavior using systematic observation.

4.11 System for Observing Fitness Instruction Time (SOFIT) researcher assistant training

The PI had extensive experience in data collection using the SOFIT tool. Two undergraduate students from Mount Royal University were trained by the PI to work as RA’s to collect observation data. All SO data was collected by the RA’s. An RA, who had been previously hired and trained by the PI using the SOFIT protocols, was used to assist with inter-rater reliability training of other RA’s.

Training in SOFIT protocols (Appendix U) began with the PI providing a detailed overview of the systematic observation tool followed by the RA’s observing a pre-coded gold-standard training video segment accessed through iTunes University. RA scores were compared to the scores provided on the training video. SOFIT protocols state that observers must maintain 80% or better in inter-rater reliability. This was maintained throughout the study through
occasional PI and RA co-observations. If the inter-rater agreement between the PI and RA was less than 80% the protocols state that further training must occur. This includes; reviewing the training videos and discussing disagreements until consensus is achieved. Inter-observer agreement ranged from 84-96%.

There are a total of 17 observation codes in which observers are trained in. To assist in the training of the RA’s, the PI created a tip sheet to highlight the codes and abbreviate the hierarchal system that occurs within the tool (Appendix V). The original coding sheet was modified for ease of tabulation, particularly in regard to including gender in the analysis (Appendix X). Table 4-8 below identifies the training schedule created to build competency in the RA’s when working with the SOFIT tool.

**Table 4-8 Schedule of RA SOFIT training**

<table>
<thead>
<tr>
<th>Training session</th>
<th>Training Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Training session</td>
<td>• PI provides overview of SOFIT objectives</td>
</tr>
<tr>
<td></td>
<td>• SOFIT team observes training videos as a group</td>
</tr>
<tr>
<td>2nd and 3rd Training session</td>
<td>• PI coordinated two separate training sessions to observe PA programs with the RA team</td>
</tr>
<tr>
<td></td>
<td>• These initial sessions involved observing programs and collaboratively discussing what codes should be applied at each ‘prompt’</td>
</tr>
<tr>
<td>4th Training session</td>
<td>• Inter-rater observation agreement</td>
</tr>
</tbody>
</table>

Observation data was collected between January 2014 and May 2014. Each PA program was scheduled to be observed a total of 3 times (once at the beginning of the session, once in the middle and once close to the end) to obtain a broad representation of what took place in each program and to reduce lesson-to-lesson variability (such as more knowledge and skill generation in the early weeks compared to more game play in the later weeks). The programs selected for
observation included 3 in each of the environments in the PL program (gym-based, swimming, skating and gymnastics). Systematic observation was also conducted for children involved in the TR group. There was a large selection of PA programs that were observed in the TR group. This was due to the opportunity that these individuals had to self-select the activities they participated in.

Both boys and girls were represented in all classes with the exception of some dance programs. The control group participated in programming that ran for 8 weeks and ranged in duration from 30-55 minutes each. The ratio of instructors to participants was approximately 10:1. This varied however depending on the environment children were participating in. Swimming and skating environments had smaller ratios of approximately 6:1. This smaller number is to ensure safety amongst the participants.

Table 4-9 provides an overview of the number of diverse programs that were observed. These programs represent the PA selections of the PL program and those of the TR group. The various PA programs were then grouped according to the different environments of participation (water, snow/ice, ground and air).
Table 4-9 Physical activity programs divided amongst instructor training

<table>
<thead>
<tr>
<th>Environment</th>
<th>PL program</th>
<th>Instructor of activity</th>
<th>TR program</th>
<th>Instructor of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water environment</td>
<td>Swimming</td>
<td>Trained Instructor</td>
<td>Swimming, Aquablast</td>
<td>Traditional Recreation Instructor</td>
</tr>
<tr>
<td>Snow/ice environment</td>
<td>Skating lessons</td>
<td>Trained Instructor</td>
<td>Skating lessons</td>
<td>Traditional Recreation Instructor</td>
</tr>
<tr>
<td>Ground environment</td>
<td>Gym-based activities</td>
<td>Physical Literacy Instructor</td>
<td>Zumbatonic, Soccer Pro’s, Multi-Sport, Badminton, Floor hockey, Aikido, Urban Dance, Basketball and Hapkido</td>
<td>Traditional Recreation Instructor</td>
</tr>
<tr>
<td>Air environment</td>
<td>Gymnastics</td>
<td>Physical Literacy Instructor</td>
<td>Junior Tumblers, Courageous Climbers, Climbers and Tumblers</td>
<td>Traditional Recreation Instructor</td>
</tr>
</tbody>
</table>

As previously mentioned, one of the differences between the two different PA programs was the curriculum. The PL program was aligned to education curriculum objectives, philosophy of sport models and the use of best teaching practice. Table 4-9 identifies the different instructors responsible for teaching the PA programs and was divided into three particular categories. These categories include; the PI teaching the program, referred as PL instructor, who has over 20 years of experience working with children, the second category is instructors who had been trained (TI) by the PL specialist and the final category is the traditional recreation (TR) instructors. All instructors were trained in their respective environments (i.e. skating and swimming).
4.12 Focus group recruitment

In order to capture parents’ perceptions of recreation programming parents were invited to participate in a focus group. The purpose of the focus group was to specifically discuss the topic of recreation programming for children. Due to children participating in two different PA programs, two different focus group meetings were offered for these groups. Parents were invited to participate in the focus group via email invitation (Appendix Y & Z). Child minding, for the participants and siblings, was offered to encourage participation.

4.12.1 Focus group preparation

Prior to conducting the focus groups, the PI met with a qualitative expert who had extensive background in facilitating focus groups. The PI and qualitative expert met to review the format and process of the meetings as well as to discuss the guiding questions used to facilitate the meetings (Appendix AA). The focus groups were scheduled for 90 minutes. A total of seven parents participated from the traditional recreation program and nine parents participated from the PL program.

4.12.2 Focus group meetings

As parents walked into the meeting room at Vivo, the PI introduced herself, asked the parents to put on a name tag and offered them water and fruit. The meeting began with personal introductions followed by establishing rules for the meeting. Parents were asked to be honest and open about their opinions and respectful of others. The participants were asked their permission to have the focus group meeting audio-recorded before the interview began. They were also informed that their names would not be associated to the data or included in the dissemination of findings. Participants incurred no costs for their participation in the study. The PI guided the
conversation in the presence of the qualitative expert and took notes to capture immediate comments.

At the conclusion of the meeting the PI reviewed some of the high level comments received from the meeting with the group to ensure that their feedback was documented correctly. All participants were thanked for their participation.

### 4.13 Quantitative data analysis

All quantitative data was analyzed using IBM SPSS version 22.0.

#### 4.13.1 BOT-2 short form (SF) quantitative data analysis

The first quantitative analysis performed was on the BOT-2 SF motor proficiency data. The data was screened to ensure that all data was valid. To be considered valid, the data had to include results from baseline and post motor proficiency testing.

All data was collected prior to the implementation of training and again at the completion of the research study. A two-way repeated analysis of variance (ANOVA) was conducted to determine if change occurred in standard score for motor proficiency and for the 14 individual test items over time and by training. The statistical analysis specifically explored: group participation (PL versus TR program) with repeated measures of time (pre and post testing dates). Pairwise comparisons were also conducted to explore the influence of training participation for standard score and individual test items.

#### 4.13.2 SOFIT analysis

The SO data collected, through the SOFIT measurement tool, was also analyzed through the IBM SPSS 22.0 statistical program. Grouping the environments into land, air, water and snow/ice allowed for greater comparisons of physical activity expenditure, lesson context and instructor behavior.
SOFIT specifically measured the three categories of; PA expenditure, Lesson Context and Instructor Interaction. A one-way ANOVA was performed to explore MVPA and gender. A two-way ANOVA was also executed to explore the amount of time spent in MVPA by instructor and PA environment. Mixed two-way ANOVA’s were run on the Lesson Context and Instructor Interaction variables to examine the role of the instructor on each of the specific variables. Pearson product-moment correlations were also performed to look at interaction effect amongst variables particularly in regard to Lesson Context and Instructor Interaction.

Finally, a discriminant analysis was performed on the Lesson Context and Instructor Interaction variables. This analysis was executed to determine if the instructor could be identified through the SO recording procedure.

4.14 Qualitative data analysis

Chapter Five: In order to gain an understanding of parental perceptions of recreation programming, one family member from each of the respective PA groups was invited to participate in a focus group conversation. The analysis began with the transcription of the raw data followed by the reading, organizing and coding of the data. Next steps included a thematic analysis of all data and the identification and interpretation of themes.

A qualitative data analysis process was utilized to identify patterns of responses from the participants of the focus groups. The analysis approach taken, as suggested by Creswell et al. (2003, 2011), and identified in Figure 4.2, was a 6-step hierarchical system which included: 1) organizing the data for analysis, 2) reading all data to gain meaning, 3) coding the data, 4) describing themes, 5) determining how themes will be represented, and 6) interpretation of the data.
Figure 4.2 Qualitative data analysis process

To begin the qualitative data analysis the first step included the transcription of the focus group meetings. The data was then read multiple times to identify common elements/themes from the parents. In order to provide meaning to the data the coding process began by reducing the large amount of data by sorting responses into several important and broad topics as suggested by Miles, Huberman and Saldana (2014). The reduction of data was done based on the questions asked, allowing the data to be better managed and for comparisons to be made. The data was re-reviewed and keywords or phrases that captured either emotion or parental values were used as preliminary codes (Miles et al., 2014). The codes for each research question were reviewed and compared to those that were similar and/or different. Once the coding process was complete a description of the themes were then developed. Upon completion of generating themes the final element of analysis included the interpretation of themes.

5.1 Data management

All quantitative and qualitative data collected for this research study was stored on a passcode protected computer and external drive.

5.2 Ethical considerations

The Conjoint Health Research Ethics Board, at the University of Calgary granted ethics approval prior to the initiation of the study, on November 27, 2013. During the recruitment
process, all participants were presented with an information letter, informed consent and assent that emphasized voluntary participation, confidentiality, freedom to withdraw from the study at any time without repercussion, and freedom of refuse to respond to questions they were not comfortable answering.

5.3 Hypotheses

There are several hypotheses for this research study and are identified below.

Hypotheses #1 - Motor proficiency will be increased by those children involved in the PL PA program compared to TR programming, as determined by BOT-2 SF.

Hypotheses #2 - An increase in moderate to vigorous physical activity behaviors will be demonstrated in the PL PA program compared to TR programming as identified through systematic observation (SOFIT).

Hypotheses #3 - An improvement in instructor behavior (particularly in praise and demonstration) will occur in the PL PA program compared to the TR programming, as measured by SOFIT. This increase will largely be demonstrated in the programs taught by the primary investigator and then followed by the instructors who received specialized training, in the intentionally designed PA program from the primary investigator.

Hypotheses #4 - Parents in the PL PA program will identify a difference in recreation programming from their experience in the new curriculum as identified through focus groups.

5.4 Chapter Summary

This study was designed to explore motor proficiency and PA programming for children in grade one and two. More specifically, the research sought to determine if an intentionally designed PL curriculum influenced the motor proficiency and lesson delivery of recreation
programming. A mixed-methods approach was used to provide a broader perspective to the interpretation of the findings.
Chapter Five: Results

This chapter presents the results of the quantitative and qualitative data collected for this research study. Quantitative data includes the results gathered from the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form (SF) and from systematic observation (SO) through System for Observing Fitness Instruction Time (SOFIT). The final results include qualitative data gathered through focus group discussions.

The findings are presented in order of hypotheses.

5.5 BOT-2

Hypotheses #1 - Motor proficiency will be increased by those children involved in the physical literacy (PL) physical activity (PA) program compared to traditional recreation (TR) programming, as determined by BOT-2 SF.

5.6 Descriptive statistics for BOT-2

5.6.1 Characteristics of sample

The results from the BOT-2 SF motor proficiency test consisted of the analysis of 57 children (n=57). The children ranged in age between 6-8 years of age and are identified by training in Table 5-1 below.

Table 5-1 Number of participants by training (PL and TR)

<table>
<thead>
<tr>
<th>Group</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Recreation (TR) Programming</td>
<td>15</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td>Physical Literacy (PL) Programming</td>
<td>16</td>
<td>12</td>
<td>28</td>
</tr>
</tbody>
</table>
5.7 Standard score

The standard score provides an indication of an individual’s overall level of motor proficiency. The means and standard deviations for the standard scores (pre and post) for the two groups are identified in Table 5-2.

Table 5-2 Descriptive statistics for mean, standard deviation for standard score at pre post test by training (PL and TR)

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Group</th>
<th>N</th>
<th>Gender</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test Standard</td>
<td>TR</td>
<td>29</td>
<td>Total</td>
<td>46.17</td>
<td>8.22</td>
</tr>
<tr>
<td></td>
<td>PL</td>
<td>28</td>
<td>Total</td>
<td>46.39</td>
<td>7.89</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>46.28</td>
<td>7.99</td>
</tr>
<tr>
<td>Post Test Standard</td>
<td>TR</td>
<td>29</td>
<td>Total</td>
<td>48.17</td>
<td>9.54</td>
</tr>
<tr>
<td></td>
<td>PL</td>
<td>28</td>
<td>Total</td>
<td>50.61</td>
<td>8.48</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>49.37</td>
<td>9.03</td>
</tr>
</tbody>
</table>

A two-way repeated measures analysis of variance (ANOVA) for standard score was conducted on the variables of group participation and time as demonstrated in Table 5-3. Statistical significance for standard score from pre to post testing were significant over time for both the TR and PL programs (p<.001).
Table 5-3 Two-way ANOVA training (PL and TR) by time (pre post) on measures of standard score

<table>
<thead>
<tr>
<th></th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>275.064</td>
<td>1</td>
<td>12.407</td>
<td>.001**</td>
</tr>
<tr>
<td>Time*Training</td>
<td>34.924</td>
<td>1</td>
<td>1.575</td>
<td>.215</td>
</tr>
<tr>
<td>Error (Time)</td>
<td>1219.357</td>
<td>55</td>
<td>22.170</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>50.215</td>
<td>1</td>
<td>.404</td>
<td>.528</td>
</tr>
<tr>
<td>Error</td>
<td>6842.276</td>
<td>5</td>
<td>124.405</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

A pairwise comparison between pre and post test showed a significant change over time for PL participants for standard score (p<.001) (see Table 5-4 and Figure 5.1).

Table 5-4 Pairwise comparison by time (pre post) by training on measures of standard score

<table>
<thead>
<tr>
<th>Training</th>
<th>Time</th>
<th>Mean Diff.</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR</td>
<td>Pre</td>
<td>Post</td>
<td>-2.0</td>
<td>1.24</td>
</tr>
<tr>
<td>PL</td>
<td>Pre</td>
<td>Post</td>
<td>-4.21</td>
<td>1.26</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

A significant interaction effect was not identified between time and group participation however, due to the nature of the research study a pairwise comparison was conducted to explore the difference between groups. This type of analysis is supported in the literature (Gelman & Stern, 2006).

Figure 5.1 identifies the means for standard score for motor proficiency testing pre and post testing by training group.
In total 71% of the PL participants demonstrated an increase in standard score (males increased by 75% and females by 67%). For TR participants, 59% improved pre to post testing (males increased by 47% and females by 71%).

5.8 Descriptive results for individual test items

A total of 14 individual test items are used in the BOT-2 SF to determine an individual’s overall motor proficiency score. Descriptive information, including mean and standard deviation, for each of the individual test items are highlighted in the Table 5-5 below.
<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group</th>
<th>N</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre Draw Path</strong></td>
<td>TR</td>
<td>29</td>
<td>Total</td>
<td>1.35</td>
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<tr>
<td></td>
<td>PL</td>
<td>28</td>
<td>Total</td>
<td>1.46</td>
<td>1.97</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>1.40</td>
<td>2.17</td>
</tr>
<tr>
<td><strong>Post Draw Path</strong></td>
<td>TR</td>
<td>29</td>
<td>Total</td>
<td>2.17</td>
<td>2.85</td>
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<td>28</td>
<td>Total</td>
<td>1.50</td>
<td>1.90</td>
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<tr>
<td></td>
<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>1.84</td>
<td>2.45</td>
</tr>
<tr>
<td><strong>Pre Folding Paper</strong></td>
<td>TR</td>
<td>29</td>
<td>Total</td>
<td>8.79</td>
<td>3.68</td>
</tr>
<tr>
<td></td>
<td>PL</td>
<td>28</td>
<td>Total</td>
<td>6.82</td>
<td>4.68</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>7.83</td>
<td>4.28</td>
</tr>
<tr>
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<td>Total</td>
<td>9.62</td>
<td>3.61</td>
</tr>
<tr>
<td></td>
<td>PL</td>
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<td>Total</td>
<td>8.86</td>
<td>3.35</td>
</tr>
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<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>9.25</td>
<td>3.48</td>
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<tr>
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<td>TR</td>
<td>29</td>
<td>Total</td>
<td>4.83</td>
<td>.47</td>
</tr>
<tr>
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<td>PL</td>
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<td>Total</td>
<td>4.82</td>
<td>.61</td>
</tr>
<tr>
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<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>4.83</td>
<td>.54</td>
</tr>
<tr>
<td><strong>Post Square</strong></td>
<td>TR</td>
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<td>Total</td>
<td>4.62</td>
<td>.56</td>
</tr>
<tr>
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<td>PL</td>
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<td>Total</td>
<td>4.68</td>
<td>.48</td>
</tr>
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<td>Total</td>
<td>4.65</td>
<td>.52</td>
</tr>
<tr>
<td><strong>Pre Star</strong></td>
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<td>Total</td>
<td>3.97</td>
<td>1.30</td>
</tr>
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<td>1.28</td>
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<td>3.01</td>
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</tr>
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Table 5-5 Mean and standard deviation for individual BOT-2 test items
<table>
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<tr>
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<th>N</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
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<td>.74</td>
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<td>.00</td>
</tr>
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<td>Total</td>
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<td>Total</td>
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</tr>
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<td>Total</td>
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</tr>
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</tr>
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<td>Total</td>
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<td>Total</td>
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<td>1.39</td>
</tr>
<tr>
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</tr>
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<td>Total</td>
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<td>1.12</td>
</tr>
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<td>PL</td>
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<td>Total</td>
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</tr>
<tr>
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<td>Total</td>
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<td>2.44</td>
</tr>
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<td>TOTAL</td>
<td>57</td>
<td>Total</td>
<td>2.33</td>
<td>2.36</td>
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<td>Post Dribble</td>
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<td>Total</td>
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</tr>
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<td>2.98</td>
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</tr>
<tr>
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<td>PL</td>
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<td>Total</td>
<td>2.68</td>
<td>3.62</td>
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<tr>
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<td>Total</td>
<td>2.86</td>
<td>3.95</td>
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</tr>
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<td>4.37</td>
</tr>
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<td>Total</td>
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<td>5.16</td>
</tr>
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</table>
### Analysis for individual subtest items over time

A two-way ANOVA was performed on the 14 individual test items (see Table 5-6).

**Table 5-6 Two-way ANOVA on time (pre post) and training (TR and PL)**

<table>
<thead>
<tr>
<th>Subtest Item</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
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<td>Drawing Lines</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>through Path - Crooked</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.162</td>
</tr>
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<td>3.400</td>
<td>.071</td>
</tr>
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<td>.114</td>
<td>.737</td>
</tr>
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<td>1</td>
<td>.061</td>
<td>.805</td>
</tr>
<tr>
<td>Error</td>
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<td>Copying a Star</td>
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<tr>
<td>Time</td>
<td>5.507</td>
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<td>5.141</td>
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<tr>
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<td>.097</td>
<td>.757</td>
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<td>Error (Time)</td>
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<td>.360</td>
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<td>F</td>
<td>Sig.</td>
</tr>
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<td>-------------------------------------------</td>
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<td>-------</td>
<td>-------</td>
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<tr>
<td><strong>Transferring Pennies</strong></td>
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<td></td>
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<tr>
<td>Error</td>
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<td>55</td>
<td>2.299</td>
<td></td>
</tr>
<tr>
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<td>50.169</td>
<td>1</td>
<td>15.280</td>
<td>.001**</td>
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<td>1</td>
<td>1.141</td>
<td>.290</td>
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<tr>
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<td>55</td>
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<td>2.323</td>
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<td>55</td>
<td>9.470</td>
<td></td>
</tr>
<tr>
<td><strong>Jumping in Place</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(same sides synchronized)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>7.550</td>
<td>1</td>
<td>6.946</td>
<td>.011**</td>
</tr>
<tr>
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<td>1</td>
<td>3.072</td>
<td>.085</td>
</tr>
<tr>
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<td>55</td>
<td>1.087</td>
<td></td>
</tr>
<tr>
<td>Error (Time)</td>
<td>.136</td>
<td>1</td>
<td>.073</td>
<td>.788</td>
</tr>
<tr>
<td>Type of Training</td>
<td>101.724</td>
<td>55</td>
<td>1.850</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>17.727</td>
<td>1</td>
<td>8.012</td>
<td>.006**</td>
</tr>
<tr>
<td>Time*Training</td>
<td>.043</td>
<td>1</td>
<td>.019</td>
<td>.890</td>
</tr>
<tr>
<td>Error (Time)</td>
<td>121.694</td>
<td>55</td>
<td>2.213</td>
<td></td>
</tr>
<tr>
<td>Type of Training</td>
<td>.338</td>
<td>1</td>
<td>.078</td>
<td>.781</td>
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<tr>
<td>Error</td>
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<td>55</td>
<td>4.316</td>
<td></td>
</tr>
<tr>
<td><strong>Tapping Feet and Fingers (same sides synchronized)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>9.034</td>
<td>1</td>
<td>.188</td>
<td>.667</td>
</tr>
<tr>
<td>Time</td>
<td>.034</td>
<td>1</td>
<td>.188</td>
<td>.667</td>
</tr>
<tr>
<td>Time*Training</td>
<td>9.931</td>
<td>55</td>
<td>.181</td>
<td></td>
</tr>
<tr>
<td>Error (Time)</td>
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<td>1</td>
<td>1.788</td>
<td>.187</td>
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<tr>
<td>Type of Training</td>
<td>9.379</td>
<td>55</td>
<td>.171</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>3.026</td>
<td>1</td>
<td>.211</td>
<td>.648</td>
</tr>
<tr>
<td><strong>Standing on One Leg on Balance Beam – Eyes Open</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>11699.068</td>
<td>55</td>
<td>212.710</td>
<td></td>
</tr>
<tr>
<td>Time</td>
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<td>55</td>
<td>6.942</td>
<td></td>
</tr>
<tr>
<td>Time*Training</td>
<td>788.256</td>
<td>55</td>
<td>14.332</td>
<td></td>
</tr>
<tr>
<td>Error (Time)</td>
<td>3.026</td>
<td>1</td>
<td>.211</td>
<td>.648</td>
</tr>
<tr>
<td>Type of Training</td>
<td>105.092</td>
<td>1</td>
<td>1.668</td>
<td>.202</td>
</tr>
<tr>
<td>Error</td>
<td>569.864</td>
<td>1</td>
<td>9.046</td>
<td>.004**</td>
</tr>
<tr>
<td>Time</td>
<td>3464.925</td>
<td>55</td>
<td>62.999</td>
<td></td>
</tr>
<tr>
<td>Time*Training</td>
<td>67.897</td>
<td>1</td>
<td>.319</td>
<td>.574</td>
</tr>
<tr>
<td>Error</td>
<td>123.012</td>
<td>55</td>
<td>2.299</td>
<td></td>
</tr>
</tbody>
</table>
For the following individual subtests a significant time effect was found (see Table 5-7); ‘Folding Paper’ (p<.002), ‘Copying a Star’ (p<.027), ‘Transferring Pennies’ (p<.001), ‘Jumping in Place’ (p<.011), Tapping Feet and Fingers’ (p<.006), ‘One-Legged Stationary Hop’ (p<.004), ‘Dribbling a Ball – Alternating Hands’ (p<.003),’ Push Ups’ (p<.010) and ‘Sit Ups’ (p<.001).

Pairwise comparisons were conducted between individual subtests and training for each of the nine variables identified above (see Table 5-7). Statistical significance for time and training was found over time for pre to post testing by TR; ‘Drawing Lines
through Path – Crooked’ (p<.039), ‘Transferring Pennies’ (p<.001), ‘Tapping Feet and Fingers – Same Time Synchronized’ (p<.003) and ‘Dropping and Catching a Ball-Both Hands’ (p<.024).

Significance in the PL program over time was also identified for the following variables; ‘Folding Paper’ (p<.002), ‘Jumping in Place – Same Sides Synchronized’ (p<.003), ‘One-Legged Stationary Hop’ (p<.004), ‘Dropping and Catching a Ball-Both Hands’ (p<.01), ‘Dribbling a Ball – Alternating Hands’ (p<.012), ‘Push Ups’ (p<.035) and ‘Sit Ups’ (p<.001).
<table>
<thead>
<tr>
<th>Test Item Variable</th>
<th>Group</th>
<th>Time</th>
<th>Mean Diff</th>
<th>Std.</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing Lines through Path - Crooked</td>
<td>TR</td>
<td>Pre-Post</td>
<td>-.828</td>
<td>.392</td>
<td>.039*</td>
</tr>
<tr>
<td>Folding Paper</td>
<td>PL</td>
<td>Pre-Post</td>
<td>-2.036</td>
<td>.635</td>
<td>.002**</td>
</tr>
<tr>
<td>Transferring Pennies</td>
<td>TR</td>
<td>Pre-Post</td>
<td>-1.690</td>
<td>.476</td>
<td>.001**</td>
</tr>
<tr>
<td>Jumping in Place (same sides synchronized)</td>
<td>PL</td>
<td>Pre-Post</td>
<td>-.857</td>
<td>.279</td>
<td>.003**</td>
</tr>
<tr>
<td>Tapping Feet and Fingers (same sides synchronized)</td>
<td>TR</td>
<td>Pre-Post</td>
<td>-.828</td>
<td>.391</td>
<td>.039*</td>
</tr>
<tr>
<td>One-Legged Stationary Hop</td>
<td>PL</td>
<td>Pre-Post</td>
<td>-6.393</td>
<td>2.121</td>
<td>.004**</td>
</tr>
<tr>
<td>Dropping and Catching a Ball – Both Hands</td>
<td>TR</td>
<td>Pre-Post</td>
<td>-.690</td>
<td>.297</td>
<td>.024*</td>
</tr>
<tr>
<td></td>
<td>PL</td>
<td>Pre-Post</td>
<td>-.786</td>
<td>.303</td>
<td>.012*</td>
</tr>
<tr>
<td>Dribbling a Ball – Alternating Hands</td>
<td>PL</td>
<td>Pre-Post</td>
<td>-1.500</td>
<td>.547</td>
<td>.009**</td>
</tr>
<tr>
<td>Push Ups</td>
<td>PL</td>
<td>Pre-Post</td>
<td>-1.929</td>
<td>.892</td>
<td>.035*</td>
</tr>
<tr>
<td>Sit Ups</td>
<td>PL</td>
<td>Pre-Post</td>
<td>-3.536</td>
<td>.908</td>
<td>.000***</td>
</tr>
</tbody>
</table>

Figure 5.2 and 5.3 represent the change, from pre to post assessment, in statistically significant individual test items.
Further, pairwise comparisons were performed for group and time to explore relationships amongst variables. Significance was determined by time and between groups with PL demonstrating improvement compared to TR programs from pre to post testing on the following individual test items ‘Jumping in Place – Same Sides
Synchronized’ (p<.037), ‘Dropping and Catching a Ball-Both Hands’(p<.031) and ‘Sit Ups’ (p.006), as demonstrated in Table 5-8.

**Table 5-8 Pairwise comparisons for individual test items by training (PL and TR) and time (pre post)**

<table>
<thead>
<tr>
<th>Test Item Variable</th>
<th>Group</th>
<th>Time</th>
<th>Mean Diff</th>
<th>Std</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumping in Place (same sides synchronized)</td>
<td>TR-PL</td>
<td>Pre-Post</td>
<td>-.411</td>
<td>.193</td>
<td>.037*</td>
</tr>
<tr>
<td>Dropping and Catching a Ball – Both Hands</td>
<td>TR-PL</td>
<td>Pre-Post</td>
<td>-.570</td>
<td>.257</td>
<td>.031*</td>
</tr>
<tr>
<td>Sit Ups</td>
<td>TR-PL</td>
<td>Pre-Post</td>
<td>-3.679</td>
<td>1.275</td>
<td>.006**</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

The following figures (Figure 5.4-5.6) demonstrate the change in individual subtest scores on these three individual test items.

*Figure 5.4 Jumping in Place - Same sides synchronized by time (pre post) by training (TR and PL)*
Figure 5.5 Dropping and Catching a Ball - Both hands by time (pre post) and training (TR and PL)

Figure 5.6 Sit Ups by time (pre post) by training (TR and PL)

129
5.11 Percentage of change in standard score each and each individual test item

The percentage of change score for standard score and individual test scores is identified below in Table 5-9. This table demonstrates the number of children who improved, declined and had no change in their score for each of the subtests performed.
<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Improved</th>
<th>Standard Score</th>
<th>No Change</th>
<th>Improved</th>
<th>Trace Pathway</th>
<th>No Change</th>
<th>Improved</th>
<th>Fold Paper</th>
<th>No Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR</td>
<td>29</td>
<td>17 (59%)</td>
<td>11 (38%)</td>
<td>1 (.03%)</td>
<td>13 (45%)</td>
<td>8 (28%)</td>
<td>12 (43%)</td>
<td>16 (55%)</td>
<td>6 (21%)</td>
<td>7 ((24%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>28</td>
<td>20 (71%)</td>
<td>6 (21%)</td>
<td>1 (.04%)</td>
<td>8 (29%)</td>
<td>8 (29%)</td>
<td>12 (43%)</td>
<td>16 (57%)</td>
<td>9 (32%)</td>
<td>3 (11%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Improved</th>
<th>Copy Square</th>
<th>No Change</th>
<th>Improved</th>
<th>Copy Star</th>
<th>No Change</th>
<th>Improved</th>
<th>Transfer Pennies</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR</td>
<td>29</td>
<td>3 (10%)</td>
<td>10 (34%)</td>
<td>16 (55%)</td>
<td>12 (41%)</td>
<td>3 (10%)</td>
<td>14 (48%)</td>
<td>21 (72%)</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>28</td>
<td>3 (11%)</td>
<td>8 (29%)</td>
<td>17 (61%)</td>
<td>11 (39%)</td>
<td>4 (14%)</td>
<td>13 (46%)</td>
<td>19 (68%)</td>
<td>6 (21%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Improved</th>
<th>Jumping</th>
<th>No Change</th>
<th>Improved</th>
<th>Tapping</th>
<th>No Change</th>
<th>Improved</th>
<th>Walking</th>
<th>No Change</th>
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</thead>
<tbody>
<tr>
<td>TR</td>
<td>29</td>
<td>5 (17%)</td>
<td>4 (14%)</td>
<td>20 (69%)</td>
<td>5 (17%)</td>
<td>1 (.03%)</td>
<td>23 (79%)</td>
<td>1 (.03%)</td>
<td>1 (.03%)</td>
<td>27 (93%)</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>PL</td>
<td>28</td>
<td>8 (29%)</td>
<td>0 (0%)</td>
<td>20 (71%)</td>
<td>4 (14%)</td>
<td>0 (0%)</td>
<td>24 (86%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Table 5-9 Percentage of individual BOT-2 test items by improved, declined and no change**
<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Improved Balance Decline</th>
<th>No Change</th>
<th>Improved Drop ball Decline</th>
<th>No Change</th>
<th>Improved Dribble Decline</th>
<th>No Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR Total</td>
<td>29</td>
<td>11 (38%)</td>
<td>6 (21%)</td>
<td>12 (41%)</td>
<td>15 (52%)</td>
<td>12 (41%)</td>
<td>2 (.07%)</td>
</tr>
<tr>
<td>PL Total</td>
<td>28</td>
<td>7 (25%)</td>
<td>11 (39%)</td>
<td>10 (36%)</td>
<td>13 (46%)</td>
<td>5 (18%)</td>
<td>10 (36%)</td>
</tr>
<tr>
<td>TR Total</td>
<td>29</td>
<td>14 (48%)</td>
<td>7 (24%)</td>
<td>8 (28%)</td>
<td>14 (48%)</td>
<td>7 (24%)</td>
<td>8 (28%)</td>
</tr>
<tr>
<td>PL Total</td>
<td>28</td>
<td>16 (57%)</td>
<td>5 (18%)</td>
<td>7 (25%)</td>
<td>20 (71%)</td>
<td>6 (21%)</td>
<td>2 (.07%)</td>
</tr>
</tbody>
</table>

TR = Traditional Recreation Programming
PL= Physical Literacy Programming
5.12 Section Summary

A statistical difference was identified pre post for both groups in motor proficiency. Participants in the PL group demonstrated a significant increase in motor proficiency standard score compared to TR participants. Several individual test items were also found to be significant over time (pre post) and three that were significant for time (pre post) and training (TR and PL).

The next section identifies the results of SO.

5.13 System for Observing Fitness Instruction Time

Hypotheses #2 - An increase in MVPA will be demonstrated in the PL PA program compared to TR programming as identified through SOFIT.

In addition to motor proficiency testing SO was performed for all 57 children involved in the research study. For each observation conducted, two males and two females were observed. Interobserver reliability occurred for 10% of all observations performed. This involved two observers simultaneously observing the same children in a PA program. Interval by interval was compared for agreement between observers and an average of 86% agreement was achieved.

SO, performed through momentary time sampling, measured three variables including; PA expenditure, lesson context and instructor interaction. Observation of children’s PA programming was divided into three groups based on the training of the instructor. The first instructor was regarded as a PL specialist, the second group of instructors received additional training from the PL specialist and were considered to be trained (TI), the final group of instructors were traditional recreation instructors (TR). The distribution of SO is listed in Table 5-10.
Table 5-10 Number of observations conducted in each environment by instructor

<table>
<thead>
<tr>
<th></th>
<th>Physical Literacy Instructor</th>
<th>Trained Instructor</th>
<th>Traditional Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>5</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Air</td>
<td>6</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Water</td>
<td>-</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Ice</td>
<td>-</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total Observations</td>
<td>11</td>
<td>15</td>
<td>38</td>
</tr>
</tbody>
</table>

5.14 SOFIT and PA expenditure

Descriptive statistics for PA expenditure in the categories of sedentary and moderate-vigorous (MVPA) by gender are identified in Table 5-11.

Table 5-11 Descriptives for sedentary and MVPA by gender

<table>
<thead>
<tr>
<th>PA level</th>
<th>Gender</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>Male</td>
<td>24.29</td>
<td>8.80</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>24.40</td>
<td>12.20</td>
</tr>
<tr>
<td>MVPA</td>
<td>Male</td>
<td>27.02</td>
<td>9.40</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>25.75</td>
<td>8.13</td>
</tr>
</tbody>
</table>

It was identified that the amount of time spent in sedentary behavior was similar between boys and girls. Boys averaged more time in MVPA than females and is demonstrated in Figure 5.7.
Figure 5.7 Time spent in sedentary and MVPA by gender

A one-way ANOVA, demonstrated in Table 5-12, identified that a difference in MVPA for females, between groups existed (p<.006).

Table 5-12 One-way ANOVA for sedentary and MVPA

<table>
<thead>
<tr>
<th>PA</th>
<th>Sum of Squares</th>
<th>df</th>
<th>f</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female MVPA</td>
<td>640.62</td>
<td>2</td>
<td>5.54</td>
<td>.006**</td>
</tr>
</tbody>
</table>

*p<.05
**p<.01
***p<.001

The amount of time spent in sedentary and MVPA PA expenditure is identified below in Table 5-13.
Table 5-13 Descriptive statistics for sedentary and MVPA physical activity expenditure by instructor

<table>
<thead>
<tr>
<th>PA level</th>
<th>Instructor</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>Physical Literacy</td>
<td>46.06</td>
<td>10.38</td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>39.36</td>
<td>12.83</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>51.09</td>
<td>12.80</td>
</tr>
<tr>
<td>MVPA</td>
<td>Physical Literacy</td>
<td>53.94</td>
<td>10.38</td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>60.64</td>
<td>12.83</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>48.91</td>
<td>12.80</td>
</tr>
</tbody>
</table>

The amount of time spent in sedentary and MVPA, by instructor is demonstrated in Figure 5.8.

![Figure 5.8 Amount of time in sedentary and MVPA by instructor](image)

A Post Hoc, LSD, test was executed and a statistical finding was determined for female participants in MVPA between the TI training compared to TR training (p<.007). These findings are listed in Table 5-14.
Table 5-14 Post Hoc of MVPA and gender by training

<table>
<thead>
<tr>
<th>PA Behavior</th>
<th>Instructor</th>
<th>Mean Diff.</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female MVPA</td>
<td>TI-TR</td>
<td>7.654</td>
<td>2.319</td>
<td>.007**</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

Table 5-15 lists the means and standard deviations for each of the instructors and respective PA environments based on the amount of time spent in sedentary and MVPA.

Table 5-15 Mean and standard deviation for training by PA environment

<table>
<thead>
<tr>
<th></th>
<th>Sedentary</th>
<th></th>
<th>MVPA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Mean</td>
<td>Std. Deviation</td>
</tr>
<tr>
<td>PL Instructor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>46.63</td>
<td>9.83</td>
<td>53.38</td>
<td>9.83</td>
</tr>
<tr>
<td>Air</td>
<td>45.82</td>
<td>11.73</td>
<td>54.42</td>
<td>11.73</td>
</tr>
<tr>
<td>TI Instructor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>45.94</td>
<td>5.47</td>
<td>54.06</td>
<td>5.46</td>
</tr>
<tr>
<td>Ice</td>
<td>33.60</td>
<td>14.92</td>
<td>66.40</td>
<td>14.92</td>
</tr>
<tr>
<td>TR Instructor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>56.29</td>
<td>7.39</td>
<td>43.71</td>
<td>7.39</td>
</tr>
<tr>
<td>Air</td>
<td>55.84</td>
<td>8.44</td>
<td>44.16</td>
<td>8.44</td>
</tr>
<tr>
<td>Water</td>
<td>53.34</td>
<td>13.00</td>
<td>46.66</td>
<td>13.00</td>
</tr>
<tr>
<td>Ice</td>
<td>35.74</td>
<td>11.95</td>
<td>64.26</td>
<td>11.95</td>
</tr>
</tbody>
</table>

The amount of time spent in sedentary behavior in each of the PA environments of land, air, water and ice by instructor is identified in Figure 5.9.
Figure 5.9 Time spent in sedentary behavior by environment and instructor

Figure 5.10 illustrates the amount of time spent children engaged in MVPA based on the instructor teaching the lesson and the PA environment.

Figure 5.10 Time spent in MVPA by environment and instructor

A post hoc test, LSD, was performed to examine the influence of the instructor on sedentary and MVPA behaviors. Participants taught by TI instructors spent more time in
MVPA than those taught by TR instructors (p<.001). PA behaviors by instructor are identified in Table 5-16.

Table 5-16 Instructor by MVPA

<table>
<thead>
<tr>
<th>Instructor</th>
<th>PA Behavior</th>
<th>Mean Diff.</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI-TR</td>
<td>MVPA</td>
<td>11.738</td>
<td>3.267</td>
<td>.001**</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

A two-way ANOVA identified that the PA environment (p<.000) and instructor (p<.028) were significant in the amount of time spent in sedentary and MVPA behavior. Table 5-17 demonstrates the findings.

Table 5-17 Sedentary and MVPA by instructor and PA environment

<table>
<thead>
<tr>
<th>Activity</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary and MVPA</td>
<td>Activity environment</td>
<td>2914.739</td>
<td>3</td>
<td>8.462</td>
</tr>
<tr>
<td></td>
<td>Instructor</td>
<td>875.397</td>
<td>2</td>
<td>8.381</td>
</tr>
<tr>
<td></td>
<td>Activity*Instructor</td>
<td>57.002</td>
<td>2</td>
<td>.248</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>6429.674</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

A statistical finding was not identified between MVPA and the PA environments of land, air and water. However, significance was determined between ice and other environments (p<.001) when a Post Hoc (LSD) was performed. This finding revealed that more time was spent in MVPA in the ice environment than the other environments. In
addition children spent more time in sedentary behavior in the environments on the land, air and water \((p<.001)\) and is demonstrated in Table 5-18.

**Table 5-18 Time spent in sedentary and MVPA by environment**

<table>
<thead>
<tr>
<th>Environment</th>
<th>Sedentary Mean Diff</th>
<th>Sedentary Std. Error</th>
<th>Sedentary Sig.</th>
<th>MVPA Mean Diff</th>
<th>MVPA Std. Error</th>
<th>MVPA Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>Ice</td>
<td>18.780</td>
<td>3.859</td>
<td>.001***</td>
<td>-18.780</td>
<td>3.859</td>
</tr>
<tr>
<td>Air</td>
<td>Ice</td>
<td>16.777</td>
<td>4.054</td>
<td>.001***</td>
<td>-16.777</td>
<td>4.054</td>
</tr>
<tr>
<td>Water</td>
<td>Ice</td>
<td>15.625</td>
<td>3.859</td>
<td>.001***</td>
<td>-15.625</td>
<td>3.859</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

**5.15 Lesson context**

The lesson context variables of the SO tool provide information that describes the nature of the activities that occur throughout the duration of the lesson. The information collected specifically explores the amount of time spent in each of the following variables; management, knowledge, fitness, skill development, game play and other. Table 5-19 identifies the mean and standard deviations for each of the lesson context variables.
Table 5-19 Mean and standard deviation for descriptive statistics on Lesson Context variables

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson Context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>PL 18.13</td>
<td>7.72</td>
</tr>
<tr>
<td></td>
<td>Trained 12.88</td>
<td>5.24</td>
</tr>
<tr>
<td></td>
<td>Traditional 14.65</td>
<td>6.65</td>
</tr>
<tr>
<td>Knowledge</td>
<td>PL 9.01</td>
<td>4.42</td>
</tr>
<tr>
<td></td>
<td>Trained 12.50</td>
<td>5.94</td>
</tr>
<tr>
<td></td>
<td>Traditional 12.77</td>
<td>5.37</td>
</tr>
<tr>
<td>Fitness</td>
<td>PL 8.51</td>
<td>6.45</td>
</tr>
<tr>
<td></td>
<td>Trained 1.89</td>
<td>3.88</td>
</tr>
<tr>
<td></td>
<td>Traditional 5.85</td>
<td>8.98</td>
</tr>
<tr>
<td>Skill</td>
<td>PL 44.10</td>
<td>15.57</td>
</tr>
<tr>
<td>Development</td>
<td>Trained 44.99</td>
<td>13.02</td>
</tr>
<tr>
<td></td>
<td>Traditional 52.61</td>
<td>15.19</td>
</tr>
<tr>
<td>Game play</td>
<td>PL 16.30</td>
<td>12.38</td>
</tr>
<tr>
<td></td>
<td>Trained 24.82</td>
<td>13.75</td>
</tr>
<tr>
<td></td>
<td>Traditional 12.85</td>
<td>10.16</td>
</tr>
<tr>
<td>Other</td>
<td>PL 3.95</td>
<td>3.68</td>
</tr>
<tr>
<td></td>
<td>Trained 2.91</td>
<td>3.94</td>
</tr>
<tr>
<td></td>
<td>Traditional 1.26</td>
<td>2.55</td>
</tr>
</tbody>
</table>

Figure 5.11 illustrates the amount of time spent in each of the lesson context variables by instructor.
Positive Pearson product-moment correlations were found between several lesson context variables. A fair relationship was identified for the following variables; time spent in sedentary behavior and management (r=.460; df=62, p<.001), which accounts for 21% of the variance, management and skills (r=-.479, df=622, p<.001), 23% of variance, management and other (r=.257, df=62, p<.040), 7% of variance and fitness and skills (r=-.289, df=62, p<.020) equalling 8% of variance. A moderate relationship was demonstrated between game play and skills (r=-.711, df=62, p<.001) accounting for 51% of the variance.

Time spent in each of the lesson context by instructor in each of the PA environments is identified in Table 5-20.
Table 5-20 Amount of time spent in each Lesson Context variable by instructor

<table>
<thead>
<tr>
<th>Lesson Context Variable</th>
<th>Instructor</th>
<th>PA environment</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>PL</td>
<td>Land</td>
<td>24.59</td>
<td>7.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air</td>
<td>12.70</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>Water</td>
<td>15.51</td>
<td>5.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>12.09</td>
<td>7.06</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>Land</td>
<td>19.48</td>
<td>8.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air</td>
<td>13.92</td>
<td>7.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water</td>
<td>13.59</td>
<td>7.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>10.03</td>
<td>4.82</td>
</tr>
<tr>
<td>Knowledge</td>
<td>PL</td>
<td>Land</td>
<td>11.95</td>
<td>4.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air</td>
<td>7.12</td>
<td>2.72</td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>Water</td>
<td>14.34</td>
<td>5.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>11.90</td>
<td>6.51</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>Land</td>
<td>10.60</td>
<td>6.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air</td>
<td>12.14</td>
<td>7.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water</td>
<td>18.16</td>
<td>7.99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>10.74</td>
<td>3.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land</td>
<td></td>
<td>Air</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Fitness</td>
<td>PL</td>
<td>5.38</td>
<td>4.15</td>
<td>13.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>.57</td>
<td>1.43</td>
<td>3.22</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>7.75</td>
<td>9.75</td>
<td>8.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.36</td>
<td>9.71</td>
<td>.21</td>
</tr>
<tr>
<td>Skills</td>
<td>PL</td>
<td>33.31</td>
<td>6.54</td>
<td>52.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>42.50</td>
<td>12.06</td>
<td>48.69</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>39.21</td>
<td>15.12</td>
<td>55.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54.57</td>
<td>13.02</td>
<td>64.79</td>
</tr>
<tr>
<td>Game Play</td>
<td>PL</td>
<td>23.79</td>
<td>8.4</td>
<td>9.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>21.94</td>
<td>12.23</td>
<td>22.12</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>19.51</td>
<td>14.27</td>
<td>9.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.79</td>
<td>8.40</td>
<td>14.23</td>
</tr>
<tr>
<td>Other</td>
<td>PL</td>
<td>.99</td>
<td>1.84</td>
<td>5.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>5.13</td>
<td>5.23</td>
<td>1.98</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>3.45</td>
<td>5.13</td>
<td>.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.53</td>
<td>1.16</td>
<td>.00</td>
</tr>
</tbody>
</table>

A two-way mixed ANOVA was performed, one between subject factor, namely, instructor of 3 levels, and one within subject factor, namely lesson context of 6 levels, i.e. 3 x 6 design. The results indicate that there is a statistical significant instructor by lesson
interaction effect, $F(12,366)=3.611, p<.001$), which means that the instructor varies with the lesson, and lesson varies with the instructor. Exploring the significance of the lesson (p<.001) and the interaction effect between the lesson context variable and instructor (p<.001) and instructor (p<.011) was determined. This is demonstrated in Table 5-21.

**Table 5-21 Lesson Context variable and interaction effect**

<table>
<thead>
<tr>
<th></th>
<th>Type III Sum of Squares</th>
<th>Df.</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson</td>
<td>97866.01</td>
<td>6</td>
<td>157.08</td>
<td>.001***</td>
</tr>
<tr>
<td>Lesson*Instructor</td>
<td>4499.38</td>
<td>12</td>
<td>3.61</td>
<td>.001***</td>
</tr>
<tr>
<td>Error (Lesson)</td>
<td>38005.39</td>
<td>366</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor</td>
<td>215.51</td>
<td>2</td>
<td>4.87</td>
<td>.01**</td>
</tr>
<tr>
<td>Error</td>
<td>1348.95</td>
<td>61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

Time spent by instructor in the lesson context variables proved to be significantly important as measured by simple effect testing with the instructor as the dependent variable. A statistically significant finding was made with TI instructors spending more time than TR in game play (p<.003) and PL instructors spent more time in other tasks compared to TR (p<.044), as demonstrated in Table 5-22.
Table 5-22 Pairwise comparison of Lesson Context variables and instructor

<table>
<thead>
<tr>
<th>Grouping</th>
<th>Lesson Context Variable</th>
<th>Mean</th>
<th>Standard Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game Play</td>
<td>TI-TR</td>
<td>11.964</td>
<td>3.491</td>
<td>.003**</td>
</tr>
<tr>
<td>Other</td>
<td>PL-TR</td>
<td>2.684</td>
<td>1.068</td>
<td>.044*</td>
</tr>
</tbody>
</table>

*p<.05
**p<.01
***p<.001

5.16 Discriminant analysis on lesson context variables

A discriminant analysis was conducted to explore the role of the instructor in relation to lesson context variables. Table 5-23 demonstrates eigenvalues and multivariate tests and Table 5-24 identifies a multivariate statistic to explore the canonical correlations. The category of ‘Other’ was removed as it did not meet the minimum tolerance test.

Table 5-23 Eigenvalue and multivariate tests

<table>
<thead>
<tr>
<th>Function</th>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Cumulative %</th>
<th>Canonical Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.366</td>
<td>66.1</td>
<td>66.1</td>
<td>.518</td>
</tr>
<tr>
<td>2</td>
<td>.188</td>
<td>33.9</td>
<td>100</td>
<td>.398</td>
</tr>
</tbody>
</table>
Table 5-24 Wilks’ Lambda

<table>
<thead>
<tr>
<th>Test of Function(s)</th>
<th>Wilks’ Lambda</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.616</td>
<td>28.556</td>
<td>10</td>
<td>.001***</td>
</tr>
<tr>
<td>2</td>
<td>.842</td>
<td>10.160</td>
<td>4</td>
<td>.038*</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001

The standardized canonical discriminant function coefficients used to predict instructors were (in order of significance) skills, management, fitness, game play and knowledge as demonstrated in Table 5-25.

Table 5-25 Standardized canonical discriminant

<table>
<thead>
<tr>
<th>Function</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>1.673</td>
<td>.765</td>
</tr>
<tr>
<td>Knowledge</td>
<td>.961</td>
<td>1.340</td>
</tr>
<tr>
<td>Fitness</td>
<td>1.664</td>
<td>.869</td>
</tr>
<tr>
<td>Skills</td>
<td>2.727</td>
<td>2.569</td>
</tr>
<tr>
<td>Game play</td>
<td>1.264</td>
<td>1.950</td>
</tr>
</tbody>
</table>

Processing the variables for discriminant variables is demonstrated in Table 5-26 and probabilities for groups in Table 5-27.
Table 5-26 Classification processing summary

<table>
<thead>
<tr>
<th>Processed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Excluded</td>
<td>64</td>
</tr>
<tr>
<td>Missing or out-of-range</td>
<td>0</td>
</tr>
<tr>
<td>group codes</td>
<td></td>
</tr>
<tr>
<td>At least one missing</td>
<td>0</td>
</tr>
<tr>
<td>discriminating variable</td>
<td></td>
</tr>
<tr>
<td>Used in Output</td>
<td>64</td>
</tr>
</tbody>
</table>

Table 5-27 Prior probabilities for groups

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Prior</th>
<th>Unweighted</th>
<th>Weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL</td>
<td>.172</td>
<td>11</td>
<td>11.000</td>
</tr>
<tr>
<td>TI</td>
<td>.234</td>
<td>15</td>
<td>15.000</td>
</tr>
<tr>
<td>TR</td>
<td>.594</td>
<td>38</td>
<td>38.000</td>
</tr>
<tr>
<td>Total</td>
<td>1.000</td>
<td>64</td>
<td>64.000</td>
</tr>
</tbody>
</table>

The ability to predict group participation by instructor is identified in Table 5-28.

The ability to predict the Physical Literacy specialist was 18%, TI instructor 47% and TR instructor 92%.

Table 5-28 Discriminant analysis on instructor and Instructor Interaction variables

<table>
<thead>
<tr>
<th>Instructor</th>
<th>PL</th>
<th>TI</th>
<th>TR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td>PL</td>
<td>TI</td>
<td>TR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (18.2%)</td>
<td>2 (18.3%)</td>
<td>7 (63.6%)</td>
<td>11 (100)</td>
</tr>
<tr>
<td></td>
<td>0 (0%)</td>
<td>7 (46.7%)</td>
<td>8 (53.3%)</td>
<td>15(100)</td>
</tr>
<tr>
<td></td>
<td>2 (5.3%)</td>
<td>1 (2.6%)</td>
<td>35 (92.1%)</td>
<td>38 (100)</td>
</tr>
</tbody>
</table>

5.17 Instructor interaction

Hypotheses #3 - An improvement in instructor behavior (particularly in praise and demonstration) will occur in the PL PA program compared to TR programming, as measured by SOFIT.
The descriptive statistics for each of the instructor interaction variables are identified, by instructor, in Table 5-29.

Table 5-29 Mean and standard deviation for Instructor Interaction variables by instructor

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson Context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Praise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>25.32</td>
<td>6.49</td>
</tr>
<tr>
<td>Trained</td>
<td>15.45</td>
<td>7.07</td>
</tr>
<tr>
<td>Traditional</td>
<td>10.09</td>
<td>7.19</td>
</tr>
<tr>
<td>Demonstration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>14.16</td>
<td>6.17</td>
</tr>
<tr>
<td>Trained</td>
<td>8.93</td>
<td>5.77</td>
</tr>
<tr>
<td>Traditional</td>
<td>10.14</td>
<td>10.34</td>
</tr>
<tr>
<td>Instruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>44.99</td>
<td>12.06</td>
</tr>
<tr>
<td>Trained</td>
<td>46.90</td>
<td>9.34</td>
</tr>
<tr>
<td>Traditional</td>
<td>45.61</td>
<td>15.10</td>
</tr>
<tr>
<td>Management 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>13.54</td>
<td>7.05</td>
</tr>
<tr>
<td>Trained</td>
<td>14.76</td>
<td>6.97</td>
</tr>
<tr>
<td>Traditional</td>
<td>15.29</td>
<td>10.21</td>
</tr>
<tr>
<td>Observing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>1.96</td>
<td>2.22</td>
</tr>
<tr>
<td>Trained</td>
<td>11.09</td>
<td>7.95</td>
</tr>
<tr>
<td>Traditional</td>
<td>17.77</td>
<td>9.59</td>
</tr>
<tr>
<td>Other task</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL</td>
<td>.03</td>
<td>.10</td>
</tr>
<tr>
<td>Trained</td>
<td>2.87</td>
<td>2.67</td>
</tr>
<tr>
<td>Traditional</td>
<td>1.10</td>
<td>1.89</td>
</tr>
</tbody>
</table>

A visual representation, in Figure 5-13, illustrates the amount of time spent in each of the instructor interaction variables listed by instructor.
Figure 5.13 Instructor interaction variables by instructor

Means and standard deviations are identified Table 5-30 below for instructor interaction variables and PA environment.

Table 5-30 Instruction Interaction variable and PA environments

<table>
<thead>
<tr>
<th>Instructor Interaction Variable</th>
<th>Instructor</th>
<th>PA environment</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise</td>
<td>PL</td>
<td>Land</td>
<td>20.61</td>
<td>3.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air</td>
<td>29.24</td>
<td>5.93</td>
</tr>
<tr>
<td>Trained</td>
<td>PL</td>
<td>Water</td>
<td>13.33</td>
<td>6.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>17.30</td>
<td>7.10</td>
</tr>
<tr>
<td>Traditional</td>
<td>PL</td>
<td>Land</td>
<td>7.02</td>
<td>4.04</td>
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<tr>
<td></td>
<td></td>
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<td>15.34</td>
<td>8.38</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>6.47</td>
<td>2.68</td>
</tr>
<tr>
<td>Demonstration</td>
<td>PL</td>
<td>Land</td>
<td>13.17</td>
<td>7.73</td>
</tr>
<tr>
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<td></td>
<td>Air</td>
<td>14.98</td>
<td>5.15</td>
</tr>
<tr>
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<td>Water</td>
<td>6.28</td>
<td>5.56</td>
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<td></td>
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<tr>
<td>Traditional</td>
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<td>Land</td>
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<td>15.88</td>
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<td>3.36</td>
</tr>
<tr>
<td>Instructor Interaction Variable</td>
<td>Instructor</td>
<td>PA environment</td>
<td>Mean</td>
<td>Std. Deviation</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water</td>
<td>7.55</td>
<td>4.19</td>
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<td></td>
<td></td>
<td>Ice</td>
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<td>4.99</td>
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<td>15.91</td>
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<td>9.07</td>
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<td>8.24</td>
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<td>Land</td>
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<td>17.06</td>
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<td>12.24</td>
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<td></td>
<td>Water</td>
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<tr>
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<td></td>
<td>Ice</td>
<td>32.93</td>
<td>8.25</td>
</tr>
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<td>5.41</td>
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<td>9.27</td>
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<td>4.75</td>
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<td>2.77</td>
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<td>1.73</td>
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<td>7.14</td>
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<td></td>
<td></td>
<td>Ice</td>
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<td>9.05</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>Land</td>
<td>15.89</td>
<td>8.34</td>
</tr>
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<td>9.32</td>
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<td></td>
<td>Ice</td>
<td>28.77</td>
<td>8.72</td>
</tr>
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<td>0.15</td>
</tr>
<tr>
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<td></td>
<td>Air</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Trained</td>
<td>Water</td>
<td>1.85</td>
<td>2.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>3.76</td>
<td>2.30</td>
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<tr>
<td></td>
<td>Traditional</td>
<td>Land</td>
<td>2.10</td>
<td>2.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air</td>
<td>0.63</td>
<td>1.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water</td>
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<td>1.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice</td>
<td>0.58</td>
<td>0.78</td>
</tr>
</tbody>
</table>
A two-way mixed ANOVA was performed, one between subject factor, namely, instructor of 3 levels, and one within subject factor, namely instructor interaction of context of 5 levels, i.e. 3 x 5 design. Other task was removed from analysis due to the means in descriptive statistics being so small that they would contaminate the findings.

The results indicate that there is a statistical significant instructor by instructor interaction effect, F(8,244=4.854, p<.001), which means that the instructor varies with the instructor interaction behavior, and instructor interaction varies with the instructor. Exploring the significance of the lesson (p<.001) and the interaction effect between the lesson context variable and instructor (p<.001) and instructor (p<.001) was determined. This is demonstrated in Table 5-31.
A linear regression identifies the behavior of instructor interaction by group participation as is highlighted in Table 5-32. Instructors in the PL program ‘praised’ children’s performance more than TI (p<.002) and TR programs (p<.001). Praise was also significant between the instructor of the TI program compared to TR (p<.046). TI instructors ‘Observed’ more than those in the PL program (p<.025). The TR instructors also ‘Observed’ more than the PL (p<.001) and TI programs (p<.035).

Table 5-32 Mean difference, standard error and significance for Instructor Interaction variables

<table>
<thead>
<tr>
<th>Instructor Interaction</th>
<th>Grouping</th>
<th>Mean Diff.</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise</td>
<td>PL-TI</td>
<td>9.867</td>
<td>2.799</td>
<td>.002**</td>
</tr>
<tr>
<td></td>
<td>PL-TR</td>
<td>15.231</td>
<td>2.414</td>
<td>.000***</td>
</tr>
<tr>
<td></td>
<td>TI-TR</td>
<td>5.364</td>
<td>2.150</td>
<td>.046*</td>
</tr>
<tr>
<td>Observing</td>
<td>TI-PL</td>
<td>9.131</td>
<td>3.347</td>
<td>.025*</td>
</tr>
<tr>
<td></td>
<td>TR-PL</td>
<td>15.816</td>
<td>2.887</td>
<td>.000***</td>
</tr>
<tr>
<td></td>
<td>TR-TI</td>
<td>6.685</td>
<td>2.571</td>
<td>.035*</td>
</tr>
</tbody>
</table>

*p<.05  
**p<.01  
***p<.001
To explore the instructor interaction variable ‘Other Task’ a Post Hoc, Tamhane, test (see Table 5-33) conducted and identified that this variable was significant between the TI and PL instructors (p<.003) and when comparing the TI to TR instructors (p<.004).

Table 5-33 Tamhane test on 'Other Task'

<table>
<thead>
<tr>
<th>Instructor Interaction</th>
<th>Grouping</th>
<th>Mean Diff</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>TI-PL</td>
<td>2.837</td>
<td>.691</td>
<td>.003**</td>
</tr>
<tr>
<td></td>
<td>TI-TR</td>
<td>1.065</td>
<td>.308</td>
<td>.004**</td>
</tr>
</tbody>
</table>

*p<.05
**p<.01
***p<.001

5.18 Discriminant analysis for instructor interaction variables

A discriminant analysis was performed to identify group participation by instructor. Table 5-34 demonstrates eigenvalues and multivariate tests and Table 5-35 identifies a multivariate statistic to explore the canonical correlations. The variable ‘Other Task’ was not included as it did not meet the minimum tolerance test.

Table 5-34 Eigenvalue and multivariate tests

<table>
<thead>
<tr>
<th>Function</th>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Cumulative %</th>
<th>Canonical Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.969</td>
<td>67.7</td>
<td>67.7</td>
<td>.702</td>
</tr>
<tr>
<td>2</td>
<td>.321</td>
<td>32.3</td>
<td>100.00</td>
<td>.563</td>
</tr>
</tbody>
</table>
Table 5-35 Wilks’ Lambda

<table>
<thead>
<tr>
<th>Test of Function(s)</th>
<th>Wilks’ Lambda</th>
<th>Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.347</td>
<td>62.450</td>
<td>6</td>
<td>.001***</td>
</tr>
<tr>
<td>2</td>
<td>.683</td>
<td>22.649</td>
<td>2</td>
<td>.001***</td>
</tr>
</tbody>
</table>

* p<.05  
** p<.01 
*** p<.001

The standardized canonical discriminant function coefficients used to predict instructors were (in order of significance) instruction, demonstration, praise and management as demonstrated in Table 5-36.

Table 5-36 Standardized canonical discriminant

<table>
<thead>
<tr>
<th>Function</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise</td>
<td>2.566</td>
<td>3.778</td>
</tr>
<tr>
<td>Demonstration</td>
<td>3.009</td>
<td>5.874</td>
</tr>
<tr>
<td>Instruction</td>
<td>3.621</td>
<td>7.733</td>
</tr>
<tr>
<td>Management 2</td>
<td>2.767</td>
<td>5.529</td>
</tr>
<tr>
<td>Observing</td>
<td>1.926</td>
<td>5.177</td>
</tr>
</tbody>
</table>

Processing the variables for discriminant variables is demonstrated in Table 5-37 and probabilities for groups in Table 5-38.
Table 5-37 Classification processing summary

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Processed</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Excluded</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Missing or out-of-range group codes</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>At least one missing discriminating variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used in Output</td>
<td></td>
<td>64</td>
</tr>
</tbody>
</table>

Table 5-38 Prior probabilities for groups

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Prior</th>
<th>Cases Used in Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unweighted</td>
</tr>
<tr>
<td>PL</td>
<td>.172</td>
<td>11</td>
</tr>
<tr>
<td>TI</td>
<td>.234</td>
<td>15</td>
</tr>
<tr>
<td>TR</td>
<td>.594</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>1.000</td>
<td>64</td>
</tr>
</tbody>
</table>

The ability to predict group participation by instructor is identified in Table 5-39.

The ability to predict the Physical Literacy specialist was 82%, TI instructor 67% and TR instructor 95%.

Table 5-39 Discriminant analysis on instructor and Instructor Interaction variables

<table>
<thead>
<tr>
<th></th>
<th>Instructor</th>
<th>PL</th>
<th>Predicted Group Membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>PL</td>
<td>9 (81.8%)</td>
<td>1 (9.1%)</td>
</tr>
<tr>
<td></td>
<td>TI</td>
<td>0 (0%)</td>
<td>10 (66.7%)</td>
</tr>
<tr>
<td></td>
<td>TR</td>
<td>1 (2.6%)</td>
<td>1 (2.6%)</td>
</tr>
</tbody>
</table>

Table 5-40 identifies the percentage of time children spent in each of the following categories; physical activity expenditure, lesson context and instructor interaction.
Table 5-40 Percent of time spent in each context of PA, Lesson Context and Instructor Interaction variables

<table>
<thead>
<tr>
<th>PA Context</th>
<th>Traditional Recreation Program (Mean % of time) Coef (95% CI)</th>
<th>Program taught by trained individuals (Mean % of time) Coef (95% CI)</th>
<th>Physical Literacy Program (Mean % of time) Coef (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>16.84% (16.08, 17.59)</td>
<td>14.43% (12.90, 15.96)</td>
<td>14.88% (12.96, 16.79)</td>
</tr>
<tr>
<td></td>
<td>Male Sedentary 8.35% (7.80, 8.90)</td>
<td>7.82% (6.70, 8.94)</td>
<td>7.57% (6.17, 8.97)</td>
</tr>
<tr>
<td></td>
<td>Female Sedentary 8.43% (7.60, 9.25)</td>
<td>8.96% (7.28, 10.63)</td>
<td>7.32% (5.23, 9.41)</td>
</tr>
<tr>
<td>Moderate-Vigorous (MVPA)</td>
<td>49.52% (47.26, 51.77)</td>
<td>56.72% (52.13, 61.31)</td>
<td>55.40% (49.63, 61.11)</td>
</tr>
<tr>
<td></td>
<td>Male MVPA 25.74% (23.92, 27.56)</td>
<td>27.65% (23.94, 31.35)</td>
<td>30.10% (25.45, 34.72)</td>
</tr>
<tr>
<td></td>
<td>Female MVPA 23.97% (22.40, 25.54)</td>
<td>30.30% (27.10, 33.50)</td>
<td>25.20% (21.20, 29.20)</td>
</tr>
<tr>
<td>Lesson Context</td>
<td>13.55% (12.31, 14.78)</td>
<td>14.19% (11.67, 16.70)</td>
<td>20.45% (17.30, 23.61)</td>
</tr>
<tr>
<td>Management</td>
<td>Knowledge 11.86% (10.78, 12.95)</td>
<td>13.39% (11.18, 15.60)</td>
<td>10.27% (7.50, 13.04)</td>
</tr>
<tr>
<td>Fitness</td>
<td>4.96% (3.56, 6.35)</td>
<td>1.60% (-1.24, 4.44)</td>
<td>8.16% (4.61, 11.71)</td>
</tr>
<tr>
<td>Skills</td>
<td>47.94% (45.13, 50.75)</td>
<td>44.91% (39.19, 50.63)</td>
<td>39.89% (32.74, 47.05)</td>
</tr>
<tr>
<td>Game Play</td>
<td>12.25% (10.40, 14.10)</td>
<td>22.01% (18.24, 25.78)</td>
<td>18.74% (14.02, 23.46)</td>
</tr>
<tr>
<td>Other Task</td>
<td>1.17% (.60, 1.73)</td>
<td>3.91% (2.77, 5.05)</td>
<td>2.48% (1.06, 3.91)</td>
</tr>
<tr>
<td>Instructor Interaction</td>
<td>10.27% (8.88, 11.66)</td>
<td>13.46% (10.64, 16.29)</td>
<td>24.57% (21.04, 28.10)</td>
</tr>
<tr>
<td>Praises</td>
<td>Demonstrates 9.68% (8.10, 11.27)</td>
<td>8.10% (4.87, 11.33)</td>
<td>14.68% (10.65, 18.72)</td>
</tr>
<tr>
<td></td>
<td>Instructs 44.52% (42.06, 46.98)</td>
<td>48.16% (43.16, 53.17)</td>
<td>45.23% (38.97, 51.49)</td>
</tr>
<tr>
<td></td>
<td>Management (2) 16.18% (14.44, 17.92)</td>
<td>15.20% (11.67, 18.74)</td>
<td>13.14% (8.72, 17.56)</td>
</tr>
<tr>
<td></td>
<td>Observes 18.17% (16.48, 19.86)</td>
<td>12.41% (8.98, 15.85)</td>
<td>2.33% (-1.97, 6.63)</td>
</tr>
<tr>
<td></td>
<td>Other 1.18% (0.76, 1.61)</td>
<td>2.66% (1.79, 3.53)</td>
<td>0.04% (-1.05, 1.13)</td>
</tr>
</tbody>
</table>
5.19 Section summary

SO provided information on three specific variables; PA expenditure, Lesson Context and Instructor Interaction. The tool identified that engagement in MVPA was positively associated to group participation. Females in the TI program spent more time in MVPA than females in TR programs. In addition it was demonstrated that participants were most active in activities that occurred on the ice compared to those on the land, air and water.

A statistically significant finding was also identified between training and lesson context variables. The TI program spent more time in ‘Game Play’ compared to TR and PL participants were engaged, more often, in ‘Other’ compared to TR.

Finally, also a positive relationship between the amount of praise between PL and TI and TI and TR was demonstrated. The TI also spent more time in ‘Other Task’ compared to PL and TR. A discriminant analysis was also executed and identified that through SO that an observer could distinguish between the instructors teaching the class based on the variables in the Instructor Interaction category.

In addition to the collection of quantitative data, qualitative data was also collected to gather an understanding from parents in regard to their perception of recreation programming.

5.20 Focus groups

Hypotheses #4 - Parents in the PL PA program will identify a difference in recreation programming based on their experience in the PL program identified through focus groups.

Parents who had children participating in the research study were afforded the opportunity to participate in a focus group. The focus groups sought to gain an understanding of parents perceptions on elements related to recreation programming. Focus group conversations
were organized according to children’s program participation (i.e., Parents of children in the TR group participated collectively in the focus group). Several common themes emerged and are identified in Table 5-41 and discussed below.

**Table 5-41 Qualitative themes identified in focus groups**

<table>
<thead>
<tr>
<th>Theme 1</th>
<th>Diverse physical activity experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 2</td>
<td>Benefits of recreation programming</td>
</tr>
<tr>
<td>Theme 3</td>
<td>Limitations of recreation programming</td>
</tr>
<tr>
<td>Theme 4</td>
<td>Recreation instructors and physical activity engagement</td>
</tr>
<tr>
<td>Theme 5</td>
<td>Swimming</td>
</tr>
<tr>
<td>Theme 6</td>
<td>Play</td>
</tr>
<tr>
<td>Theme 7</td>
<td>Program Consistency</td>
</tr>
<tr>
<td>Theme 8</td>
<td>Social Connection</td>
</tr>
</tbody>
</table>

**5.20.1 Theme 1: Diverse physical activity experiences**

One of the first things expressed was a collective agreement amongst parents that exposing children to diverse physical activity experiences is important. All parents believed that having their children participate in many different activities was of benefit for different reasons.

‘I think that they should try as many things as possible, to see what their interests are and what they are going to love for years’.

“I agree too. I think that especially at this age they need to try new things and experiment with different things rather than trying to focus just on one… unless they don’t love it right away but I think that it is good for them to think about it”.

“For us it is really looking at variety and introduction to different activities. My idea is to expose them to as many different things so they can make a decision as to where their strengths are”.

Parent’s also mentioned that they enrolled their children in specific PA programs to address safety concerns.

“Swimming for me, I feel like it’s a life skill they have to learn”.

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“The trouble with us is swimming is very important that our kids know how to do it, they will probably go in to swim lesson regardless. When we go to Mexico we want him to know how to swim”.

5.20.2 Theme 2: Benefits of recreation programming

Parents perceive there to be many benefits to their child participating in recreation programs.

“It’s confidence building for them. You see that if they couldn’t do it when they started, but by the end their playing through it”.

“I think working with the other kids too, that they are at the same level, also learning the same skills is good for them”.

“And work as a team that’s important”.

5.20.3 Theme 3: Limitations of recreation programming

Although parents identified benefits to recreation programming they also expressed limitations. One of the first limitations identified centered on the registration process for recreation programs. Due to the process (first come first served) many are not able to register for all of their preferred programs.

“Did I win the registration?”

“It fills up, you have to be on line and registered within ten minutes after opening otherwise the classes are full”.

“My wife is online half an hour before the class session is open for registrations and she sits there and waits, and refreshes the screen until it says open. Then by the time she gets one of the kids registered, we quite often can’t get the others into their gym classes”.

These comments were made in response to the registration process. Due to the current registration system if you do not register your child when the system opens a child may not be able to participate in the program because it is full.

“We have been here for a long time and it is always hard to register for programs. Being a member they should give us a chance to sign up first”.

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5.20.4 Theme 4: Recreation instructors and physical activity

Parents were asked to provide their feedback on the recreation instructors and the amount of time they felt their child was physically active in the program they were registered in. The comments for those families in TR programming are highlighted first.

“They spend a lot of time sitting and waiting”.

“You know they have a lot of kids in their groups. They stand and wait to get to the equipment”.

“I don’t think they are very active lots of sitting and waiting”.

“I thought that the climbing instructors were phenomenal, they were all very engaged”.

“You know I like it better if there is smaller groups or like a high instructor to kid ratio. Right, something like that so there is not a lot of wait time for the kids”.

“A lot of times, depending on the instructors, they don’t really get taught anything”.

“I find that the instructors look bored and don’t want to be there, they stand there with their arms crossed”.

“Instructors should be approachable”.

The theme of instructor engagement and PA engagement became a strong theme with TR program parents.

Comments regarding recreation instructors and physical activity collected from the PL group are identified below. This group, 28 participants, remained as one group for the gym-based and gymnastic activities. A volunteer was recruited to assist with the large class size. For those activities in alternate environments (swimming and skating) the children were divided into smaller groups to meet ratios for safety requirements.

“It is a large group, a lot of kids running around”.

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“We tend to like the smaller sessions and the smaller groups just because they get to know them”.

“When I compare the skating program which I thought was very, very good because they broke them up in to four or five kids per group. I don’t know if that was based on availability or if it was just four or five kids but they got very much. Like the one on one attention. Swimming I thought was very similar to that too. So when I watch the gym sports, I felt a lot of the kids, were not as engaged and involved as he was in the skating or swimming”.

“She was very angry with me… (laughter) I just put her in soccer and she was just walking around, she never touched the ball… here she is running all the time”.

“This program is more active than all other programs”.

“This program gave them more confidence from the activities and leaders”.

5.20.5 Theme 5: Swimming

Swimming was a topic that came up within both focus groups.

“She’s in this level four times, even though he passed it the first time”.

“Oh sorry buddy you are doing it again. I know you don’t want to but you are in whale again”.

“Like my boys had to take one class like four times. The same class but each time there was certain things like from the first one that was ticked off and then they weren’t ticked off the second time. Then the third time they were ticked off again and then they weren’t”.

“Well the wait time was huge, not much swimming”.

5.20.6 Theme 6: Play

One unique element of the PL program was that children were allotted the first and last five minutes of each class to engage in unstructured play. The parents of this group were specifically asked their thoughts on the incorporation of play in the PL program curriculum.

“Well, I noticed that my son doesn’t always focus, especially in the swimming program. Having the whole hour where they get to play, get rid of some of that energy, and then actually focus on the instructions so helped him and made it so much fun”. 
“I like the hour format where they had the play and then the instruction, because it got rid of their energy for them”.

“My son said the exact the same thing, especially with the swimming because doing the lesson is one thing, but having that free time after or before the lesson makes it fun. It’s not all about instruction and learning it’s about being able to enjoy the time. Sometimes at this level it’s just learning and they actually don’t get that free time to just enjoy it. With this program play was incorporated in all the classes”.

5.20.7 Theme 7: Program consistency

Another theme that was identified by the PL group pertained to the duration of the physical activity program (16 weeks). It was discussed that the consistent duration of the program (days and times) provided continuity within their family.

“They know on Tuesdays and Thursdays where are we going to be. With having the program set, it actually is good because they actually like to have everything the same”.

“You know that they are involved a couple times a week and that there is a good appropriate amount of variety and that they are doing a lot of things and increasing their skill level”.

“I liked the consistency when we are going and for this length of time. It was a big chunk taken care of, I don’t have to worry about anything else that she was going to do for another two months so”.

5.20.8 Theme 8: Social connection

The final theme that emerged from the PL focus group meeting was one of social connection.

“He loved the instructors and enjoyed making friends”.

“He couldn’t remember some of the kid’s names but as we walked in he would say ‘hey there’s my friend’”.

“My guy is not good meeting others and this consistent group really helped him”.

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5.21 Section summary

The use of qualitative methodology in this research study, through the use of focus groups, provided richness and depth to understanding recreation programming from the lens of the parent. The emergence of common themes amongst the two groups provided information that are practical and tangible for the recreation sector to listen and employ in the designing of future programming.

5.22 Chapter summary

The use of both quantitative and qualitative data methodology was truly necessary to explore the dynamic variables that exist within the recreation sector. By conducting such analysis a deeper understanding of the constructs that exist within the recreation sector were identified and opportunities to improve elements of recreation programming were identified. Addressing the issues identified in this research study has the possibility to positively influence PA levels and the overall wellness of children attending recreation programs.
Chapter Six: Discussion

The final chapter of this dissertation provides discussion on the research findings; including that of motor proficiency, systematic observation (SO) as well as insights gathered from focus groups. It also provides a reflective summary of the research study including contributions to the existing body of knowledge. The chapter concludes by identifying limitations of the research study and recommendations for recreation programming and future research.

This 17-week research study was designed with the intention to improve the motor proficiency of grade one and two children, while at the same time understanding the role of the instructor when facilitating physical activity (PA) programs. Further, this study created an intentionally designed curriculum that aligned with education curricular outcomes, sport philosophy and best practices in facilitation with the intent to improve motor proficiency and PA experiences.

To the author’s knowledge this is the first study of this kind, to be conducted in the recreation sector. A mixed methodology was performed in order to capture the essence of recreation programming from a quantitative and qualitative perspective.

The results will be presented in order of the research questions.

6.1 Research question #1

What is the impact of an intentionally designed (physical literacy) PL curriculum, on the motor proficiency of children in grades one and two compared to children involved in traditional recreation (TR) programming as measured by Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form (SF)?
6.2 Motor proficiency data

6.2.1 Standard score

A pre test-post test experimental design was used to collect motor proficiency data via the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form (SF). A 2x2 repeated measures analysis of variance (ANOVA) was conducted by type of training physical literacy (PL) and traditional recreation programming (TR) by time (pre post).

Standard score is an indicator used to reflect an individual’s overall level of motor proficiency. This study identified a statistically significant result (p<.001) over time for both groups in standard score, an interaction effect between groups was not identified. However, due to the nature of this study a pairwise comparison test was performed and identified that the participants in the PL group improved significantly from pre test to post test compared to participants in the TR group.

The pre test standard score achieved for TR program participants averaged 46.17 and 46.38 for PL participants. Post test scores for both groups demonstrated improvement with the TR averaging 48.17 and PL 50.61. The average standard score in this testing, both pre test and post test, are lower than those reported in other studies (Jan Patricia Piek et al., 2013; Jan P Piek et al., 2010; Wrotniak et al., 2006). Studies conducted, with normal populations (those without physical or mental impairments), have identified standard scores to range between 51.22-58.21 (Jan Patricia Piek et al., 2013; Wrotniak et al., 2006).

In total, 71% of the participants in PL demonstrated an increase in standard scores (males increased by 75% and females by 67%) compared to children in TR programming. TR programming participants demonstrated a total increase in standard score from pre to post testing by 59% (males increased by 47% and females by 71%). In general, an improvement was
identified in the overall standard score of motor proficiency in both groups for males and females. It appears that males in the PL group increased considerably compared to males in the TR programming, although not statistically significant. Girls improved consistently between groups.

6.2.2 Individual subtest items

In addition to standard score there are 14 subtest items in the BOT-2 SF test. These test items are reflective of the fine and gross motor skills that are tested in the long form of this motor proficiency test. Cumulatively, the subtests comprise the components of the standard score. Pre post testing identified significance over time for each of the two training groups in several variables.

Statistical significance for time and training was found for the following variables in TR programming; ‘Drawing Lines through Path – Crooked’ (p<.039), ‘Transferring Pennies’ (p<.001), ‘Tapping Feet and Fingers – Same Time Synchronized’ (p<.003) and ‘Dropping and Catching a Ball-Both Hands’ (p<.024).

Similar findings were identified with the PL program, over time, for the following variables; ‘Folding Paper’ (p<.002), ‘Jumping in Place – Same Sides Synchronized’ (p<.003), ‘One-Legged Stationary Hop’ (p<.004), ‘Dropping and Catching a Ball-Both Hands’ (p<.01), ‘Dribbling a Ball – Alternating Hands’ (p<.012), ‘Push Ups’ (p<.035) and ‘Sit Ups’ (p<.001).

There were several subtest items that the PL program improved and exceeded that of the TR program (over time and training group), these variables were; ‘Jumping in Place (same sides synchronized)’(P<.037), ‘Dropping and Catching a Ball – Both Hands’ (P<.031) and ‘Sit Ups’ (P<.006).
6.3 Motor proficiency comparison data

Comparing motor proficiency data, across studies, is challenging for a number of reasons. To begin, research in the area of motor proficiency has been primarily conducted with the intention to identify or diagnose motor impairments or deficits (Brahler, Donahoe-Fillmore, Mrowzinski, Aebker, & Kreill, 2012; Cairney et al., 2006; Cairney et al., 2005; Cliff et al., 2009; Goodway et al., 2003; Lucas et al., 2013; Wuang & Su, 2009). As a result, limited research has been conducted with normal sample populations with the exception of a few in preschool and after-school programs (Cliff et al., 2009; Hardy, King, Farrell, Macniven, & Howlett, 2010; Piek et al., 2013; Piek et al., 2010; Wrotniak et al., 2006). Directly comparing results therefore is difficult.

A variety of process and product-oriented motor proficiency tests, as well as the selection of specific fundamental movement skills, have been performed in relation to measuring children’s motor abilities (Foweather et al., 2008; Goodway et al., 2003; Karabourniotis, Evaggelinou, Tzetzis, & Kourtessis, 2002; van Beurden, Zask, Barnett, & Dietrich, 2002; Wrotniak et al., 2006; Wuang & Su, 2009). Therefore, the variability of the data collected makes it difficult to compare the results of such motor proficiency tests. However, the importance of collecting this data is significant in order to develop programs that are developmentally appropriate to ensure children have the opportunity to develop skills that will allow them to be competent and proficient movers (Cross et al., 2010; Karabourniotis et al., 2002; Payne & Isaacs, 1998).

There is a belief that motor coordination and development will naturally develop in children (Cools et al., 2009; Goodway et al., 2003; Karabourniotis et al., 2002; Lubans et al., 2010; Rajan & Basch, 2012). Children will develop through natural movement experiences,
however, such experiences alone will likely not ensure that they become proficient in motor skills if they are not provided with specific practice, feedback, encouragement and instruction (Goodway et al., 2003; Karabourniotis et al., 2002; Lubans et al., 2010).

What emerges in the literature, and from this study, is a need to continue to identify strategies to increase children’s motor proficiency and physical activity behaviors. Some of the literature identifies the positive impact of interventions (Babin, Katić, Ropac, & Bonacin, 2001; Chow et al., 2008; Katić, Maleš, & Miletč, 2002; Parker & Curtner-Smith, 2005; Jan Patricia Piek et al., 2013). However, as the literature suggests, there is an opportunity to do more.

6.4 Section summary

The benefits of conducting intervention activities is documented in the literature which supports the idea that initiating and reinforcing change, through intervention activities, is likely to yield a positive result (Bush & Bengoechea, 2015; Logan et al., 2012; Riethmuller et al., 2009; Salmon, Booth, Phongsavan, Murphy, & Timperio, 2007). This study was able to identify that a statistically significant result could be achieved in an intentionally designed PL curriculum.

This is the first study conducted, to the best of the author’s knowledge, on the motor proficiency levels of children, in the recreation sector. The BOT-2 SF was selected due to its ease of use and the ability to provide a snapshot on children’s motor proficiency. Increased proficiency was demonstrated between both groups identifying that participating in PA, ongoing practice and repetition, can improve performance, regardless of PA program.

Ongoing motor proficiency testing in recreation would not only allow for comparative results but would also help inform the recreation sector of their opportunity to enhance children’s motor skills through recreation programming. The baseline data collected from this study creates a benchmark for future comparison.
6.5 Systematic observation

For the purpose of SO analysis participants were divided into three groups based on instructor; PL specialist (PL), trained instructor (TI) and traditional instructor (TR). Statistically significant findings were identified through the utilization of the System for Observing Fitness Instruction Time (SOFIT) in all three contextual variables of physical activity expenditure, lesson context and instructor interaction. Physical activity was the first variable to be explored.

6.6 Research question #2

What is the relationship between PA levels (in multiple environments) and Lesson Context variables between PL and TR programming for boys and girls in grades one and two as measured by the System for Observing Fitness Instruction Time (SOFIT)?

6.6.1 Physical activity expenditure

This study provides some empirical evidence to suggest that instructor training positively influences the amount of time spent in moderate to vigorous physical activity (MVPA). MVPA is a combination of children’s PA expenditure in the categories of walking and vigorous physical activity.

A one-way ANOVA, with instructor as the dependent variable, identified that participants instructed by TI instructors (those who participated in professional development training and received ongoing support from the PL specialist) spent more time in MVPA compared to instructors taught by TR instructors (p<.003). Further analysis demonstrated that there was a significant amount of time spent for females in MVPA in the TI program compared to females in the TR program (p<.007).

The percentage of time spent in sedentary behavior amongst groups, in this research study, went as follows; TI 39%, PL 46 % and TR, 51%. The study results for TR programming is
consistent with the literature which demonstrates that children spend approximately 50-68% of class time in sedentary behavior (McKenzie et al., 1991; Schuna, Lauersdorf, Behrens, Liguori, & Liebert, 2013; Sheehan, 2015; Simons-Morton, Taylor, Snider, Huang, & Fulton, 1994; Van Cauwenberghe et al., 2012).

It is suggested in the literature that schools and program planners should assist children in achieving a threshold of participating in MVPA for 50% of physical education class time (Chow et al., 2008; McKenzie, 2010; McKenzie et al., 2000). The ability to increase the threshold of MVPA was demonstrated in the PL (54%) and TI (60%) programs and is relevant to other studies that have been conducted in education and after school programming (Behrens et al., 2015; Chow et al., 2008; Coleman, Geller, Rosenkranz, & Dzewaltowski, 2008; McKenzie et al., 2000; Schuna et al., 2013). The amount of time spent in MVPA within these studies was identified between 50.7% - 69% (Chow et al., 2008; Coleman et al., 2008; Parker & Curtner-Smith, 2005).

A study conducted by Coleman et al. (2008) was able to identify that those children that participated in unstructured play (adult supervision), while at an afterschool program, were able to acquire 60% of MVPA compared to 51% of MVPA when physical activity was organized by an adult. This further suggests that participation in PA that is self-selected has a greater likelihood of kids enjoying and putting in a more concerted effort to participating.

What this evidence suggests is that there is support that programs can achieve 50% of MVPA. Although these increased findings of MVPA are trending in the right direction there is still concern regarding the amount of time spent in sedentary behavior in typical programs (Behrens et al., 2015; Chow et al., 2008; Sheehan, 2015; Van Cauwenberghe et al., 2012) A great deal of the literature identifies that in most programs children are spending upwards of 68%
of the time in sedentary behavior (Behrens et al., 2015; Schuna et al., 2013; Sheehan, 2015, Simons-Morton et al., 1993).

6.6.1.1 Physical activity expenditure by environment

In addition to these findings, further analysis was performed to explore PA expenditure in each of the environments of land, air, water and ice. The results identified that the activities that occurred on the ice spent more time in MVPA compared to the other environments. Participants in this environment were engaged in ‘learn to skate’ programs where most of the lesson involved game play type activities. These activities often included the instructor distributing equipment throughout the playing space (ice) and then the children were asked to collect the equipment. Participants enjoyed these activities which kept them active for most of the class time.

Safety is a large concern in the aquatic environment and may be an inhibiting factor in the amount of time spent in MVPA. Although class size usually remained at a reasonable ratio (approximately 1 instructor to 6 children), much of the class time was spent in sedentary behavior. A typical swim lesson usually involves one child taking a turn and the remaining children holding on to the side of the pool waiting for their turn. The TI instructors were given tips and tricks to encourage more PA and although not statistically significant these instructors were able to promote more MVPA than TR instructors.

Exploring PA expenditure based on environment of participation has not been performed to the best of the author’s knowledge. As a result, comparable data is not available.

The next analysis focused on exploring the lesson context variables by training groups.

6.6.2 Lesson context variable

Subsequent analysis for SO continued with the investigation of the lesson components which identified the amount of time spent in each of the following variables; management,
knowledge, fitness, skill development, game play and free play. Collection of this data occurred at the SOFIT prompt (the end of the 10s. observation period).

A positive Pearson product-moment correlation was identified for several variables based on Cohen’s (1988) determination of relationship strength. Relationship strength is determined as follows; -.25 little to no relationship, .25-.50 fair degree of relationship, .50-.75 moderate to good relationship and greater than .75 indicates a very good to excellent relationship (Cohen, 1988). The first correlation identified a fair relationship between time spent in sedentary behavior and ‘management’ (r=.460). This identifies that the more time spent in ‘class management’ (distributing equipment, organizing participants into groups) the more likely children are to be sedentary. This relationship is supported in the literature (Behrens et al., 2015; McKenzie et al., 2000; McKenzie et al., 2006; Parker & Curtner-Smith, 2005; Sheehan, 2015).

In conjunction with this finding, fair relationships were also found between ‘management’ and ‘skills’ (r=-.479) as well as ‘management’ and ‘other task’ (r=.257). This finding further identifies that when an instructor is engaged in class management activities, the children may not actively be participating in the PA lesson. The amount of time spent in management in this research study is similar to that found in the literature (Chow et al., 2008; Parker & Curtner-Smith, 2005; Simons-Morton et al., 1993; Van Cauwenberghe et al., 2012).

In addition, the data collected identifies that if participants are involved in ‘fitness’ type activities, they are less likely to be participating in ‘skill’ development (r=.289). A moderate relationship recognized a similar pattern that identified when participants were involved in ‘game play’, they were not acquiring or developing ‘skills’ (r=-.711).

The findings associated with the analysis of the lesson context variables demonstrated that there is a great deal of diversity that occurs within each lesson. Not only do the lesson
contexts variables differ in each lesson, they also vary based on the instructor delivering the lesson. The variability that exists within each lesson is not surprising for a few different reasons. One reasonable explanation may be a result of the focus or the occurrence of the lesson. If children are learning a new activity more class time might be spent in class management (i.e., getting skates on), and if it is at the beginning of a new program, instructors may spend more time organizing the equipment and participants.

The only statistically significant findings between groups occurred between the TI and TR programs, and were for the variable of ‘game play’. The participants taught by the TI instructors participated in more ‘game play’ activities (p<.003). The statistical findings of game play in this study were found to complement other studies for children of similar age (Mckenzie et al., 2000; McKenzie et al., 2006; Schuna et al., 2013). Only two other studies, conducted by Parker et al. (2005) and Van Cauwenberghe (2012) were found to have a high proportion of time spent in ‘skill’ development similar to that of TR programming.

The second finding was between PL and TR for the variable of ‘other’. PL participants experienced more time engaged in this variable compared to both other groups (p<.044). ‘Other’ largely refers to activities that do not fit within the other lesson context variables. In this situation, other task primarily consisted of participants engaging in free play, unstructured supervised type activities.

The last analysis conducted for SO focused on examining the role of the instructor when delivering PA programming.

6.7 Research question #3

What is the relationship between PA levels and Instructor Interaction variables between PL and TR programming, for children in grades one and two as measured by SOFIT?
6.7.1 Instructor interaction

The final variable measured by SOFIT is instructor interaction. Instructor interaction explores the dynamic role of the instructor when facilitating a PA program for the following variables; praise, demonstration, instruction, management, observing and other task. Instructor interaction variables are hierarchical with ‘praise’ being the most desired behavior and ‘other task’ the least desired. When collecting data, the observer observes throughout the 10s interval and records the most desired behavior at the recording prompt.

Statistical significance was determined for the variable of ‘praise’ in the PL program compared to both the TI (p<.002) and TR (p<.001) instructors. The TI instructors spent more time in praise compared to TR instructors (p<.046). In addition, the PL instructor betrothed higher amounts of praise compared to other studies in the literature (Chow et al., 2008; McKenzie, 2010; Parker & Curtner-Smith, 2005; Schuna et al., 2013; Simons-Morton et al., 1993; Van Cauwenberghe et al., 2012). The PL specialist, on average, recognized children’s performance and effort 19.63% of program time. Other studies have demonstrated a significantly lower amount of praise 6% to 11% (McKenzie et al., 2000; Schuna Jr et al., 2013; Sheehan, 2015).

There is evidence in the literature that suggests that there is a positive association between praise and MVPA (Beets et al., 2013; Coleman et al., 2008; Parker & Curtner-Smith, 2005). Although this study was not able to statistically support this claim, participants in PL and the TI programs demonstrated higher amounts of MVPA compared to their TR counterparts and experienced more praise.

Statistical significance was also determined for the variable ‘observing’. The TI instructors spent more time than PL (p<.025) in this category, and TR instructors spent more
time observing than TI (p<.035) and PL (p<.001). In the coding protocol ‘observing’ refers to the instructor watching the activities that the participants are engaged in. In the hierarchical nature of the SOFIT recording protocols, this classification of instructor interaction is not considered to be a desired behavior of instructors. However, participants taught by the TI instructor also spent more time in ‘game play’ activities which may account for the increased amount of time ‘observing’ by the instructor. According to Parker et al., (2005) low levels of observing suggest that instructors are actively involved in the lesson being delivered. In this particular instance we see the opposite happening with high levels of observing occurring.

The final variable measured in the instructor interaction context, with statistical significance, is ‘other task’. This is the least desired behavior coded in this category and is associated with the instructor being off task (i.e. chatting with a fellow instructor unrelated to the PA program, checking their phone). Due to the small means of this variable a separate Tamhane analysis was conducted. The analysis found that the TI instructors spent significantly more time in ‘other task’ than both the TR (p<.004) and PL (p<.003) instructors. This result is surprising and further investigation in this particular variable should be explored.

6.7.2 Discriminant analysis – instructor interaction

The final analysis performed on the instructor interaction variables was a discriminant analysis. The main purpose of a discriminant analysis is to predict group membership based on a linear combination of group interval variables. The procedure begins with a set of observations where both group membership and the values of membership are known. The interval variables are called the predictor variables. The use of discriminant analysis, in this manner, is the first time performed in SO to the best of the authors knowledge. This type of analysis allows the ability to determine if there were different patterns of behaviour depending on the instructor.
Further, this type of analysis gives insight into the approach that instructors use to teach and this could be a tool used in future SO research where group membership is a criterion to be assessed.

A discriminant analysis was conducted to determine if the PA program could be predicted based on the instructor facilitating the program. Again, the variable of ‘other task’ was not included in the analysis due to its inability to meet the minimum tolerance test.

The discriminant analysis was able to demonstrate that PA instructors could be distinguished from one another based on the instructor interaction coding variables. The analysis determined that the PL instructor could be identified 81.8% of all lessons, measured by SOFIT, and TI 66.7% and TR 94.7% respectively. This is valuable information that suggests that the behavior of the instructor can be consistently identified as measured through the SOFIT protocols. The results illustrate that the style of program delivery between the PL specialist and the TR instructor were vastly different. Further, the participants taught by the PL specialist appeared to have a different PA experience than those taught by the TR instructor. Participants in PL, as mentioned previously, experienced more MVPA (although not statistically significant), more time on ‘other’ variables and received more praise and encouragement from the instructor than those in the other programs.

The profiling of instructor behavior through discriminant analysis contributes greatly to the literature of SO. Prior research conducted in SO has often explored the relationships of PA expenditure with the activities occurring within the lesson context, relationships between PA expenditure and instructor interaction and finally lesson context variables with instructor interaction. The ability to profile instructors, based on the instructor interaction variables, will allow individuals to evaluate instructors against the profile characteristics that have been identified in the literature to promote PA.
6.8 Section summary

The findings identified in SO are consistent with the literature. Even though participants in the PL and TI programs spent more time in MVPA than TR programs, there is still an opportunity to increase the amount of PA time within recreation programs.

There are a few opportunities for future research using SO. SO could explore more specific variables that pertain to the diverse PA environments. For example, protocols could be created that would specifically code elements in alternative environments such as for swimming or rock climbing. More detailed variables or description of variables for these diverse environments may provide a more accurate depiction of PA in those specific environments (i.e., floating in the pool is equal in energy expenditure to walking).

It may also be beneficial to create thresholds for MVPA that are developmentally appropriate for children’s growth and development as well as for individuals with impairments (physical and/or mental). Doing so may provide program planners with more accurate expectations of MVPA when evaluating program outcomes. The threshold of achieving 50% of class time in MVPA may be an unrealistic expectation for young children or marginalized groups.

In addition to creating thresholds for MVPA, it may also be valuable to create thresholds for lesson context variables. Providing program planners and instructors with indicators of how much time should be spent in ‘skill development’ versus ‘game play’, to match developmental milestones, may also provide valuable information to program planners when planning lessons. Indicators may allow for more appropriate programming which in turn may influence PA levels and behaviors toward PA.
The final significant finding identified in this research study, through SO and discriminant analysis, is recreation instructor profiling. The ability to distinguish between instructors has the potential to separate between those instructors who have undergone professional development training and those who have not. The ability to profile instructor interaction with participants would not be limited to the recreation sector but could be employed in the education and sport sector as well.

The quantitative data collected through motor proficiency and SO assessments provided detailed, descriptive data that allows for comparison amongst other similar research studies. To enhance the information gathered a qualitative approach was taken to understand recreation programming through the lens of the parents. This occurred through focus group conversations that provided depth and richness to the data collected.

6.9 Research question #4

What are parental perceptions of recreation PA programs, as identified through focus group conversations? Are parents in the PL program able to distinguish between traditional recreation programming and intentionally designed programming?

6.10 Qualitative data

The utilization of focus groups was designed for the sole purpose of acquiring information on parental perceptions of recreation programming. The data collected sought the perspectives of parents who had children in TR and PL programming. More specifically, the study wanted to gather information on existing recreation programs from TR parents and determine if parents involved in the PL program identified a difference from this new type of program delivery to what they have traditionally experienced. The qualitative data collected was
done to provide further insight into recreation programming and not intended to corroborate the quantitative data.

Program evaluation is typically done through post program questionnaires which are distributed at the end of recreation programs to inquire about elements such as cost, time of program etc. (Camiré, Trudel, & Forneris, 2014; Howe, 1993). The limitation however with such methodology is that it does not capture the true essence of the individual’s experience. The focus groups afforded the opportunity for parents to interact and share (and perhaps validate) their perspectives.

A thematic analysis was done and found common themes which emerged from the conversations. Themes included: diverse physical activity experiences, benefits of recreation programming, limitations of recreation programming, recreation instructors and physical activity engagement, swimming, play, program consistency and social connection. The opportunity for parents to express their thoughts and share their ‘story’ of their experience in recreation has provided tangible suggestions for opportunities of improvement in programming.

6.10.1 Diverse physical activity experiences

Conversations held with both sets of parents (PL and TR) collectively identified that parents believe that exposing their children to a variety of PA is important. There was a general understanding that such diverse experiences positively contribute to the overall well-being of their child. The literature supports the opinion that a strong sense of motor proficiency, acquired through the acquisition and application of fundamental movement skills (FMS) and fundamental sport skills (FSS), assists in the development of motor proficiency (Barnett et al., 2013; Barnett et al., 2009; Findlay et al., 2010; Lopes et al., 2011; Okely et al., 2001). As a result, many parents make a concerted effort to enrol their children in multiple PA programs. Although this
was strongly supported by both parent groups a few individuals expressed how diverse experiences can be cost prohibitive.

6.10.2 Benefits of recreation programming

A few parents identified that some of the benefits of participating in recreation programming consisted of the perceived improved competence in their children’s physical ability. The opportunity to practice FMS and FSS aids in the overall physical development of children and is supported in the literature (Herrington et al., 2015, Loprinzi et al., 2012). This was associated with children in the PA program being at the same motor competence level as others, therefore making children feel good about their own ability.

Limitations of recreation programming

The limitations of recreation programming, for most parents, largely stemmed from frustration that exists with the registration process. Current registration is on a first come-first serve basis and allows everybody to register at the same time. Many members (those who purchase yearly passes) felt that they should be given an opportunity to register prior to the public as recognition of their support to the recreation facility. Parents expressed that often the online registration system crashes due to the abundance of people trying to register simultaneously. Further, as a result of the difficulty with the registration process, some parents identified that they had to prioritize the programs they wanted to register their child in with the understanding that subsequent registrations may already be full.

6.10.3 Recreation instructors and physical activity

The first focus group conversations on this topic are from parents who had a child in the TR program. The consensus from these parents was that recreation instructors often appeared to be disinterested in leading the PA program. This comment stemmed from parental observation of
the body language and level of engagement of the program instructors. In addition, parents felt that children spent majority of class time sitting, listening to instructions or standing in line waiting to take their turn and not engaged in PA.

Although the intention of the focus groups was not to validate the quantitative data, the comments from parents on this topic are congruent with the data found in SO. Parents recognized that their children were not physically active and that the instructor did not appear to be motivated in teaching the class.

The parents of participants in the PL program were also asked their opinion of the recreation instructors. In the environments that occurred on the land and air, all 28 participants remained in the same group and were taught by the PL specialist, with the assistance of a volunteer. Children were organized into smaller groups for the activities that occurred in the water and ice as per safety guidelines.

Comments from the PL program parents identified that most of them did not enjoy the large group experience on the land and air environments. They felt that the PA experience was more enriching when the participants were divided into smaller groups, such as on the water and ice. Generally speaking, parents in this group recognized that their children were more actively engaged in this program compared to traditional recreation programs.

6.10.4 Swimming

Swimming was universally described as a ‘life skill’ amongst most parents and was a topic of conversation that drew a lot of attention. Many parents expressed frustration with this activity and its evaluation process. Most parents identified that children were not very active in swimming and felt that children spent most of the class time waiting for their turn. In addition to these comments, parents expressed frustration with the badge system used to evaluate their
children. It appears that there is inconsistency amongst swim instructors when assessing the children. Several parents identified that after one session several test items were checked off of their child’s evaluation form as completed, yet when they returned for a subsequent session, some of the test items that had been previously checked as completed were now considered incomplete.

6.10.5 Play

Parents of the PL program were specifically asked about their perception of ‘play’ which was included at the beginning and end of each program. There was resounding positive praise, from majority of the parents, for the inclusion of ‘play’ into the program for various reasons. A few accolades for the inclusion of play included the opportunity for children to blow off some steam before the lesson began. The opportunity to ‘play’ was suggested to improve some children’s focus during the actual lesson. A final argument for ‘play’ was simply to enhance the fun factor. Often PA programs are very structured. Allowing children the opportunity to ‘play’ provided them the opportunity to self-select and discover on their own.

A growing body of research supports the importance of play to the overall development of children (Bergen & Fromberg, 2009; Herrington & Brussoni, 2015; Huisman, 2014; Lester & Russell, 2008; Milteer et al., 2012). Play is often unstructured and is performed for pure enjoyment with benefits to an individual’s overall well-being (Lester & Russell, 2008). The benefits of play, as identified in the literature, were reinforced by the parents in the focus group conversations.

6.10.6 Program consistency

Parents of participants in the PL program were asked their opinion of consistently attending a PA program on the same day and time for a 17-week period. Most parents responded
positively to this format of programming identifying that it eased their already busy schedules. Majority of the parents agreed that they would register for a program like this for the benefits of the PA variety and the one time registration.

6.10.7 Social connection

The final theme that emerged from the PL program focus groups was social connection. Many of the parents in the PL group expressed how their child felt a connection to the other participants within the program and developed a bond with the PL instructor. Although this was not an intended consequence to the research study, it does support the literature that speaks to the important role of peers and social relationships to continued participation (Barnett et al., 2008; Bart et al., 2007; Jago et al., 2009; Maturo & Cunningham, 2013; Vlachopoulos & Michailidou, 2006). This also coincides with social-ecological and self-determination theories reinforcing that there are many levels of influence on individual behavior (Heitzler et al., 2006; Sallis et al., 2006; Sylvia & Baldwin, 2003; Vlachopoulos & Michailidou, 2006).

One final element discussed in the focus groups, by some parents, but did not present itself as a theme, was the opinion that the recreation centre should support the family, not just the individual, to be active. Providing opportunities for parents and siblings to participate in programs that run simultaneously were identified as being advantageous. Further, it was identified that there is an interest to support the family, at the recreation facility, in issues that extend beyond the realm of physical health. Parents suggested that they would welcome the organization to facilitate additional support and resources on topics such as bullying and mental health via Webinars, guest speakers or other mediums.
6.11 Section summary

The qualitative data collected through focus group discussions provided substantial depth to the research study. This information provides recreation instructors, program planners and managers with valuable information that can be implemented in the recreation sector to improve customer experience.

Some of the information gathered from the focus groups validates the data collected from SO, particularly in the realm of PA expenditure and instructor interaction. Overall, the data suggests that the recreation centre is simply more than a place for individuals to exercise. Parents see it as an opportunity to build social connections and as a place where they can go for education and resource materials.

A significant component to the research design was staff training. This is discussed in the next section.

6.12 Staff training

Professional development training was delivered, by the PL specialist, to the instructors teaching the water and air environments. Providing opportunities for professional development is intended to enrich the experience of the participants and of the instructors (Huberty et al., 2009; Petrunoff et al., 2009; Weaver et al., 2012). In this research study, the professional development training was both formal, with meetings, and informal as the PL specialist engaged the instructors after each lesson.

Many of these instructors felt that their existing format of program delivery encouraged children to be active most of the class time. The challenge presented to these instructors was twofold; first they were asked to consider how they could modify their lessons to eliminate
standing and wait times, and the second was to consider how the element of ‘play’ could safely be incorporated into the beginning and end of each lesson.

Instructors were provided with class management strategies to encourage a fun, physically challenging and motivationally charged PA environment. Encouraging all children to be active was stressed in each of these environments. For example, instead of one child performing a skill in the water and the remaining children holding on to the edge of the pool, instructors were asked what children, who are waiting their turn, could be doing. A great deal of conversation evoked from discussing how to promote PA in each of the environments and several options emerged.

The greatest challenge that came from the professional development training was the element of ‘play’. The resistance to ‘play’ was largely due to safety concerns, particularly by the swimming instructors. These instructors advocated that water safety was a concern. To combat this challenge, the PL specialist and the swimming instructors worked collaboratively to create ways for children to ‘play’ in a safe manner. Examples included children playing with beach balls, in the shallow end, and having children wear life jackets in the deep end while providing children with a variety of equipment to play with. Although there was a great deal of reluctance for the inclusion of ‘play’, it was incorporated into each program lesson.

Ongoing advocacy and training for the inclusion of ‘play’ in recreation programming is something that should continue. There is a great deal of research advocating the benefits of ‘play’ not only physically, but socially, emotionally and mentally (Bergen & Fromberg, 2009; Huisman, 2014; Milteer et al., 2012; Myck-Wayne, 2010). Many definitions exist in regard to ‘play’ which often include elements of play being a voluntary activity, done for enjoyment, that
occurs individually or with others and with or without materials (Bergen & Fromberg, 2009; Dridea & Murgoci, 2010; Huisman, 2014).

6.13 Contribution to the literature

The findings collected, both quantitatively and qualitatively contribute to the literature in recreation programming in a number of ways. Being the first in the area to quantitatively explore motor proficiency in this sector provides empirical evidence to suggest that there is an opportunity to develop and enhance children’s fundamental movement and sport specific skills in recreation. There is an opportunity in recreation, similar to education and sport, to quantitatively assess children’s motor performance.

The greatest contribution made by SO in this research study is its ability to discriminate between instructors. Profiling instructors based on instructor interaction variables will help distinguish instructors who have received training from those who have not. As a result, there is the potential to hold instructors accountable for their program delivery based on this profiling.

6.14 Limitations of the research study

As with most research, there were limitations in this study, including; number of participants, duration of research study, the scheduling of PA for the research study and finally the selection of physical activities for TR participants.

6.14.1.1 Number of participants

The sample size of this study included a total of 57 children. This is comparable to other studies, however; it may be limited in the ability to achieve statistical power. Further, a larger sample would have provided a broader representation of children in this age category possibly influencing the final analysis, particularly that of motor proficiency. In addition, the children invited to participate in this study had previously enrolled in a program at Vivo. This therefore
suggests that the sample population may be biased because these children have already attended programs and are not reflective of children who do not have the opportunity to participate.

6.14.1.2 Duration of research study

The study consisted of a 17-week long program where children participated in organized physical activity twice a week. Pre-post test measurements were conducted on motor proficiency prior to the commencement and completion of the program. A longer duration of the research study may have demonstrated a stronger statistical finding in the area of motor proficiency between the two groups. More opportunity to practice and reinforce basic fundamental movement skills may have been associated with higher standard scores at the conclusion of the study.

6.14.1.3 Scheduling of PA

Children engaged in the PL program collectively participated and rotated from one physical activity environment to another, spending 8 classes in each context. The sequencing of physical activities for this group went as follows: gym-based (land), gymnastics (air), skating (ice) and then swimming (water). Due to scheduling discrepancies at the recreation facility this group participated in the same space for the first 2 activities for a total of 16 consecutive days. This was problematic on two levels. The first being boredom amongst the children. Although the focus of the activity changed, it was difficult for the children to become excited about something ‘new’ when they were in the same space. The second concern, due to scheduling, is that it may have negatively affected the motor proficiency post test findings. Many skills were taught and developed within the two environments on land and air, at the beginning of the program that were not necessarily reinforced in the environments of water and ice.
6.14.1.4 Selection of physical activities for TR participants

The participants in TR programming group were given the opportunity to have priority enrolment in physical activities of their choice. As a result, some parents selected activities that they may not have necessarily enrolled their child in. This potentially may have influenced the findings with some kids acquiring skills that may have not necessarily been developed if this option were not provided. For example, if children selected basketball as an activity and had never played that sport it may have effected their hand-eye coordination. This is of benefit to the child but potentially could influence the findings.

6.15 Practical implications

There is an increasing societal concern over the prevalence of decreasing physical activity and increasing sedentary behaviors, and the negative health consequences attributed to such behaviors. As a result, there is a need to explore alternative opportunities to address the issue.

Conducting research in the recreation sector is certainly not the norm. Evaluation that typically occurs in recreation is usually summative and yields little information. There are challenges to conducting research in recreation, the first being the lack of consistency amongst participants. Participants typically attend programs of interest for a small window of time, upon completion of the program they may re-enroll, select an alternative activity, or choose to no longer participate in the activities offered by the recreation facility. As a result, conducting motor proficiency testing may be difficult to offer as a pre-post test design. However, understanding the implications of motor proficiency to later participation is extremely important. Recreation has an opportunity to develop and enhance fundamental movement skills through PA programs.
Although a true research design on an ongoing basis may be unrealistic, there may be an opportunity to facilitate motor proficiency at the commencement of programs.

Many motor proficiency tests such as the BOT-2 are game-like type activities that may easily be incorporated into a typical lesson. The information collected would help inform program planners of their membership’s level of motor proficiency and perhaps modify programs accordingly to accommodate any identified deficiencies.

Alternatively, SO is a validated assessment tool that is easy to use and provides valuable information. The incorporation of SO, as a form of ongoing evaluation, allows program managers to ensure quality programming and instruction. This tool does not require consistent program participants and provides a snapshot on multiple variables simultaneously.

Recreation facilities, particularly program managers and front-line instructors, have an opportunity to positively influence a wide range of children and families in supporting them to acquire skills that will foster physical activity behaviours and lifelong wellness. The findings of this study should also prove valuable to other facilities, community organizations or sectors that see an opportunity to align physical activity promotion to existing programs.

6.16 Section summary

This research study represents an important step towards exploring holistic curriculum development. Motor proficiency testing, curriculum design, and staff training were explicitly examined. A great deal of literature exists that suggests that high degrees of motor proficiency positively coincide with sustained participation. However, motor proficiency alone is only one indicator of an individual’s physical ability. Although the data collected from such testing can assist teachers and coaches to help individuals become more proficient, it is only one solution. There are other physical tests that provide a much better, overall perspective of children’s
development and understanding including their physical, social and mental capabilities. One example of such testing, as mentioned earlier, is the Canadian Assessment of Physical Literacy (CAPL). This testing protocol, although only presently valid for children in grades four and five, goes beyond the simple physical testing of children. CAPL delves further into the cognitive and social understanding of children as it relates to PA.

This further speaks to the physical literacy philosophy created by Margaret Whitehead which advocates that the body is not simply a mechanism but that individuals should see their existence as beings in the world (Whitehead, 2007, 2010). How we understand and interpret the world around is through our experiences. This, therefore, suggests and reinforces that programming should not focus solely on motor skills, that there is a repertoire of elements that should be included in program design.

Creating programs that develop fundamental movement skills are important. What is of even greater importance, however, is the experience that occurs within recreation programming. Enriching programs, with specific objectives and quality instruction has the capability to provide strong connections for individuals that include PA, but also provides linkages to the individuals overall well-being.

6.17 Recommendations for future research

A wonderful opportunity exists in the recreation sector to advance knowledge in regard to; physical activity levels of children, the effectiveness of curricular design on motor proficiency and the influence of professional development on instructor interaction with children. From this study there are several suggestions for future research.

The first suggestion is to re-create the existing research study into a longitudinal study to further explore holistic programming and its’ long-term impact on the curriculum, program
design and children’s motor skills. Further, there is an opportunity to engage the participants themselves in the research study to further a holistic approach to recreation. There is a multitude of data that can be collected from the participants, including measures of self-competence as well as feedback from program participation.

A second immediate opportunity for future research is to explore the influence of professional development in recreation programming. Specifically, this refers to the creation of a professional designation for front-line practitioners in the recreation sector. The author suggests a designation referred to as the ‘Physical Literacy Professional’ (PLP). The development of a recognized designation/training for recreation instructors, as an educational component would not only add credibility, knowledge and expertise to recreation instructors, but should positively impact the PA experience of the participants. Professional development that is relevant and practical for front-line leaders should assist program delivery to be more developmentally, mentally, emotionally and socially appropriate. The author believes that the creation of such a designation has the ability to ensure that front-line staff have an understanding of the competencies that are required to be recreation instructors including; a greater understanding of children’s developmental stages with the ability to recognize and reinforce the concept of embodiment in PA experiences.

In alignment with professional development is the opportunity to create a recreation framework that would outline the developmental milestones for children in regard to the learning domains of cognitive, psychomotor and affective development. This framework is similar to that which exists in education (program of studies) and sport (Long-Term Athlete Development Model), but is void in recreation. The creation of such a framework would aid in ensuring that developmentally appropriate activities are being delivered in recreation.
Further, the continuation of instructor profiling as a means of evaluating instructor effectiveness, as identified in the discriminant analysis, has ramifications for future studies using SO. This finding can be employed to any number of environments where adults are working with children. The author believes that a great opportunity exists within this finding that aligns extremely well with professional development and has implications for staff accountability and program quality control.

A final suggestion for future research is to explore recreation programming from a social-ecological perspective. This perspective would encourage recreation, education and sport sectors to work collaboratively to share their learning, resources and expertise in the best interest of children and youth. Eliminating the silos that exist amongst the sectors would allow for consistent messaging in the development and fostering of PL. This research study utilized information from other sectors to develop an intentionally designed curriculum; however physical health and wellness go beyond curriculum and one organization. There is a real opportunity to connect individuals, communities and organizations to collaboratively work together to positively shift and influence PA and healthy behaviors.

6.18 Chapter summary

This research study has demonstrated that the ability to conduct research in recreation is not only possible, but that by doing so an opportunity to positively influence recreation programming exists. This study has shed light on the motor proficiency levels of children and the PA levels of children in recreation programs. The results also provide information on what occurs in recreation lessons, including the behavior of the instructor. In addition, the study also identified the perception of recreation programming from the lens of the parent.
This study was not without limitations however, there were several important strengths. There was no attrition from program participants and the mixed methods design proved to provide an in-depth perspective of recreation programming. Future research is warranted and several suggestions have been provided.

This study has demonstrated the ability to effectively incorporate research in the recreation sector to gain an understanding of children’s participation in recreation programming. The findings contribute to the body of literature supporting the opportunity for recreation to assist children in leading active and healthy lives through their life-course through intentionally designed programs delivered by quality instructors.
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Appendix A: Email Invitation for Participation

WE NEED YOUR HELP TO RAISE HEALTHIER GENERATIONS!

Together with Mount Royal University and the University of Calgary, Carcel Place is inviting your child, registered in senior grade one or grade two for the 2013/2014 school year, to participate in a research study that is being conducted by Nadine Van Wyk, a PhD candidate.

The purpose of the study is to determine if children’s motor proficiency skills, such as throwing, catching, running, strength and balance, is improved by participating in a 16-week intentionally designed course compared to registration in a series of typical recreation programs. It will begin in January 2014 and continue until mid-May 2014.

Benefits

If you qualify for the study you will receive:

• A summary of your child’s physical activity behaviour and motor proficiency results ($150 value)
• Participation in organized activities at Carcel Place 2X per week from January to May ($100 value).

How to get involved!

This opportunity is open to all participants. For more information or to qualify your child for this project please contact Nadine Van Wyk

http://www.universityofcalgary.ca/life/healthy-generations.html
Appendix B: Eligibility Invitation

Thank you for expressing interest in the Child & Youth Action Research Study taking place at Cardel Place in January 2014. Please find attached an eligibility form that will help us identify your child’s availability to participate in this initiative. This attachment is a fillable form. This means that you will be able to provide your answers directly to the form on your computer. I would like you to save the attachment with your last name (i.e. Smith) and then return your electronic form to me via email.

Selection into this research study will be done based on your availability. At this time we are only inviting 50 participants, if we receive a large number of interested applicants we will determine who participates based on availability and through randomization.

Please complete and return the attached form.

Thank you,
Nadine
Appendix C: Eligibility Form

ELIGIBILITY TO PARTICIPATE
Thank you for your interest in this pioneering research study. Below is a short questionnaire that provides more information on how to qualify for participation.

1. Your child must be available for two days of physical activity at Cardel Place from January 8, 2014 to May 14, 2014. Please check your child’s availability in the box below.

<table>
<thead>
<tr>
<th>My child is available on the following days/times (please check all that apply)</th>
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<tbody>
<tr>
<td>□ Monday – Friday evenings between 4:00-8:00 pm</td>
</tr>
<tr>
<td>□ Tuesday &amp; Thursday 4:30-5:30 pm</td>
</tr>
<tr>
<td>□ Monday &amp; Wednesday 4:30-5:30 pm</td>
</tr>
<tr>
<td>□ Saturday – Sunday mornings only</td>
</tr>
<tr>
<td>□ Saturday – Sunday afternoons only</td>
</tr>
<tr>
<td>Only on the following days and times</td>
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2. Your child must be free of any medical diagnosis that would impede their participation in this physical activity program.

3. Your child will be asked to wear an accelerometer. This is a watch-like device that they will be asked to wear for 10 days on 2 different occasions between January and May, 2014. The information collected from this device informs us of the types of physical activity that your child participates in.

4. Your child will also be asked to participate in a motor proficiency evaluation on 2 different occasions at in January and May, 2014. This test will measure your child’s fundamental movement skills and is as simple as doing a shuttle run for 50 feet, throwing and catching a ball, or balancing on one foot. This test takes approximately 30-40 minutes. If you agree to participate you will be required to select a date for physical testing, prior to enrollment. There will be more information to follow, regarding testing dates, depending on your initial interest of participation.

5. Your child’s attendance is paramount to the success of this research study. If you consent to participation you are asked to ensure that your child is in attendance a minimum of 80% of the classes (at least 29 of 34 classes).

6. At various times throughout your child’s physical activity program at Cardel Place the class will be observed by research assistants. Information will be collected in regard to the types of activities occurring in the class.

I, __________________________, consent to all of the above. __________________________ Date

________________________ Email address

________________________ Phone number

Cardel Place for healthier generations
Hello,

Thank for you expressing interest in participating in the Child & Youth action research study that is taking place at Cardel Place. Based on your availability I am pleased to advise you that your child is being invited to participate in a physical activity program that will run from 4:30-5:30 on Tuesday and Thursday evenings beginning January 14th –May 8th 2014. To provide clarity on the program you are invited to attend one information session that Cardel Place will be hosting in the Pro Shop on the following dates; Thursday November 14 from 5:00-6:00 pm or Saturday November 16 from 9:00 -10:00 am.

To confirm your child’s registration into this research study please create a user account at Cardel Place (www.cardelplace.com) and register your child using the following code R1234. A fee of $100.00 is required.

I look forward to meeting you,

Nadine
Appendix E: Notice of Invitation to Participate in Research Study – Control Group (via email)

Hello,

Thank for you expressing interest in participating in the Child & Youth Action Research study that is taking place at Cardel Place. Based on your availability I am pleased to advise you that you will have the opportunity to self-select a total of 4 physical activity programs for your child to participate in. I would like you to self-select 2 activities for your child to participate in from January through the end of February and then another 2 physical activity programs running from March - April. To provide clarity on the program you are invited to attend one information session at Cardel Place in the Pro Shop on the following dates; Thursday November 14 from 7:00-8:00 pm or Saturday November 16 from 10:00 -11:00 am. In this email you will find two attachments;

1. The program guide with all of the different physical activity programs that you are able to choose from
2. You will find a form to complete that will ask you to identify the physical activity programs that you would like your child to participate in

I will ask you to come to the parent meeting with your choice of physical activity selections for your child.

To confirm your child’s registration into this research study please create a user account at Cardel Place (www.cardelplace.com) and register your child using the following code C1234. A fee of $100.00 is required.

I look forward to meeting you,

Nadine
Appendix F: Email Notice of Over Subscribed Program

Hello,

Thank you for expressing interest in the Child & Youth Action Research Study that will be occurring at Cardel Place in January 2014. Unfortunately your child was not selected to participate in this program at this time. Cardel Place will keep you informed of future opportunities.

Be well,

Nadine
Appendix G: Parent Meeting Email Reminder (Control Group)

Hello,
I would just like to remind you that you have been invited to attend one information session regarding your child’s physical activity program beginning in January 2014. The meeting will be held in the Pro Shop at Cardel Place. The meeting day and times are as follows;

Thursday November 14 from 5:00-6:00 pm
or
Saturday November 16 from 9:00 -10:00 am

Thank you, I look forward to seeing you.
Nadine
Hello,
I would just like to remind you that you have been invited to attend one information session regarding your child’s physical activity program beginning in January 2014. The meeting will be held in the Pro Shop at Cardel Place. The meeting day and times are as follows;

Thursday November 14 from 5:00-6:00 pm
or
Saturday November 16 from 9:00 -10:00 am

Thank you, I look forward to seeing you.
Nadine
Appendix I: Program Brochure
Appendix J: Participant Program Selection Form

**PARTICIPANT PROGRAM SELECTION FORM**

**2014 Winter A session**: Pick two courses for your child that run anytime between **Jan. 4 to Feb. 28**

<table>
<thead>
<tr>
<th>Barcode</th>
<th>Course Name</th>
<th>Day of Week</th>
<th>Time</th>
<th>Dates</th>
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<tr>
<td>Example</td>
<td>22222</td>
<td>Basketball</td>
<td>Fridays</td>
<td>4:30-5:30</td>
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</table>

1

2

**2014 Winter B session**: Pick two courses for your child that run anytime between **Mar. 1 to May 2**

<table>
<thead>
<tr>
<th>Barcode</th>
<th>Course Name</th>
<th>Day of Week</th>
<th>Time</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>33333</td>
<td>Basketball</td>
<td>Fridays</td>
<td>4:30-5:30</td>
</tr>
</tbody>
</table>

1

2

Please complete and hand this form in at the Parent Information meeting.
Appendix K: Consent Form

TITLE: Impact of Evidence-Based Recreation Program Planning on Motor Proficiency with Primary-Aged Children

INVESTIGATOR:

Nadine Van Wyk PhD student
University of Calgary - Faculty of Kinesiology

Larry Katz, PhD, Professor (Supervisor)
University of Calgary - Faculty of Kinesiology

This consent form is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your child’s participation will involve. If you would like more detail about something mentioned here, or information not included here, please ask. Take the time to read this carefully and to understand any accompanying information. You will receive a copy of this form.

BACKGROUND

Physical activity is an important part of staying healthy. We are interested in determining if an innovative program planning model at Cardel Place Recreation Centre will increase children’s motor proficiency and attitudes towards physical activity. We are also interested in engaging parents in discussions of physical activity and nutrition.

WHAT IS THE PURPOSE OF THE STUDY?

You and your child are being invited to participate in a research study that will begin in January and continue until middle of May, 2014, entitled Impact of Evidence-Based Recreation Program Planning on Motor Proficiency with Primary-Aged Children. The purpose of this research study is to compare different types of program delivery. All participants will be equally physically active 2 times/week.
WHAT DO I HAVE TO DO?

At the beginning and end of the research study you will be asked to complete a questionnaire about your child’s participation in physical activity.

You will be asked to participate in 3 parent information sessions between January and May 2014
You may be invited to participate in a focus group to discuss physical activity

WHAT ARE THE RISKS?

There are no known or anticipated risks to you participating in this research. All activities will occur at Cardel Place. You are not being asked to be physically active.

In the event that you suffer injury as a result of participating in this research, no compensation will be provided to you by Cardel Place, the University of Calgary, Alberta Health Services or the Researchers. You still have all your legal rights. Nothing said in this consent form alters your right to seek damages.

ARE THERE ANY BENEFITS?

The benefits of participating in this research study include;

Acquiring new knowledge about physical literacy, fundamental movement skills and nutrition
Contributing to the existing body of knowledge about physical activity in recreation

DO I OR MY CHILD HAVE TO PARTICIPATE?

You and your child’s participation in this research study is completely voluntary. If you or your child would like to withdraw from the research study simply contact Nadine Van Wyk (nvanwyk@mtroyal.ca). Any information that has been collected will not be included in the final results.

WHAT ELSE DOES MY PARTICIPATION INVOLVE?

There are no other commitments.
WILL WE BE PAID FOR PARTICIPATING, OR DO WE HAVE TO PAY FOR ANYTHING?

Cardel Place is providing the facility, equipment and instructors for 50 children to participate in this activity. To secure registration there is a $100 registration fee. The program activity is valued at $400.

Families will be eligible to receive a $100 credit to Cardel Place upon completion of the physical activity program.

WILL MY CHILD’S RECORDS BE KEPT PRIVATE?

All children will receive a randomized number that will be the only connection to the collected information. The name of each child and their corresponding code shall be locked in a separate secure cabinet from the information collected during testing. All field notes, journals or observations shall remain in the co-investigator’s possession or securely locked in a filing cabinet inside the co-investigators office.

Final results will be shared publically during a PhD defense held at the University of Calgary in the Spring of 2015. It is also intended that the results will be presented at a conferences and through written publications.

Your signature on this form indicates that you have understood to your satisfaction the information regarding your child’s participation in the research project and agree to their participation as a subject. In no way does this waive your legal rights nor release the investigators, or involved institutions from their legal and professional responsibilities. You are free to withdraw your child from the study at any time without penalty. If you have further questions concerning matters related to this research, please contact:

Nadine Van Wyk PhD student
nvanwyk@mtroyal.ca

Larry Katz, PhD, Professor (Supervisor)
If you have any questions concerning your rights as a possible participant in this research, please contact The Chair of the Conjoint Health Research Ethics Board, University of Calgary.

Parent/Guardian’s Name

Signature and Date

Investigator/Delegate’s Name

Signature and Date

Witness’ Name

Signature and Date

The investigator or a member of the research team will, as appropriate, explain to your child the research and his or her involvement. They will seek your child’s ongoing cooperation throughout the study. The University of Calgary Conjoint Health Research Ethics Board has approved this research study. A signed copy of this consent form has been given to you to keep for your records and reference.
Appendix L: Control Parent Meeting

Pioneering Action Research in Physical Literacy

Parent Meeting Agenda

• Welcome
• Local solutions - Cardel Place
• Enrolment in the research study
• Expectations of parents and children
• Measurement tools
• Location of Canadian Healthy Living Academy

PhD Student

Nadine Van Wyk
LOCAL SOLUTIONS

Expectations

- Number of children enrolled
- Typical recreation programs and physical activity levels
- Credit to Cardel Place upon completion of activities
- Minimum of 80% attendance

What is involved

- Select 2 courses for each session
- 2 physical testing dates – based on your availability
- Observations
- Focus groups – random selection
- Minimum of 80% attendance
- Credit to Cardel Place
Motor Proficiency Testing

Druminks-Oseretsky Test of Motor Proficiency

NEXT STEPS

Questions
Appendix M: Program Selection Confirmation Email (Control Group)

Hello,

Thank you for attending the parent meeting and selecting the physical activity programs for your child. This is a confirmation of your program selection.

Winter session A selection 1:
- Program name:
- Program start and finish date:
- Program time:
- Program location:

Winter session A selection 2:
- Program name:
- Program start and finish date:
- Program time:
- Program location:

Winter session B selection 1:
- Program name:
- Program start and finish date:
- Program time:
- Program location:

Winter session B selection 2:
- Program name:
- Program start and finish date:
- Program time:
- Program location:

Please let me know if you have any comments or questions. I look forward to the programs beginning.

Sincerely,
Nadine
Appendix N: Physical Literacy Program Parent Meeting

Pioneering Action Research in Physical Literacy

Parent Meeting Agenda

• Welcome
• Local Solutions - Cardel Place
• Enrolment in the research study
• Expectations of parents and children
• Measurement tools
• Location of Canadian Healthy Living Academy

PhD Student

Nadine Van Wyk
LOCAL SOLUTIONS

Enrollment

• Number of children enrolled
• Participation in purposeful and intentional physical activity program
• Alignment to Education and Sport
• Credit to Cardel Place upon completion of activities
• Commitment to research study

Motor Proficiency Testing

Bruminks-Oseretsky Test of Motor Proficiency
Program Participation

- New way of program delivery in recreation
- Alignment with theory and best practice
- Variety of experiences and environments
- Meet on Tuesday & Thursday at the bottom of the ramp
- 8 classes in the gymnasium
- 8 classes gymnastics
- 8 classes swimming
- 8 classes skating (need skates and helmet)

Expectations

- Attend 80% of physical activity programs
- Participate in 2 physical testing dates (at your convenience)
- Join a focus group conversation on recreation programming
Motor Proficiency Testing

Bruininks-Oseretsky Test of Motor Proficiency

Benefits

• Physical activity
• Reports on performance
• Sharing of knowledge
• Acquire new knowledge
## Appendix O: Lesson Plan Example

### Grade 2: Paper Plate Aerobics

**Objective:** Try a variety of moves while keeping the plate under your feet

**Prep**
- 4 cones
- 2 paper plates/student
- Music and player

### Set...It up!

- Create large open playing space (marked by cones)
- Scatter students in open playing area

### Activate!...

Utilize best teaching practice to distribute equipment

1. Give a few minutes for children to explore with paper plates
2. Ask...
   1. Can you pretend to skate on your paper plates (forward and backward)?
   2. Can you pretend you are cross country skiing?
   3. Can move sideways?
   4. Can you move at a low level?
   5. Can you slide with plates on your hands?

### Cues

- Head up
- Look where you are going
- Move safely in open space

### Challenges

- Play game of tag while on plates
- Play some relay races

### Prep

- 4 cones
- 2 paper plates/student
- Music and player

<table>
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<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<td>2</td>
<td>1</td>
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Appendix P: Teaching Strategies

SPARK Teaching Strategies

The following strategies reflect years of extensive research and field testing and have been developed to align with SPARK program objectives. They include:

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Page</th>
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<tbody>
<tr>
<td>Building a Positive Learning Environment</td>
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<tr>
<td>Organization &amp; Management</td>
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<tr>
<td>Maintaining Appropriate Behavior</td>
<td>4</td>
</tr>
<tr>
<td>Giving Instructions</td>
<td>8</td>
</tr>
<tr>
<td>Challenge by Choice</td>
<td>9</td>
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<tr>
<td>Forming Groups</td>
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<tr>
<td>Increasing MVPA</td>
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<td>Team Teaching</td>
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Appendix Q: Parent Take-Away

TOGETHER, RAISING HEALTHIER GENERATIONS
## Appendix R: SOFIT Coding Sheet

### Table: SOFIT Coding Sheet

<table>
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<tr>
<th>INTERVAL</th>
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</table>

### Notes
- **Interval:** 1-240
- **Student Activity:** M (M), F (F), S (S), G (G), O (O)
- **Lesson Context:** P (P), D (D), I (I), M (M), O (O)
- **Teacher Involvement:** T (T)

Date: ____________
Class: ____________
Obs: ____________

SOFIT CODING SHEET

Page: ____________
Appendix S: SOFIT Summary Sheet

SOFIT SUMMARY SHEET

Date________ Location________ Program _____________
Observer________ Rel obs________ No of students________
Lesson length________ min Total number of pages________

Physical Activity Engagement

<table>
<thead>
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<tr>
<td></td>
<td>Male</td>
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<tr>
<td>Lying down</td>
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<tr>
<td>Sitting</td>
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</tr>
<tr>
<td>Standing</td>
<td>p.3</td>
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<tr>
<td>Walking</td>
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Lesson Context

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<td>General Knowledge (K)</td>
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<td>Fitness Activity (F)</td>
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<td>Skill Practice (S)</td>
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<td>Game Play (G)</td>
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<td>Other (O)</td>
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Interactions

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<tr>
<td>Demonstrates Fitness (D)</td>
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<td>General Instruction (I)</td>
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<td>Observes (O)</td>
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<tr>
<td>Other task (T)</td>
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<td></td>
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SPECIAL NOTES:
Appendix T: Scheduling of Motor Proficiency Testing
Appendix U: Child Assent Form

Project Title: Impact of Evidence-Based Recreation Program Planning on Motor Proficiency with Primary-Aged Children

Investigators: Larry Katz and Nadine Van Wyk

We want to tell you about a research study we are doing. A research study is a way to learn more about something. I would like to find out more about physical activity for children. You are being asked to join the study because you are in grade 1 or 2.

If you agree to join this study, you will be asked to answer some questions about physical activity. You will also have the chance to show some of your skills that you have in physical activity like balancing on one foot and doing sit ups. There will also be the chance for you to wear a special watch. Each of these will happen at two separate times. One time will be right after Christmas and the other at the end of the school year.

When doing the activities you might fall and get a bruise or hurt a part of your body but this will be by accident. You won’t be asked to do anything that is dangerous.

The benefit of you helping me with this research study is that I will learn what children do in programs here at Cardel Place and what we can do to make them better.

You do not have to join this study. It is up to you. You can say okay now and change your mind later. All you have to do is tell us you want to stop. No one will be mad at you if you don’t want to be in the study or if you join the study and change your mind later and stop.

Before you say yes or no to being in this study, we will answer any questions you have. If you join the study, you can ask questions at any time. Just tell the researcher that you have a question.

If you have any questions about this study please feel free to contact us, Nadine Van Wyk at 403-440-6502 or Larry Katz 403 220-3418.

Would you like to be in this research study?

_____ Yes, I will be in this research study. _____ No, I don’t want to do this.

Child’s name ___________________________ Signature of the child ___________ Date ___________

Person obtaining assent __________________ Signature __________________ Date ___________

Impact of Evidence-Based Recreation Program Planning on Motor Proficiency with Primary-Aged Children
Principal Investigator: Larry Katz
IRB: 12008-4-4516
November 14, 2013, Version 1, Page 1 of 1
Appendix V: BOT-2 Evaluation Example

June 20, 2014
To: Parents/guardians of ---
Re: Cardel Place Child-Youth Action Research Project Physical Evaluation Results

Thank you for agreeing to have --- participate in the Cardel Place Raise the Bar campaign. This research study conducted by Mount Royal University and the University of Calgary is titled Impact of Evidence-Based Recreation Program Planning on Motor Proficiency with Primary-Aged Children. This study explored the elements of motor proficiency as well as discover parental attitudes towards recreation programming.

Fundamental movement skills are the foundation for all physical activity skills and are important in the development of physical literacy. Physical literacy is about helping children develop competence to perform a range of skills such as throwing, kicking, running and dodging with confidence in a variety of environments. Learning these skills, which are commonly referred to as the ABCs of physical literacy (Agility, Balance, Coordination), will provide children with a foundation that will allow them to lead an active and healthy life.

In order to assess — fundamental movement skills the short form, second edition, of the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) was performed.

**Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) short form**

The BOT-2 short form is an internationally recognized and highly validated, standardized test. Vigorous testing protocols allow us to compare your child’s test results to the performance of other children of the same age. The age-based norms used in the evaluation are from American children. Normative tables do not exist for Canadian children at this time. The following summary describes the performance results of the BOT-2 evaluation. The BOT-2 short form provides a general statement of your child’s overall motor proficiency compared to other children across North America. This is not a detailed report but rather a preliminary overview of motor proficiency.

The attached summary sheet provides you with information about the test your child performed, highlighting the skills tested. For some of the test items, children were given two opportunities to attempt the skill which is identified as trial 1 / trial 2. At the bottom of the summary sheet is an overall motor proficiency statement that is generated by the BOT-2 database. The average column compares your child’s results to the other 38 children involved in this research study. Please note that under the subtest 'Fine Motor Precision', test item 'Drawing lines through path (crooked)', the objective is to achieve zero errors, or a score of 3/7. The average number refers to the average number of errors made by children.
Appendix W: SOFIT Protocols

SOFIT
(System for Observing Fitness Instruction Time)

Description and Procedures Manual
(Generic Version for Paper Entry)

Thomas L. McKenzie, Ph.D.
Professor Emeritus
School of Exercise and Nutritional Sciences
San Diego State University
San Diego, CA 92182

tmckenzie@sdsu.edu
website: Thommckenzie.com

May 1, 2015

INSTRUMENT PURPOSE. To obtain simultaneous objective data on student/athlete activity levels, the lesson/session context in which they occur, and how teachers/instructors/coaches interact regarding promoting physical activity and fitness during physical education, exercise classes, and sport practices.

NOTE: This document is written primarily for studying physical education classes. Researchers interested in applying these procedures in other settings can replace the words “lesson” or “practice” for “lesson,” “lesson context” for lesson context, and “instructor” or “coach” for “teacher.”

ACKNOWLEDGEMENTS. I wish to thank James Sallis (San Diego State University) and Patty Driskill (Tulane University) for their assistance and support with SOFIT since 1989.
Appendix X: SOFIT Tip Sheet

SOFIT CODING TIP SHEET

1. Student engagement — this refers to type of physical activity kids are engaged in
   - (1) Lying down
   - (2) Sitting
   - (3) Standing
   - (4) Waiting
   - (5) Vigorous (this can include activities like wrestling, moving their legs in the air)

2. Lesson context — what is actually happening in the lesson (instruction, knowledge or motor content). When transitioning code this as activity. If activity stopped for more than 10 seconds categorize it as M or K
   - M — management — transistion, breaks and class management — not intended to PE time
   - K — knowledge — physical fitness, general knowledge, rules, strategies
   - F — fitness — time spent developing endurance, strength, flexibility
   - S — Skill practice — focus of skill development
   - G — Game Play — applying skills in a game/competitive setting
   - O — Free play — when physical education is not intended resembles recess

3. Teacher Behavior — describes what the teacher is doing
   - P — promotes fitness — prompts or encourages kids — all about encouragement
   - D — demonstrates fitness — models fitness/engages with children
   - I — INSTRUCTS — lectures, describes, prompts, provides feedback — all about feedback
   - M — manages — sets up equipment, attendance
   - O — observes — monitors entire class, group or individual (teacher must not be doing anything else
   - T — other task — does things that are not related to class i.e. reads newspaper

Recording

✓ Record student engagement AND lesson context based on what is happening or record prompt
✓ Record teacher behavior based on what the teacher was doing during the 10 second interval. The category is in hierarchical order — if the higher category occurs at all throughout the 10 sec interval it should be recorded. The hierarchy is

P
D
I
M
O
T
Appendix Y: Physical Literacy Program Focus Group Invitation

Hello,

I hope you and your child are enjoying your physical activity experiences at Cardel Place. As part of this research study I would like to invite you to participate in a focus group meeting on April 22nd from 7:00-8:00 pm in the ProShop. This is an opportunity to have a conversation on your thoughts on recreation programming.

Only one family member is requested to attend. Light refreshments and child-minding will also be provided. I would like to ask that you confirm your attendance to participate in this meeting by responding to this email.

Thank you,
Nadine
Appendix Z: Traditional Recreation Program Focus Group Invitation

Hello,

I hope you and your child are enjoying your physical activity experiences at Cardel Place. As part of this research study I would like to invite you to participate in a focus group meeting on May 4th from 9:30-10:30 am in the Preschool classroom. This is an opportunity to have a conversation on your thoughts on recreation programming.

Only one family member is requested to attend. Light refreshments and child-minding will also be provided. I would like to ask that you confirm your attendance to participate in this meeting by responding to this email.

Thank you,
Nadine
Appendix AA: Focus Group Questions

Focus Group – 6-8 participants

- Parents will randomly be selected – names will be placed in a hat and the first 8 names drawn will be invited to participate

Intention of Focus Group – The Why

1. To find out if parents attitudes/knowledge of PA has changed over the course of 15 weeks
2. Are parents able to take away information that they can apply to their family lives outside of the recreation program?
3. Were parents able to identify a difference between the different types of programs?

Procedures

1. Good evening and welcome. Thank you for taking the time to participate in this discussion about physical activity and the program your child has participated in. My name is Nadine Van Wyk and I am a PhD student at the University of Calgary. I am meeting with you tonight to discuss your thoughts and beliefs towards physical activity and your child’s recent participation in a recreation program. The information collected is to help improve the way program planning in recreation is delivered.
2. Each of you has been invited because you have had a child participate in the intervention activities. I would like to hear your thoughts on the program and your perceptions of your child’s experience.
3. When answering questions please be aware that there are no right or wrong answers. I expect that each of you will have different points of view. Please feel free to express your point of view even when it differs from others.
4. This session will be recorded because I do not want to miss any of the comments or feedback that you provide. Your comments are confidential. Please keep in mind that I am interested in the positive and negative comments and sometimes it is the negative comments that are most helpful.
5. To help the conversation I have name tags in front of us tonight. They will help me remember names but may also help you. If you want to follow up with something that someone has said, you want to agree or disagree or provide an example you may do so. Feel free to engage in conversation with one another about the questions and do not feel like you need to respond to me all the time. Feel free to have a conversation with one another about the questions that you will be asked. I am here to ask questions, listen and make sure everyone has a chance to share. I am interested from hearing from each of you. So if you’re talking a lot, I may ask you to give others a chance. And if you aren’t saying much, I may call on you. I just want to make sure that I hear from all of you.
6. Feel free to help yourself to some water. Let’s find out some more about each other by going around the room one at a time.

Focus Group Questions (Intentionally designed physical activity program)

1. Can you introduce yourself and describe the types of activities that your child has been registered in prior to this program?
2. How do you typically determine what programs to enrol your child in?