Enhancing Physical Activity Through SEESAW: Exploring Effectiveness and Educators’ Perceptions

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Abstract

Preschoolers are generally assumed to be innately active (Santrock, Mackenzie-Rivers, Malcomson, & Leung, 2011). However, ParticipACTION (2018) found only 62% of preschoolers are engaging in the recommended amount of at least 180 minutes of physical activity each day. Guided by the belief that interpersonal relationships directly influence children’s physical activity (Stokols, 1996), this mixed-methods study examined the effectiveness of SEESAW on preschooler’s physical activity and asked:

i. How does SEESAW impact preschool children’s physical activity behaviours?

ii. What is the nature of educators’ beliefs and practices in relation to children’s physical activity and their role in promoting that activity?

iii. Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

iv. How effective is the SEESAW resource from educators’ perspectives?

Data collection occurred once in Autumn 2018 and again in Winter of 2019 using the OSRAC-P, IPAQ, and semi-structured interviews. Paired-samples t-tests found children’s standing and gross motor behaviours significantly changed after SEESAW was implemented, while educators’ physical activity did not. No significant results were found when variables associated with SEESAW were tested as predictors to children’s activity. Thematic analysis of educator interview scripts found educators’ beliefs and practices increased after SEESAW was implemented.
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CHAPTER ONE: INTRODUCTION TO THE STUDY

Images of young children with endless energy, running freely between peers and adults, laughing as they navigate their way down the slide and across the field, are often what society pictures when asked what physical activity (PA) in early childhood looks like (Centre of Excellence for Early Childhood Development [CEECD], 2011). Until recently, it was generally assumed and taught that young children, and specifically preschoolers, are innately active (Santrock, Mackenzie-Rivers, Malcomson, & Leung, 2011). However, research suggests a lack of parental and educator support has resulted in young children engaging in less activity than previous years (ParticipACTION, 2018; Tremblay et al., 2017). According to ParticipACTION’s (2018) Report Card on Physical Activity for Children and Youth, only 62% of preschoolers are engaging in the recommended amount of 180 minutes of PA each day. The increasing prevalence of inactivity during early childhood is important to address because PA provides short- and long-term benefits to children’s overall development (Archer, 2014; Santrock et al., 2011).

As of 2011, 86% of Canadian parents had their child(ren) enrolled in daily childcare (Sinha, 2014). With the majority of young children spending approximately six hours a day, five days per week in childcare (Statler, 2018), this setting is ideal to support and increase preschoolers’ engagement in PA. Further, it is an ideal setting to investigate the factors that enable or hinder their engagement in PA (Hughes, 2017).

This research study acknowledges that preschoolers’ PA is influenced by individual factors, interpersonal relationships, physical environments, and structural/organisational policies (Stokols, 1996). Guided by the belief and supporting
evidence that children’s relationships with educators directly influence children’s PA (Bower et al., 2008; Connelly, Champagne, & Manningham, 2018; Martyniuk & Tucker, 2014; Wilk et al., 2018), this study considered how the implementation of an educator resource, Supporting, Encouraging, and Engaging Children in Safe and Active Wellbeing (SEESAW), impacted children’s PA levels.

The SEESAW Initiative

Supporting, Encouraging, and Engaging Children in Safe and Active Wellbeing, otherwise known as SEESAW, was developed by the SEESAW Task Group as part of Niagara Children’s Planning Council [NCPC] (2018). Currently, there are 2 phases to SEESAW: Phase One catered toward promoting healthy eating for young children in childcare settings, while Phase Two focused on promoting PA in young children in childcare settings (NCPC, 2018). Each phase provides educators with an initial training workshop of 2 hours. This study focused solely on the components of Phase Two.

In the Phase Two workshop, the SEESAW task group first educated attendees on the importance of PA in early childhood, outlined in the Canadian 24-Hour Movement Guidelines for the Early Years (0-4 Years), and discussed ParticipACTION’s (2018) annual report card findings. The workshop was hosted at various childcare centres and delivered 7 separate times in order to reach all educators throughout the municipality. Each workshop had an attendance of approximately twenty educators, who were from various childcare centres throughout Niagara Region. Within the Phase Two workshop, educators were guided through hands-on PA learning experiences developed by the educators of the centre who hosted the event (NCPC, 2018). The host educators guided
attending educators through experiences such as obstacle courses, and song and dance activities.

Once the learning experiences were complete, the SEESAW task group provided each attendee with resource kits that they were then guided through. The resource kits included:

a) The *Power Off... and Play!* book (Healthy Kids Community Challenge Niagara, 2018);

b) The *Where the Wild Things Are* book (Sendak & Schickele, 1963);

c) A SEESAW resource and idea booklet;

d) Physical activity guidelines for each age group;

e) A physical literacy information sheet;

f) Active for Life (2018) photo cards; and

g) 22 activity cards for educators to utilise for engaging children in physical activities (see Appendix A).

The 22 activity cards include the following physical activities:

- Tape Games;
- Icy Hunt (Other Hunt Ideas);
- Obstacle Courses;
- Maze Ideas;
- A Wild Rumpus Dance Party;
- Tag Ideas;
- Yoga;
- Forts;
- Sand Castles & Tunnels;
- Water Walls;
- Stick Fence;
- Up Balloon (Other Balloon Activities);

- Sticky Note Wall Toss;
- Figure Skating (Other Sports);
- Hopscotch (Other Old School Games);
- Sponge Relay (Other Races);
- Large Block Play;
- Activity Dice;
- Pretend to be...; and
- Elephant Feet (Other Movement Activities).
These activity cards were created by the SEESAW Task Group and informed by 2 early childhood documents: *How Does Learning Happen?: Ontario’s Pedagogy for the Early Years* (HDLH) and *Quality Child Care Niagara* (QCCN) (Ontario Ministry of Education [OME], 2014; QCCN, 2006). The HDLH is a resource guide for individuals working with young children and families, and is, “intended to support pedagogy and curriculum/program development in early years programs” (OME, 2014, p. 5). This guide provides goals for children and expectations of programs that surround 4 foundations of learning: a) belonging; b) well-being; c) engagement; and d) expression (OME, 2014).

Likewise, the QCCN (2006) is a developmental reference guide specific to educators in the childcare sector within the Niagara Region. This guide provides learning outcomes and experiences for children at each stage of their development, categorised under five areas: a) emotional; social, and personal; b) communication and language; c) knowledge and understanding of the world; d) physical development and movement; and e) artistic and creative development.

Each card quotes specific learning outcomes from both the HDLH and QCCN documents that link to the activity on the card. For example, on the *Tape Games* card, the HDLH reference states, “Children have a sense of self and health and well-being when they are physically active and confident in their growing abilities” (see Appendix A). This quote relates to *Tape Games* because the child is developing their sense of self and confidence while being physically active throughout the activity. The purpose of these quotes is to provide educators with a deep understanding of what a child is experiencing during an activity. Further, these quotes provide educators with specific developmental references for their documentation of children’s learning (NCPC, 2018).
Each activity card also explains the type of sensory development children experience during the activity. On the Tape Games card, for instance, sensory development involves, “Touch: The feel of the tape and the floor on feet. Vestibular: The motion of swinging, stretching, jumping” (see Appendix A).

Additionally, each card lists step-by-step instructions for the activity, materials required, invitation/provocations necessary, procedure of activity, and possible extensions. One possible extension listed on the Tape Games card states, “Put a variety of shapes, letters, and/or numbers on the floor. Have children stand on their favourite one then give them instructions to follow that will lead them to their next destination” (See Appendix A for activity card).

**Key Terms**

To provide context for the study and accuracy in subsequent results in Chapter Four, it is necessary to provide definitions for the key terminology that is used throughout this thesis. These key terms include:

i) *Physical activity*;

ii) *Physical activity levels*;

iii) *Physical activity intensity*; and

iv) *Physical activity behaviours*.

The subjective meaning of *physical activity* may differ from individual to individual, but objectively, it is defined as, “any bodily movement produced by skeletal muscles that results in energy expenditure” (Casperson, Powell, & Christenson, 1985, p. 129). This definition is often used interchangeably with *exercise*; however, both terms have different meanings. As defined by Casperson et al. (1985), *exercise* is, “a set of
attributes that people have or achieve that relates to the ability to perform physical activity” (p. 129). For the purpose of this study, only physical activity (PA) will be discussed.

According to the World Health Organization (WHO, 2016), physical activity levels consider the duration of PA an individual acquires. Levels of activity refer to the adherence to The Canadian 24-Hour Movement Guidelines for the Early Years (0-4 Years) (Tremblay et al., 2017). For instance, low levels of PA mean a child is insufficiently active because they are not meeting the recommended 180 minutes of PA; moderate levels mean a child is sufficiently active and is meeting the 180 minutes of PA; and high levels mean a child is very active and is engaging in more than 180 minutes of PA (Tremblay et al., 2017).

Physical activity intensity refers to the rate and magnitude of effort required to perform an activity (WHO, 2016). Levels of intensities for children are categorised as sedentary, light, and moderate-to-vigorous (ParticipACTION, 2018). The sedentary intensity refers to sitting behaviours, and activities such as sitting for prolonged periods with little to no movement (ParticipACTION, 2018). Light intensity is described as activities that require some effort, such as standing and moving limbs (WHO, 2016). Finally, moderate-to-vigorous intensity refers to big movement activities that require much effort such as running and jumping (WHO, 2016).

Lastly, physical activity behaviours are the specific activities associated with movement (WHO, 2016). These behaviours include, but are not limited to, running, climbing, crawling, or sitting (Buchan, Ollis, Thomas, & Baker, 2012).
Background of the Problem

Early childhood is a significant period for children to develop their fine and gross motor abilities; this is particularly true for preschool children (Santrock et al., 2011). Health professionals and researchers alike state that this development occurs through regular PA resulting in various health benefits (Alpert, Field, Goldstein, & Perry, 1990; Kannel & Sorlie, 1979; Tremblay et al., 2017). In recognition of the health benefits associated with regular engagement in PA, The Canadian Physical Activity Guidelines for the Early Years (0-4 Years) were developed to promote PA engagement among children aged 0 to 4 years-old. Since most preschoolers are enrolled in childcare (86%), early childhood educators (ECEs) play a major role in children’s everyday interactions, and therefore become responsible for supporting and encouraging children’s engagement in PA.

Unfortunately, recent studies have found that preschoolers are consistently inactive in centre-based childcare (Barbosa & Oliveira, 2016; Chaput et al., 2017; Pate et al., 2014; Soini et al., 2014; Tremblay et al., 2017). Variances exist in children’s levels of activity within each study; however, data from the Canadian Health Measures Survey (CHMS) found that only 62% of preschoolers are meeting movement guidelines (ParticipACTION, 2018).

Moreover, educators’ perceptions, their practices, knowledge, and training surrounding PA play a key role in how much they support and initiate physical activities in early childhood educational contexts (Bower et al., 2008; Bruijns, 2018; Finn & Specker, 2000; Gehris, Gooze, & Whitaker, 2015; Vanderloo et al., 2014). Further, educators have argued that a lack of available resources and an absence of continuous
professional learning – and, consequently, their inabilities to promote PA – contribute to the inactivity in preschoolers (Gehris et al., 2015; Tucker, van Zandvoort, Burke, & Irwin, 2011).

**Statement of the Problem Situation**

Researchers have uncovered specific gaps in early childhood scholarship which informed the current study; specifically, a combination of both objective and subjective measurements of preschoolers’ PA have been deemed necessary to accurately assess activity levels. Tucker’s (2008) systematic review of the measurement of preschool-aged children’s PA, for instance, revealed that future research should measure PA using objective tools such as accelerometers. Meanwhile, Statler (2018) found that measurement of PA using accelerometers resulted in limitations such as inaccurate data of participants. Another limitation of accelerometers, as stated by Trost, Sirard, Dowda, Pfeiffer, and Pate (2003), regards the inability to obtain contextual information while children are engaging in PA.

In acknowledgement of such limitations, it is important to consider McIver, Brown, Pfeiffer, Dowda, and Pate’s (2016) study, which employed an objective measurement tool, Observational System for Recording Physical Activity in Children-Preschool Version (OSRAC-P). The OSRAC-P measured preschoolers’ PA levels in 3 separate childcare centres. McIver et al. (2016) found minimal variability in recorded observations. Similarly, Trost et al.’s (2003) study measured preschoolers’ PA using both the OSRAC-P and accelerometers. One strength of Trost et al.’s (2003) study concerned the use of the OSRAC-P because it gathered contextual information. Trost et al. (2003) and McIver et al. (2016) both suggest that it is important to gather this information so
researchers can assess and understand the mediators to children’s PA behaviours, intensities, and levels.

Gaps also exist concerning the impact educators’ knowledge, training, and skills of PA have on children’s PA (Gehris et al., 2015). Much of the literature consists of qualitative research investigating educators’ perceptions of their impact on children’s PA (Bower et al., 2008; Bruijns, 2018; Finn & Specker, 2000; Gehris et al., 2015; Vanderloo et al., 2014). While qualitative research helps build a robust understanding of specific experiences and phenomena (Leavy, 2017; Merriam, 2009), educators’ impact on children’s PA must also be measured objectively to provide empirical evidence on the issue. To date, only 3 studies objectively measure the relationship between educator facilitation and children’s PA, and these found positive relationships between the variables (Gubbels, 2014; Hughes, 2017; Larson, Normand, Morley, & Miller, 2013).

The current study aims to fill the gap of objective measurement of educator facilitation and children’s PA by utilising one direct observation tool, OSRAC-P, to measure such variables. The use of direct observation in this study would respond to the need expressed by specialists in the field (Gubbels, 2014; Hughes, 2017; McIver et al., 2016). While educator’s skills and knowledge of PA were measured subjectively through one-on-one interviews, this contributes to existing literature and deepens a global understanding of what is needed to enhance their skills and knowledge of PA.

**Purpose of the Study**

The purpose of this study was to explore the effectiveness of a local municipally endorsed initiative, entitled SEESAW, to promote PA levels and behaviours in childcare
centres. This study aims to provide a potential solution for increasing preschooler’s PA, and improve the perceived lack of resources available to educators.

A convergent triangulation design was used, and involved collecting qualitative data separately than quantitative data, then merged in the discussion (Creswell & Plano Clark, 2007). The qualitative phase involved one-on-one semi-structured interviews with Registered Early Childhood Educators (RECEs) in a private space within their workplace. The interviews investigated educators’ beliefs and practices surrounding PA, as well as their perceptions and experiences with the use of SEESAW. The quantitative phase collected educators’ PA data using the validated self-report questionnaire, IPAQ long form, as well as a modified version of the OSRAC-P to measure children’s PA. The qualitative phase compared educators’ self-reported beliefs and practices from the interview phase with both their own and the children’s PA levels and behaviours. In this convergent triangulation mixed-methods design, the central purpose was to evaluate the effectiveness of the municipal initiative (SEESAW) on children’s PA levels and behaviours in preschool children.

The current literature suggests that, generally, Canadian childcare settings hinder children’s engagement in PA due to many factors including educators’ knowledge of PA, lack of resources available, and the physical environment (McKay & Nigro, 2016; Ward, Bélanger, Donovan, & Carrier, 2015; Wilk et al., 2018). Understanding how SEESAW contributes to and supports increasing preschooler’s activity levels provides possible implications for reform of PA engagement in childcare settings.

**Research Questions**

The following 4 research questions framed the mixed-methods study:
i) How does SEESAW impact preschool children’s physical activity behaviours?

ii) What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?

iii) Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

iv) How effective is the SEESAW resource from educators’ perspectives?

**Rationale**

Preschool children’s levels of PA vary across studies, but the most recent data from the Canadian Health Measures Survey (CHMS) found not all children at this age are engaging in at least 180 minutes of PA (ParticipACTION, 2018). The varied amount of engagement in PA is concerning and calls for a nationwide objective measurement of preschooler’s PA. Since the majority of preschoolers attend childcare, Goldfield, Harvey, Grattan, and Adamo (2012) suggest that is an ideal setting to intervene and improve preschoolers’ PA.

Currently, various health promotion strategies exist to increase preschoolers’ PA, which mostly include interventions and targeted programs (Goldfield et al., 2012). However, to date, an educator’s resource such as SEESAW has not been examined as a health promotion strategy in the Niagara Region. As such, this research makes a unique contribution to the existing field of research surrounding health promotion strategies. The effectiveness of SEESAW was being investigated to provide a deeper understanding of the role that educators’ resources play in increasing children’s PA.
This study is important for various reasons. Firstly, findings from this study contribute to the research gap surrounding educator resources and their impact on preschoolers’ PA. Moreover, a deeper understanding of educators’ perceptions regarding facilitating children’s PA in childcare settings can help identify what is needed at their level to engage children in PA. Educators in previous studies have emphasised the need for additional resources in order to promote and support PA in their classrooms (Bruijns, 2018; Gehris et al., 2015; Goldfield et al., 2012; Martyniuk & Tucker, 2014; Tsangaridou, 2017). Lastly, this study is particularly significant for preschoolers in increasing their PA for optimal holistic development. Investigating the effectiveness of SEESAW allows educators to make conclusions about its usefulness in promoting PA, which has important implications for future practice and studies.

**Scope and Delimitations of the Study**

The scope of this study was limited to examining one PA initiative, SEESAW, regarding the ways in which the resource effected preschool children’s PA levels and behaviours. Several assumptions were made, the first being that ECEs would utilise SEESAW in their classrooms to engage children in physical activities. Second, this study assumed there would be an increase in children’s overall PA between Autumn and Winter due to educators’ use of SEESAW between these time points. The third assumption was that preschooler’s activity level variables were directly associated with the following variables that encompass the three main elements of SEESAW: i) play context; ii) group composition; and iii) prompts.

This study had few delimitations. Direct observation was utilised to measure children’s PA behaviours; thus, results might not provide an accurate representation of
children’s PA (McIver et al., 2016; Trost et al., 2003). Since SEESAW was not a measurable variable in the study, direct observation was the chosen method in order to collect contextual information that coincided with components of SEESAW (NCPC, 2018). Another delimitation involved the analysis of educators’ and children’s PA. Educators’ PA levels were not analysed as predictor variables of children’s PA, thus limiting possible conclusions surrounding the impact of educators’ PA on children’s PA.

Outline of Remainder of the Document

Chapter Two reviews and critiques the literature surrounding physical activity in preschool-aged children to support the investigation of preschoolers’ PA in centre-based childcare centres.

Chapter Three outlines and justifies the methodological choice for investigating educators’ perceptions about SEESAW, and SEESAW’s effectiveness on children’s PA. This chapter also discusses the recruitment procedures and the selection of participants, data collection phases, data processing and cleaning, qualitative and quantitative analyses, and methodological assumptions and limitations for this study in this chapter.

Chapter Four presents the qualitative and quantitative results using a convergent triangulation design (Creswell & Plano Clark, 2007). Qualitative results of educators’ interviews are discussed first, comparing thematic analysis findings between October 2018 and February 2019 interviews. Afterward, quantitative results of educators’ PA levels and child observations are presented. Finally, these results are integrated (Leavy, 2017), and comparisons are made between the 2 data sets in a discussion (Creswell & Plano Clark, 2007).
Lastly, Chapter Five highlights significant findings that answer the study’s research questions. Here, implications for practice and future research are discussed, and the study’s limitations are outlined.
CHAPTER TWO: LITERATURE REVIEW

From a social-ecological model, this chapter summarises literature regarding the scope of the issue of physical inactivity of preschool-aged children in centre-based childcare centres, and the impact of physical activity (PA) on psychological, social, neurological, and physiological development. Further, the chapter discusses the Canadian PA guidelines for the early years, and the current realities of children meeting these guidelines. Influences of children’s PA will be discussed, and are categorised according to individual/intrapersonal, interpersonal, physical environment, and structural/organisational levels. There, this paper elaborates on the impact children, educators, the childcare environment, and childcare policies have on preschoolers’ PA. Lastly, previous research findings surrounding approaches to promoting PA behaviours in childcare centres will be discussed.

Conceptual Framework

Research surrounding the promotion of PA is often centered on the social-ecological model of human development (Bjørgen, 2016; Cochrane & Davey, 2008; Golden & Earp, 2012; Gubbels, 2014). This model is based on principles related to Bronfenbrenner’s (1977) ecological systems theory. These principles consider that environmental and personal factors contribute to health behaviours: each environment and individual is multidimensional and complex, and multiple levels of influence affect human development (Linke, Robinson, & Pekmezi, 2014). Level names may vary depending upon the theorist being studied; however, for the purpose of this study, these levels will include:

i) The intrapersonal/individual level;
ii) The interpersonal level;

iii) The physical environment; and

iv) The structural/environmental level (Bethancourt, Rosenberg, Beatty, & Arterburn, 2014).

The intrapersonal/individual level considers characteristics an individual possesses such as their knowledge, attitudes, behavior, self-concept, and skills (Bethancourt et al., 2014). At this level, Bethancourt et al. (2014) studied adult’s perceptions of barriers and facilitators to PA and found that adult’s knowledge and skills of PA, their attitude toward activity, and their self-concept and self-esteem of their ability to engage in PA directly affected their PA levels. Bethancourt et al. (2014) propose that increased cognisance about age-related abilities negatively affects individuals’ self-concepts and self-esteem toward engaging in physical activities. This finding can be translated to children, especially because they develop their self-concept and self-esteem when they are aware that they perform competently in an area they enjoy, such as soccer (Santrock et al., 2011). Thus, when children are cognisant of their inabilities, their self-concept and self-esteem is negatively impacted (Santrock et al., 2011).

The interpersonal level includes an individual’s formal and informal social network and support systems, such as family and educators (Bethancourt et al., 2014; Stokols, 1996). At this level, children’s engagement in PA is impacted by their relationships with peers, family dynamics, and educators’ practices in the classroom (Santrock et al., 2011; Stokols, 1996). A review of social-ecological interventions in childcare by Mehtälä, Sääkslahti, Inkinen, and Poskiparta (2014) found that the interpersonal level consisted also of educator and parental involvement in children’s PA.
Further, Mehtälä et al. (2014) found that children were more active when joined by educators and guided by adults.

The physical environment includes specific characteristics in the environment such as the availability of equipment or proximity to parks (Bethancourt et al., 2014; Linke et al., 2014). At this level, Mehtälä et al. (2014) found that more space per child, as well as increased access to appropriate playground equipment, increased children’s PA levels. Weather has also been found one of the most influential characteristics in the physical environment that affects children’s PA (Linke et al., 2014; Mehtälä et al., 2014).

Finally, the structural/organisational level of the conceptual model focuses on a combination of community and policy levels (Bethancourt et al., 2014; Golden & Earp, 2012). This level considers educators’ pre-service education, the modification of policies both inside and outside of the childcare environment, and the structure of organisation (Bethancourt et al., 2014; Golden & Earp, 2012). At this level, structured PA throughout the day and targeted interventions have been found to increase children’s PA levels (Mehtälä et al., 2014).

Specifically, the current study examines the influence that preschoolers’ interpersonal environment has on their PA behaviours. Further, this study focuses on educators’ individual/intrapersonal, interpersonal, and structural/organisational environments to determine the relationship between those environments and their beliefs, practices, and PA behaviours. The influences of such levels will be further discussed below.
Impact of Physical Activity on Children’s Development

Early childhood is a significant time for children to develop their fine and gross motor abilities, particularly for preschoolers (Santrock et al., 2011). Health professionals state this is one of the facets of development which occurs through regular PA, and results in many psychological, cognitive, social, and physiological benefits (Canadian Psychological Association [CPA], 2016).

Psychologically, engagement in PA increases children’s confidence, self-esteem, self-concept, and self-efficacy (Archer, 2014; Santrock et al., 2011). Ultimately, children are able to develop these characteristics when they are engaged in different PA contexts such as a sports team or during recess (CPA, 2016; Santrock et al., 2011). A systematic review by Liu, Wu, and Ming (2015) found that regular engagement in PA promoted children and adolescents’ self-worth and self-concept. Further, Smedegaard, Brondeel, Christiansen, and Skovgaard (2017) found that regular PA promotes overall well-being and positive mental health outcomes in young children. Confidence, self-esteem, self-concept, and self-efficacy are important for young children to develop because it decreases the risk of both short- and long-term mental health problems such as depressive symptoms and feelings of anxiety (Smedegaard et al., 2017).

Concerning social gain, engagement in PA increases the likelihood of face-to-face interactions, given the context where PA most often takes place (e.g., playground, parks). Once these interactions occur, PA can promote camaraderie, foster friendships, and assist in the development of teamwork (Alberga, Russell-Mayhew, von Ranson, & McLaren, 2016).
Calero Morales et al. (2016) implemented various recreational physical activities among preschool-aged children for 12 months to improve their social conduct. Pre-test results indicated that 23 children experienced isolation, whereas post-test results indicated that only 9 experienced isolation (Calero Morales et al., 2016). These results suggest that group physical activities – such as Guess the Colour – can improve social cohesion among preschoolers (Calero Morales et al., 2016).

Cognitively, engagement in PA contributes to increased attention, motivation, and hand-eye coordination, spatial awareness, and flexibility in switching between choices (Archer, 2014; CPA, 2016; Santrock et al., 2011). Attention, motivation, problem solving, and decision-making are all aspects of executive functioning, which ParticipACTION (2018) notes receive the greatest benefits when children are physically active. Executive functions ultimately impact children’s motor skills, their ability to self-regulate their behaviour, and their task performance both in and out of school (ParticipACTION, 2018). Sibley and Etnier (2003) conducted a systematic review to investigate the relationship between PA and cognition in young children. Findings from this review suggest that when children are physically active in experimental studies, PA caused improvements in their cognitive performance such as memory, attention, and reasoning (Sibley & Etnier, 2003).

Lastly, PA engagement in young children has important physiological benefits. Although PA is recognised for the health benefits – particularly, for reducing the risk of obesity – in this chapter, there is a greater focus on overall physiological health, given Alberga et al.’s (2016) argument that obesity discourse results in, “Body weight preoccupation, body dissatisfaction, and weight bias” (p. 151).
ParticipACTION (2018) states that PA in early childhood supports neurological benefits including an increased production in dopamine and serotonin, the two neurotransmitters that promote feelings of happiness. This ultimately reduces depressive symptoms, feelings of anxiety, and improves a child’s response to stress (ParticipACTION, 2018).

Physical activity has also been found to promote motor-skill acquisition, and overall metabolic and bone health (ParticipACTION, 2018). In a study conducted by Specker and Binkley (2003), they explored the impact of gross motor activity on bone proprieties in four-year-old children. Upon completion of the experiment, leg bone mineral content was more pronounced in children who participated in the gross motor activities than those who did not (Specker & Binkley, 2003). Further, PA engagement that develops children’s fundamental movement skills contributes to subsequent sport-specific skills, should they express an interest in playing sports (Lubans, Morgan, Cliff, Barnett, & Okely, 2010).

Johnson (2009) stated that the benefits for children with developmental disabilities are much different than those with typical development, including those with autism spectrum disorder (ASD), down syndrome, or cerebral palsy. Johnson’s (2009) systematic review explored the benefits of PA at any level for children with developmental disabilities and found that overall, these children experience increased enjoyment, and improvement in functional skills and muscle strength. ParticipACTION (2018) states that PA for children with disabilities overall improves their, “daily functions, health-related outcomes, and quality of life” (p. 15).
Conclusively, the benefits of PA on children’s development are evident. Regular engagement in PA can improve mood, attention, self-esteem, motor competency, and camaraderie, among many other developmental benefits. Notably, PA can decrease the risk for heart disease, depressive symptoms, and feelings of anxiety – which can all lead to complications, such as mental illness, if left untreated. It is important to also understand that these benefits can be achieved when children meet the recommended movement guidelines (Alberga et al., 2016; Archer, 2014; Lubans et al., 2010; ParticipACTION, 2018).

**Canadian Physical Activity Guidelines for the Early Years**

The goal of PA guidelines is to promote healthy active living behaviours and reduce engagement in sedentary behaviours at different stages through the human life cycle (Tremblay, Shephard, & Brawley, 2007). The first PA guidelines were released in 1998 by The Canadian Society for Exercise Physiology (CSEP), Health Canada, and a National Advisory Committee (Tremblay et al., 2007). Since then, PA guidelines have been developed to provide recommendations on PA, sedentary behaviour, and sleep. As of 2018, there are guidelines specific to different age groups and special populations including infants and toddlers, children and youth, adults, older adults, individuals who are pregnant, and individuals with multiple sclerosis (Tremblay et al., 2017).

For the purpose of this study, this section will elaborate on the Canadian Physical Activity Guidelines for the Early Years (0-4 Years), and specifically preschoolers (Tremblay et al., 2017). These guidelines were developed in 2012 to determine the frequency, intensity, time, and type of PA that is associated with health indicators in children aged 0 to 4 years-old (Tremblay et al., 2017). Each recommendation is classified
according to age group, where *infants* are less than 1-year-old, *toddlers* are between 1 and 2 years-old, and *preschoolers* are between 3 and 4 years-old. These guidelines provide specific recommendations for sedentary time, PA, and sleep. It is important to note that these recommendations may be appropriate for any child with a disability or medical condition, but caregivers are cautioned to consult a health professional for children with particular needs rather than relying solely on the guidelines (Tremblay et al., 2017).

The guidelines state that preschoolers should be engaging in at least 3 hours, or 180 minutes, of any level of PA each day (Tremblay et al., 2017). It is further recommended that at least 60 minutes of those three hours is spent at a moderate-to-vigorous intensity (Tremblay et al., 2017). Regarding sedentary behaviours, such as sitting for extended periods, the guidelines caution that preschoolers should not be sedentary for more than 1 hour each day (Tremblay et al., 2017). The guidelines state that sedentary screen time should not be more than one hour each day, and that less is better. Regarding sleep, preschoolers should have 10 to 13 hours of good-quality sleep each night (Tremblay et al., 2017).

**Physical Activity Levels of Preschoolers**

According to the *Canadian 24-Hour Movement Guidelines for the Early Years (0–4 Years)*, preschool-aged children should be engaging in at least 180 minutes of PA each day (Tremblay et al., 2017). Unfortunately, many studies have concluded that preschoolers are not meeting these guidelines, and instead, are reporting long periods of inactivity among young children (Barbosa & Oliveira, 2016; Chaput et al., 2017; Garriguet et al., 2016; Soini et al., 2014; Tremblay et al., 2017).
A systematic review by Tucker (2008) examined the PA levels of preschoolers in accordance with PA guidelines. Tucker (2008) found that only 54% of preschoolers were adequately active. Contrastingly, Obeid, Nguyen, Gabel, and Timmons’ (2011) study measuring 30 preschoolers’ PA engagement using accelerometers found these children met the PA guidelines and engaged in an average of 220 minutes of PA each day. Similar to Obeid et al. (2011), Garriguet et al.’s (2016) study examining children’s adherence to PA and sedentary guidelines found that 75% of preschoolers engaged in at least 180 minutes of PA. However, more recently, Chaput et al.’s (2017) study investigating the proportion of preschoolers meeting PA guidelines revealed that only 12% of these children were active for at least 180 minutes each day.

Discrepancies in findings from Tucker (2008), Obeid et al. (2011), Garriguet et al. (2016), and Chaput et al.’s (2017) studies must be considered when examining children’s PA levels and adherence to PA guidelines. Tucker’s (2008) systematic review includes studies where activity was measured using various assessment tools such as accelerometers and self-report measures. Tucker (2008) notes that both instruments have limitations that can affect the accuracy of the results. Obeid et al.’s (2011) findings are likely impacted by the study’s small sample size ($N = 30$), which does not represent a general population of preschoolers. One notable limitation in Garriguet et al.’s (2016) study regards the inconsistency in accelerometer measurements and devices, while the main limitation in Chaput et al.’s (2017) study is the cross-sectional design. Fortunately, Vanderloo, Di Cristofaro, Proudfoot, Tucker, and Timmons (2016) offer a solution to accelerometer measurement limitations. Vanderloo et al. (2016) suggest that discrepancies in cut-points and sampling intervals between ActiGraph and Actical
accelerometers can be addressed by researchers accounting for their differences when utilised.

These findings and limitations are important to consider for future studies investigating preschoolers’ overall adherence to the *Canadian 24-Hour Movement Guidelines for the Early Years (0–4 Years)*. There is a lack of clarity in preschooler’s PA levels resultant from the inconsistencies and limitations inherent with any design. Further research should measure children’s PA using Vanderloo et al.’s (2016) approaches to accelerometers or using an accepted unified tool.

**Physical Activity in Centre-Based Childcare Environments**

Generally, young children are naturally active when in conducive environments which support and promote movement and play (Alberga et al., 2016; Lu & Montague, 2016). According to the Child Care and Early Years Act (CCEYA, 2014), childcare settings need to, “promote the health, safety, and well-being of children, [and] provide high quality experiences and positive outcomes for children with a provincial framework to guide pedagogy” (49b-c). The provincial pedagogy for the early years, *How Does Learning Happen?* (OME, 2014), further states that childcare environments and educators must provide children with opportunities to engage in vigorous physical play, sometimes in natural environments. Since the majority of young children spend more time in childcare than at home (Ellis et al., 2017), it is more likely they will need to meet the PA guidelines in the centre they are attending. Thus, it is equally as important that childcare centres adhere to the CCEYA (2014) and provide optimal environments and opportunities for children to meet these guidelines.
Literature has long investigated the impact of specific childcare environments on PA in young children (Bower et al., 2008; Kuzik, Clark, Ogden, Harber, & Carson, 2015; Pate et al., 2014; Statler, 2018). For the purpose of this study, the researcher will discuss PA in centre-based childcare, which has been argued as a type of environment that elicits sedentary behaviours (Bower et al., 2008; Kuzik et al., 2015). It is important, then, to examine the contextual factors that may contribute to these sedentary behaviours.

A study conducted by Statler (2018) utilised Canadian Health Measures Survey (CHMS) data to determine the relationship between childcare types and preschool children’s PA levels. The types of childcare environments that were examined included centre-based, home-based, home with parent, and Kindergarten (Statler, 2018). Preschoolers’ PA was measured using accelerometers, while childcare type was reported by parents. Statler (2018) found no significant difference between each environment and PA levels; however, most sedentary time was found in centre-based childcare. Similarly, Kuzik et al. (2015) investigated preschoolers’ and toddlers’ PA levels in centre-based childcare using accelerometers, and found that approximately 60% of their time was spent engaging in sedentary behaviour, and the majority of their engagement in PA was light PA. More recently, however, O’Brien, Vanderloo, Bruijns, Truelove, and Tucker (2018) conducted a systematic review of objectively measured PA in preschoolers and found inconsistent findings across studies. The variance between findings ultimately hindered the ability to make any conclusions about children’s actual PA. It was suggested from each study that additional research is needed to objectively measure children’s PA in centre-based childcare settings (Kuzik et al., 2015; O’Brien et al., 2018; Statler, 2018).
Preschool children’s PA and sedentary levels have been found to be directly associated with environmental factors within childcare settings (Bjørgen 2016; Gubbels, Van Kann, & Jansen, 2012; Harwood, Reichheld, McElhone, & McKinlay, 2017; Pate et al., 2014). Using objective measurement, Pate et al. (2014) compared children’s PA levels between Montessori and traditional classrooms. A Montessori program fosters children’s autonomy by encouraging them to navigate their environment independently (Pate et al., 2014). Children attending the Montessori preschools accumulated more moderate-to-vigorous PA (MVPA) than children attending the public preschools (Pate et al., 2014). An even more interesting finding discovered that children’s in-school PA levels were higher in private Montessori classrooms than in public Montessori classrooms. Pate et al. (2014) suggest that the Montessori program – and, specifically, private Montessori classrooms – encourage children to direct their own PA behaviours, resulting in increased engagement in PA. This is a particularly interesting finding because previous literature suggests that adult-directed activities are related to higher levels of PA in preschoolers (Stanley et al., 2016; Wilk et al., 2018). Bower et al.’s (2008) study observing children’s PA, for instance, found that play-based activities led by trained, knowledgeable educators could promote increased engagement in PA.

Outdoor play in childcare settings as a catalyst for increased PA engagement amongst preschoolers is also recognised in several studies (Bjørgen, 2016; Bower et al., 2008; Harwood et al., 2017). The OSRAC-P tool was utilised in Bjørgen’s (2016) study to compare children’s PA in Norwegian outdoor Kindergarten play spaces (playgrounds) and natural environments (forests). Children’s PA was measured 10 times in each environment for 20 days, in all seasons (Winter, late Winter/Spring, Summer, and Fall).
Bjørgen (2016) found that children, on average, obtained more than an hour of MVPA each day when in the natural environment, while the Kindergarten outdoor playground afforded an average of low to medium PA. Bjørgen (2016) suggests that elements in the natural environment including snow, ice, and water, “invited increased involvement, movement, social interaction, and shared experiences” (p. 6). Similarly, in Canada, Harwood et al. (2017) compared children’s PA in forest school and non-forest school environments, using both accelerometry and observational methods. Children’s PA was measured in both environments in each season (Fall, Winter, Spring), and Harwood et al. (2017) found children to be far more active in the forest environment. Specifically, children’s sedentary levels in the non-forest school environment during Spring and Fall were at least 5 times higher more than in the forest school environment (Harwood et al., 2017). Further, children’s sedentary levels in the non-forest school environment during Winter were at least twice more than those in the forest school environment (Harwood et al., 2017). Although limited by the small number of participants (N = 8) and the inability to generalise the results, the findings hint at the importance of examining specific contextual features of outdoor environments using multiple measures over long periods of time. A greater understanding of children’s PA levels in outdoor and natural environments can provide implications for promoting PA in childcare settings (Harwood et al., 2017).

A systematic review conducted by Truelove et al. (2018) investigated children’s PA during outdoor play times in centre-based childcare. The review included 18 studies that were conducted in the United States, 2 in Australia, Canada, and Finland, and 1 in Belgium, Sweden, and the Netherlands (Truelove et al., 2018). Measurements of PA in
the studies varied, where 11 utilised accelerometry, 13 used direct observation, and 2 used a combination of both accelerometry and direct observation (Truelove et al., 2018). The studies which used accelerometers measured children’s PA using either ActiGraph ($n = 9$), or Actical ($n = 4$), resulting in varied total physical activity (TPA) and MVPA results (Truelove et al., 2018). Actical results discovered children’s time in TPA (53.99%) was higher than ActiGraph results of children’s time in TPA (31.65%). These results contradict Vanderloo et al.’s (2016) findings where ActiGraph accelerometers resulted in higher TPA than Actical accelerometers. Truelove et al. (2018) suggest that cut-points for each study fluctuated, possibly resulting in the varied results between the two accelerometers. Regarding MVPA, when measured by accelerometry, it ranged from 6.7% to 43%, and MVPA measured by observation ranged from 2% to 53.9% (Truelove et al., 2018). This variance generates concern regarding the accuracy in measurement of children’s PA, which must be taken into consideration for future studies. Despite the varying results of children’s PA levels in indoor and outdoor environments within centre-based childcares, the promotion of PA remains a distinct factor of engagement (Lu & Montague, 2016).

Gubbels et al. (2012) investigated the relationship between children’s PA and PA facilities in 9 centre-based childcares. Gubbels et al. (2012) utilised the OSRAC-P to measure children’s PA behaviours, and the Environment and Policy Assessment and Observation Instrument (EPAO) to compare facilities in indoor and outdoor spaces. In all centre indoor spaces, balls and floor play equipment were available, and in most indoor spaces, portable and fixed climbing structures were available (Gubbels et al., 2012). In all centre outdoor spaces, balls, push/pull toys, riding toys, sand/water toys, and balancing
surfaces were available, and in most outdoor spaces, fixed PA structures were available (Gubbels et al., 2012).

Indoors, Gubbels et al. (2012) found children were significantly more active when jumping, push/pull, slides, or balancing surfaces were available, and significantly less active if sand/water toys were available. Further, more space in indoor spaces was positively associated with higher PA levels, except when riding toys were available (Gubbels et al., 2012). Regarding riding toys, Gubbels et al. (2012) proposes that childcare policies restrict children from engaging in high level PA while on these toys. These results suggest that adequate gross motor equipment can increase children’s PA, if childcare centre policies allow it (Gubbels et al., 2012)

Outdoors, Gubbels et al. (2012) found children were significantly more active when the following were available: a track, climbing structures, slides, tunnels, sandbox, and floor and jumping equipment. Adversely, slides, sandboxes, and swing structures caused lower levels of PA (Gubbels et al., 2012). Understandably, this equipment caused lower levels of PA because they promote sitting behaviours (Gubbels et al., 2012). These results suggest that possible educator facilitation is required when children are playing on such equipment (Gubbels et al., 2012).

**Influences on Children’s Physical Activity**

Researchers have found that preschoolers’ PA is influenced by various levels of the social-ecological model including intrapersonal/individual development, interpersonal relationships, physical environment, and structural/organisational (McKay & Nigro, 2016; Stokols, 1996; Ward et al., 2015; Wilk et al., 2018), each of which will be described below.
Intrapersonal/Individual Development

At this level, Timmons, Naylor, and Pfeiffer (2007) state that preschoolers’ body composition is directly related to their engagement in PA. Further, Wilk et al. (2018) investigated the various influences on Grade Five children’s PA. Despite the age group of this study, findings can still be applied to preschool children’s PA behaviours (Wilk et al., 2018). Using data from the community-based PA intervention, *Grade 5 ACT-i-Pass* (G5AP), Wilk et al. (2018) found that a child’s sex contributes to the amount of PA a child engages in, where boys were more active than girls (Tucker, 2008).

Age, immigration status, and ethnic identity were not significantly associated with children’s PA levels (Wilk et al., 2018). While Wilk et al.’s (2018) analysis of G5AP data found that ethnic identity was not found related to children’s PA, Pate et al. (2014) found that Black children were more physically active than Caucasian children, and McKenzie et al. (1991) found that Hispanic children were less active than Caucasian children.

Interpersonal Relationships

This level considers the influence that educators’, peers’, and parents’ skills, behaviours, and beliefs have on preschoolers’ PA (Stokols, 1996; Wilk et al., 2018). Wilk et al. (2018) found that parental and peer supports were positively related to the individual child’s PA. Parental role modeling was not found to be directly associated with children’s PA; although, children’s perceptions of parental support were significantly associated with their PA (Wilk et al., 2018).

Regarding peer influence, Duncan, Duncan, and Strycker (2005) found that in a study of youth (*N* = 372), significant correlations were found between engagement in PA and peer support. While these participants are much older than preschool age, peer
support is still a known influence in promoting PA (Timmons et al., 2007; Wilk et al., 2018).

As a key facilitator in children’s experiences in childcare centres, educators have a notable influence on preschool children’s PA (Gehris et al., 2015; Ward et al., 2015; Wilk et al., 2018). Ward et al.’s (2015) systematic review found that two studies confirmed educators’ involvement, and prompts were associated with children’s increased engagement in PA. Despite these findings, much of the reviewed literature did not consist of high-quality interventions, and therefore, the findings provide weak evidence (Ward et al., 2015).

When discussing the influence of educator’s behaviours, skills, and beliefs on children’s PA, it is also important to consider their perceptions and experiences promoting children’s PA. Martyniuk and Tucker (2014) explored ECE students’ knowledge and training experiences in relation to PA. Concerning influences on children’s PA, Martyniuk and Tucker (2014) found that approximately 70 to 91% of educators stated that ECEs play a strong role in engaging preschoolers in PA. Similarly, Connelly et al. (2018) conducted semi-structured interviews with 12 ECEs and 3 childcare centre Directors to explore their perceptions of their role in promoting PA to children in their care. One educator noted that they, “Have to play with the kids to show them it is fun. Otherwise, there is no coherence” (Connelly et al., 2018, p. 287). Further, educators in Gehris et al.’s (2015) study stated that children are more inclined to move when educators are moving with them. This is a common finding in qualitative literature, where educators’ involvement is a key factor in children’s engagement in PA (Bower et al., 2008; Bruijns, 2018; Finn & Specker, 2000; Gehris et al., 2015; Vanderloo et al.,
While educators play an important role in improving children’s involvement in PA, according to the social-ecological model, they alone cannot influence PA (Stokols, 1996).

**Physical Environment**

At the physical environment level, researchers have found influences on children’s PA to include weather, natural environments, and sufficient equipment and play facilities (Gehris et al., 2015; Harwood et al., 2017; Lewis et al., 2016; Tsangaridou, 2017). Lewis et al. (2016) conducted a study investigating associations between weather conditions and PA and sedentary time in preschoolers in Canada and Australia. For the purpose of the current study, the researcher only describes the findings from Canada. Findings from cross-sectional data of the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE), revealed that in Canada, rainfall was positively associated with sedentary time, and snowfall negatively associated with MVPA. Further, maximum temperatures (20°C to 25°C) were associated with children’s MVPA (Lewis et al., 2016). In line with these findings, studies exploring educators’ perceptions of barriers to children’s PA have found rain to be a prominent barrier, and warm weather to be a facilitator of PA (Connelly et al., 2018; Fees, Trost, Bopp, & Dzewaltowski, 2009; Tremblay, Boudreau-Larivière, & Cimon-Lambert, 2012).

Educators within Tsangaridou’s (2017) study state that inadequate facilities and decreased availability of equipment contributes to lack of PA. One educator stated that despite her ideas for engaging children in PA, “the lack of available facilities prevented [her] from executing them. It is not easy for children to roll or crawl in dirt. The infrastructure of the workspace itself sets many limitations” (Tsangaridou, 2017, p. 291).
More common is the finding that natural environments promote increased engagement in PA (Bjørgen, 2016; Gehris et al., 2015; Harwood et al., 2017). Harwood et al.’s (2017) study objectively measured preschoolers’ PA using accelerometers to compare PA levels between forest school environments and non-forest school environments. Harwood et al. (2017) ultimately found that children’s mean counts per minute of activity were greater in the forest school environment. Similarly, Lovell (2009) objectively measured school age children’s PA using accelerometers to compare PA levels between forest school days and regular school days. Lovell (2009) found children’s MVPA levels were much greater on forest school days than regular school days. These findings suggest that natural environments positively influence preschoolers’ PA levels – which should ultimately be considered in the creation of PA interventions in childcare.

**Structural/Organisational**

While the Canadian 24-Hour Movement Guidelines for the Early Years (0–4 Years) exist, currently, no specific PA guidelines exist within childcare centres. Vanderloo and Tucker’s (2018) document analysis of provincial and territorial childcare acts and legislations found that while all provinces and territories require daily outdoor play, there is no specific mention of how much time or intensity of PA children need. Previously, McKay and Nigro (2016) implemented Healthy Eating and Active Living Guidelines in 5 Ottawa childcare centres. These guidelines resulted in an increase in parental satisfaction, and educators’ increased interest in ongoing professional development (McKay & Nigro, 2016). These results suggest that at the policy level, implementation of these guidelines would be beneficial in influencing children’s PA in childcare centres (McKay & Nigro, 2016).
One of the most significant influences on children’s PA levels considers the resources available to educators and pre-service education that ECEs receive (Bruijns, 2018; Gehris et al., 2015; Goldfield et al., 2012; Martyniuk & Tucker, 2014; Tsangaridou, 2017). According to educators in Tsangaridou’s (2017) study, insufficient and inadequate resources surrounding PA can affect the quality of lessons they engage children in. Martyniuk and Tucker (2014) suggest this potentially results in increased sedentary experiences. Educators in Martyniuk and Tucker’s (2014) study stated that the following would be beneficial to increase knowledge surrounding PA: “physical activity workshops or professional development programs (74.8%); instructional strategies to promote physical activity; and, guest physical activity instructors (56.7%)” (p. 6).

Within the literature, educators most often report a need for increased training and education of PA in early childhood (Gehris et al., 2015; Goldfield et al., 2012). Goldfield et al. (2012) posit that if ECE training adequately educates individuals on the importance of PA, then these educators’ self-efficacy would increase, and therefore, they would feel prepared to engage children in PA and thereby improve engagement levels.

Conclusively, it is important to consider all levels of influence from the social-ecological model on children’s PA approach when designing health promotion initiatives that increase their PA. One of the most recognised methods of increasing children’s PA in childcare centres is deliberate and purposeful interventions that target children’s activity levels.
Approaches to Promoting Physical Activity in Preschoolers

Given the prevalence of inactivity in preschool children attending centre-based childcare (Barbosa & Oliveira, 2016; Chaput et al., 2017; Soini et al., 2014), and importance of achieving 180 minutes of PA each day for overall health benefits (Tremblay et al., 2017), strategies must be enacted to increase PA amongst this age group. This section will discuss common methods of promoting PA in preschoolers.

Childcare Interventions to Promote Physical Activity

Evidence from recent studies surrounding PA suggests that intervention is one of the most effective strategies for increasing PA in young children (Goldfield et al., 2012; Lanigan, 2014; OME, 2014; Tucker et al., 2017; Wadsworth, Robinson, Beckham, & Webster, 2012). The Ontario Ministry of Education (OME, 2014) further claims that these strategies assist in the development of motor skills and strengthen relationships with those in the child’s environment.

As defined by the World Health Organization (WHO; 2009), physical activity interventions are programs, “designed to increase levels of participation in physical activity” (p. 3). Target audiences for these interventions vary, but for the purpose of the current study, the researcher will discuss intervention studies that aim to increase preschool children’s PA. This is to provide an understanding of what is working and what is needed to increase preschoolers’ PA in centre-based childcares.

The Supporting Physical Activity in the Childcare Environment (SPACE) randomised controlled trial intervention by Tucker et al. (2017) aimed to increase preschoolers’ PA levels and decrease sedentary time. This intervention consisted of the following components:
i) Environmental modifications (delivery of play equipment such as utility balls and an obstacle course);

ii) Staff training (instruction on the importance of PA, solutions for overcoming barriers, and explanation of PA guidelines); and

iii) Modified outdoor playtime (restructured from two 60-minute outdoor sessions to four 30-minute sessions) (Tucker et al., 2017).

Following the PRECEDE-PROCEED model for health promotion (Stokols, Allen, & Bellingham, 1996), 22 childcare centres were recruited and randomly assigned to either the experimental or control condition (Tucker et al., 2017). The PRECEDE-PROCEED model assesses health needs for designing, implementing, and evaluating health promotion programs such as PA interventions (Tucker et al., 2017). The PRECEDE component structures the intervention, while the PROCEED component structures the implementation and evaluation of the intervention (Tucker et al., 2017).

Educators in the centres assigned to the experimental group delivered the intervention to preschool children ($N = 338$) at 5 separate times: baseline, intervention, post-intervention, 6-month follow-up, and 12-month follow-up (Tucker et al., 2017). Preschoolers’ measurements were obtained at all five time points, and PA was measured using Actical accelerometers for 5 days at each of the 5 time points (Tucker et al., 2017).

Although the SPACE intervention successfully increased preschoolers’ MVPA and TPA, Tucker et al. (2017) found no sustainable change in overall PA at the 6- and 12-month follow-ups of the intervention.

In addition to the environmental modifications that the SPACE study examined (Tucker et al., 2017), Wadsworth et al. (2012) investigated the effectiveness of an
educator-led program that implemented PA breaks for preschoolers in 2 separate childcare centres. Childcare A provided 9 children with instruction and services between 7:00 a.m. and 6:00 p.m., and implemented a daily gross motor movement program that included 2 30-minute blocks of unstructured outdoor play time, as well as 2 daily 10-minute PA breaks (Wadsworth et al., 2012). Childcare B provided 9 children with instruction between 8:00 a.m. and 11:00 a.m., and implemented a daily gross motor movement program as well, but which only included 45-minutes of unstructured outdoor play time, as well as 1 daily 10-minute PA break (Wadsworth et al., 2012). Activity breaks for both groups consisted of a 2-minute warm-up, followed by 6-minutes of PA movement, and finished with a 2-minute cool down (Wadsworth et al., 2012).

Children’s PA was measured using accelerometers over 4 days, and tools were worn between each child’s arrival and departure times. The results of Wadsworth et al.’s (2012) study are significant, where PA from all PA breaks in Childcare A accounted for 69% of children’s overall MVPA, and PA during breaks in Childcare B accounted for 90% of children’s overall MVPA. While these results suggest that activity breaks are useful in increasing preschoolers’ PA in childcare, the intervention only occurred over a period of 4 days (Wadsworth et al., 2012). This is a notable limitation because the initial implementation of daily breaks might excite children, and their eagerness to participate might disappear over time once children became accustomed to the routine (Santrock et al., 2011). Therefore, it would be valuable to study the implementation of these breaks over a longer period. It is also important to note the leadership role of the educator in Wadsworth et al.’s (2012) study, because it has been found that educator’s involvement
in PA with children can promote increased PA engagement amongst preschoolers (Connelly et al., 2018; Ward et al., 2015).

The educator’s role in facilitating PA experiences for children and increasing their PA levels was also part of the Encouraging Healthy Activity and Nutrition in Childcare Environments (ENHANCE) pilot project by Lanigan (2014). ENHANCE provides educators with an initial day-long wellness retreat to encourage discourse surrounding PA in early learning contexts and includes a 3-hour experiential training session educating ECEs on how to integrate PA experiences into their childcare centres (Lanigan, 2014). This project was a collaborative project to support educators ($N = 72$) in promoting PA behaviours in 4 types of childcare centres ($N = 45$) including Head Start, community-based non-profit, family home childcare, and for-profit centres (Lanigan, 2014). Two instruments were utilised to measure separate variables. The Mapping Current Policies and Practices (PMPP) was used to record educators’ indoor and outdoor PA practices, PA education, and family communication (Lanigan, 2014), while the Child Care Provider Health Eating and Activity Survey (CCPHEAS) was utilised to examine educators’ attitudes, beliefs, and knowledge regarding eating, PA, and obesity prevention (Lanigan, 2014). Observations were conducted in each centre: once at the outset of the study to establish a baseline, and again at the end of year one.

Lanigan (2014) analysed results using a paired-sample t-test comparing differences in both time points and found a statistically significant improvement in all variables – except outdoor PA did not improve, while perceptions of barriers increased. Lanigan (2014) conclusively found that the ENHANCE project successfully increased educators’ understanding of PA and its benefits, as well as fostered a greater
understanding of their role in promoting PA among young children. Sample size was considered a main limitation in Lanigan’s (2014) study; however, findings still suggest that educators’ practice can be transformed using ENHANCE.

Finch, Jones, Yoong, Wiggers, and Wolfenden (2016) conducted a systematic review to determine the effectiveness of PA interventions in centre-based childcare centres. Interventions in this review (N = 16) consisted of the following components: “structured play opportunities; enhancement of physical environment (additional equipment); and parent engagement (workshops and educational materials)” (Finch et al., 2016, p. 415). Child participants’ mean age ranged from 3.3 to 5.5 years, and intervention durations varied (Finch et al., 2016). One intervention occurred over 2 days, and another over the span of 12 months. The duration of 5 interventions lasted between 4 and 8 weeks; the duration of 6 interventions lasted between 3 and 5 months; and finally, the duration of 4 interventions lasted between 6 and 9 months (Finch et al., 2016). Fourteen of the interventions measured children’s PA using accelerometers, while the other 3 used pedometers (Finch et al., 2016). Results of this review indicated that the following characteristics of interventions were associated with greater effects: i) structured activity; ii) delivery of intervention by experts or PA professionals; and iii) the use of theory in the intervention design (Finch et al., 2016). Conclusively, there was limited evidence found to support the use of interventions in increasing PA; however, Finch et al. (2016) recommend the use of structured activity and environmental modifications in future interventions.

Despite the variance in intervention effects on children’s PA in childcare settings, Goldfield et al. (2012) suggests that interventions can be effective at supporting PA in
preschool children. Further, Goldfield et al. (2012) proposed that future, “studies utilize prospective randomized controlled trials with multiple follow-ups” (p. 1335) in order to create sustainable change in children’s PA levels.

**Chapter Summary**

This chapter described the literature outlining the issue of preschool children’s inactivity in centre-based childcare centres (Barbosa & Oliveira, 2016; Chaput et al., 2017; Garriguet et al., 2016; Soini et al., 2014; Tremblay et al., 2017). Centered on Stokol’s (1996) social-ecological model, children’s PA is influenced at various levels including their individual characteristics, interpersonal relationships, physical environment, and their structural/organizational environments.

It is clear that PA for young children supports social interaction, attentiveness, and overall development. The CCEYA (2014) suggests, then, that it is important to provide opportunities and environments where children can engage in PA. The role of the childcare environment in promoting PA was discussed, and literature suggests that outdoor and natural environments can foster PA in preschoolers. Alternatively, children are adequately active when given the appropriate amount of space indoors to do so (Gubbels et al., 2012). Other influences on preschoolers’ PA were discussed and found that influences occur at each level in the social-ecological model. The gender of a child, support from parents or peers, educators’ knowledge and practice, and policies in childcare environments can either hinder or encourage it (McKay & Nigro, 2016; Stokols, 1996; Ward et al., 2015; Wilk et al., 2018). Overall, one of the most prevalent health promotion strategies in the literature regarded interventions (Goldfield et al., 2012; Lanigan, 2014; OME, 2014; Tucker et al., 2017; Wadsworth et al., 2012). These
interventions were reviewed, and while each had particular positive effects on children’s engagement in PA, they were not without limitations. The implementation of PA breaks for preschoolers seemed to be the most feasible intervention for the childcare environment, however; thus, it should be explored for longer periods of time in future studies (Lanigan, 2014).
CHAPTER THREE: METHODS AND PROCEDURES

In this study, a triangulated mixed-methods design was selected to explore educators’ beliefs and practices surrounding PA, specifically regarding how they relate to the effectiveness of the SEESAW initiative in improving children’s PA behaviours. According to Creswell and Plano Clark (2007), a \textit{triangulated design} allows the researcher to cross-validate datasets and results to ultimately obtain valid, holistic results about the research problem. This study was reviewed and granted ethics clearance granted by the Brock University Research Ethics Board (File #18-010 - HARWOOD).

This chapter explains and justifies the methodological design and procedures utilised in conducting this study. Using the \textit{convergent model}, a variant of the triangulation design (Creswell & Plano Clark, 2007), data was collected through interviews, direct observation, and questionnaires prior to the implementation of the SEESAW intervention in October 2018, and once again 4 months after the implementation of SEESAW in February 2019. This study was guided by the following four research questions:

i) How does SEESAW impact preschool children’s physical activity behaviours?

ii) What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?

iii) Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

iv) How effective is the SEESAW resource from educators’ perspectives?
Research Methodology and Research Design

The design of this study was centered on a pragmatic philosophy (Creswell & Plano Clark, 2007; Leavy, 2017). Pragmatism emphasises the practical application and outcome of research using multiple methods of data collection (Creswell & Plano Clark, 2007; Johnson, Onwuegbuzie, & Turner, 2007; Leavy, 2017). Working from a pragmatic paradigm, Leavy (2017) posits a mixed-methods design, then, is most appropriate because, “pragmatism supports using both qualitative and quantitative methods, places the research questions at the center of inquiry, and links all methodological decisions to the research questions” (p. 168). Further, pragmatism allows for a grey area between true and false, which allows the results to be ‘kind-of true’ and ‘kind-of false’ (Johnson et al., 2007).

Mixed methods designs are considered problem-centered, meaning all aspects of the research design are centered on the research problem (Leavy, 2017). Currently, many mixed-methods designs exist (Onwuegbuzie & Collins, 2007); however, the most appropriate design for this research study was a triangulation design (Creswell, 2015). The convergence model, a variant of the triangulation design, was chosen to collect qualitative and quantitative data surrounding PA behaviours in educators and preschool children, and converge the results (Creswell & Plano Clark, 2007). Quantitative and qualitative data is collected and analyzed separately, then compared and contrasted in a discussion, and finally the results are interpreted together (Creswell & Plano Clark, 2007). This model was most appropriate for this study, given that the aim was to compare qualitative perspectives surrounding PA, with quantitative measurements of PA behaviours of children (Creswell & Plano Clark, 2007). In addition to the appropriateness
of the model for the study’s aim, this design was chosen because researchers unfamiliar with mixed-methods designs find the convergence model intuitive to employ (Creswell & Plano Clark, 2007). One advantage to this model is the ability to collect quantitative and qualitative data separately, using techniques typically associated with each specific type of data (Creswell & Plano Clark, 2007). However, Creswell and Plano Clark (2007) also note there are disadvantages to the convergence model, including expertise required for each type of data collection and analysis, and the integration of very different results in a meaningful way.

**Sampling Procedure**

_Sampling_ concerns the process of selecting a part that represents a whole, which helps to inform the quality of inferences made by a researcher (Onwuegubuzie & Collins, 2007). According to Creswell and Plano Clark (2007), quantitative and qualitative research designs require different sampling techniques. Creswell and Plano Clark (2007) argue that _purposeful sampling_ suits qualitative research because the objective is to collect rich data from a small sample size. Further, quantitative research should employ _probabilistic_ or _random sampling_ to obtain results that can be representative of a population (Creswell & Plano Clark, 2007).

Contrarily, Onwuegubuzie and Collins (2007) contest that probabilistic sampling as belonging to the quantitative design, and purposeful sampling belonging to the qualitative design, represents a false dichotomy. Onwuegubuzie and Collins (2007) explain that if the overall goal of the study is to obtain insights into a specific phenomenon, individuals, or events, then the researcher purposefully selects participants or settings, regardless of the research design. Likewise, Onwuegubuzie and Collins (2007) argue that sample size also
tends to be dichotomised, where small samples are appropriate for qualitative research, and large samples are more appropriate for quantitative research. It is important to note that small samples can be used in quantitative research if the research explores a phenomenon; however, the researcher cannot claim the sample is representative of the population (Onwuegbuzie & Collins, 2007). Based on this outlook disputing dichotomised sampling and sample size, a purposive sampling technique was employed in all aspects of the current study.

As defined by Creswell and Plano Clark (2007), *purposive sampling* is a non-probabilistic technique that intentionally selects participants and sites that relate to the research topic. The subtype of purposive sampling that was chosen for this study was *homogeneous sampling*, which is the selection of participants who share similar attributes or characteristics such as age and place of employment (Onwuegbuzie & Collins, 2007).

Initially, recruitment involved contacting 3 childcare site supervisors within the Niagara Region whose centres and educators were signed up to receive SEESAW training. Unfortunately, these supervisors expressed no interest in participating in the study, and therefore, three alternate supervisors were contacted. One supervisor responded and expressed interest in participating in the study. This study ultimately recruited 3 Registered Early Childhood Educators (RECEs) and 12 preschool-aged children, situated in a childcare setting. This sample is homogeneous given educators’ similarity in professional title and place of employment, and children’s similarity in age and development (Onwuegbuzie & Collins, 2007). The childcare site was purposefully selected given the childcare centre’s participation in the training as part of the SEESAW and the RECEs’ employment at that site.
Instrumentation

In mixed-methods research, *instrumentation* will involve the measurement of data using instruments that provide meaningful qualitative and quantitative data (Creswell & Plano Clark, 2007). In the context of researching PA behaviours, Loprinzi and Cardinal (2011) argue that researchers must select instruments that accurately and reliably measures the PA behaviours of participants and consider factors such as age, gender, body weight, and co-morbid conditions of participants (Sylvia, Bernstein, Hubbard, Keating, & Anderson, 2014).

This section will discuss two instruments that were utilised in the data collection process of the current study: The International Physical Activity Questionnaire (IPAQ; Booth, 2000), and the Observation System for Recording Physical Activity in Children – Preschool (OSRAC-P; Brown et al., 2006).

**IPAQ**

*Physical activity* in adults is described as being patterns of consistently low, steady movement that occurs for prolonged amounts of time (Loprinzi & Cardinal, 2011; Sylvia et al., 2014). Consequently, this type of activity must be measured using appropriate instrumentation to capture the continuous movement (Loprinzi & Cardinal, 2011; Sylvia et al., 2014).

There are various reliable instruments for measuring adults’ PA, which include doubly labeled water, self-report questionnaires, accelerometers, and heart-rate monitors (Sylvia et al., 2014). With several methods available for measuring PA, it is important to consider factors such as cost, study population, and activity intensity. The main factor that was considered to measure educators’ PA in this study was the age of participants.
Sylvia et al. (2014) state that adults seem to demonstrate a more reliable recall of self-reported measures of PA; conversely, children and youth have difficulty accurately assessing their own PA (Janz, Witt, & Mahoney, 1995; Sallis, 1991). In addition to age, time allotted for data collection and analysis in this study was important to consider. Self-report questionnaires are the most common instrument used to measure PA because they are time and cost-efficient (Ndahimana & Kim, 2017; Sylvia et al., 2014). Due to the lack of time and funding available for this study, a self-report questionnaire was chosen to measure educators’ PA.

Self-report questionnaires are the most common method for measuring adults’ PA (Bandmann, 2008; Booth, 2000; Sylvia et al., 2014). Questionnaires differ in terms of what is measured, how PA is reported, the quality of the PA data, and how PA data is obtained (Sylvia et al., 2014). Favorably, questionnaires are cost-effective and easy to administer, and can provide contextual details about PA that accelerometers cannot collect (Sylvia et al., 2014). Despite these advantages, Sylvia et al. (2014) note an inconsistency of validity in self-report questionnaires, and therefore, it is important to explore the reliability and validity of each questionnaire under consideration.

When selecting a questionnaire for this study, it was essential to acknowledge the aim of the study. The purpose of measuring educators’ PA was to explore their recent PA behaviours prior to, and after 4 months, use of SEESAW. Educator’s PA was collected at the same time points as children’s PA for convenience. The frequency, intensity, and context of PA were also going to be measured. The following self-report questionnaires were considered for the current study, and are discussed below:

i) The Framingham Physical Activity Index (Kannel & Sorlie, 1979);
ii) The Seven-Day Physical Activity Recall (PAR; Blair, 1984); and

iii) The International Physical Activity Questionnaire Long Version (IPAQ; Booth, 2000).

The Framingham Physical Activity Index is an interviewer-administered questionnaire which assesses adults’ PA in leisure-time and occupational contexts within the last 24 hours (Bandmann, 2008). Respondents are asked to record their PA at 4 intensities: sedentary, slight activity, moderate activity, and heavy activity (Kannel & Sorlie, 1979). The validity and reliability of this questionnaire has been investigated regarding correlations between PA and cardiovascular diseases (CVD), rather than regarding the tool itself (Albanes, Conway, Taylor, Moe, & Judd, 1990; Bandmann, 2008). Although this questionnaire measured all intensities of PA (Bandmann, 2008), it was not selected because contexts had to include work, transport, occupational, and leisure time to give a holistic view of PA for the current study (Craig et al., 2017).

The PAR is another interviewer-administered questionnaire, which assesses adult respondents’ time spent in PA, strength, and flexibility activities (Blair, 1984). Individuals record their activity in the morning, afternoon, and evening of each of the past 7 days as either moderate, hard, or very hard (Sallis et al., 1985). Hayden-Wade, Coleman, Sallis, & Armstrong (2003) tested the validity of the PAR against the measurement of accelerometry. Bland-Altman plots revealed participants overestimated their levels of PA in comparison to the accelerometer data, while a MANOVA did not reveal any statistically significant differences between the PAR and accelerometer data (Hayden-Wade et al., 2003). Conclusively, the validity and reliability of the PAR is unclear and requires additional evaluation (Hayden-Wade et al., 2003). This tool was
ultimately not selected given the absence of measurement surrounding sedentary behaviours. Measuring these behaviours, in addition to the other intensities of PA, is important because according to Tremblay, Shephard, and Brawley (2007), PA intensities are expressed in different absolute metabolic energy expenditure (MET) rates. Sedentary behaviour is characterised by ≤ 1.5 METs, while light activity is 1.5 to 3.0 METs, moderate activity is 3.0 to 6.0 METs, and vigorous activity is > 6.0 METs (Bann et al., 2015; Tremblay et al., 2017). Additionally, sedentary behaviours allow the researcher in the current study to make inferences about meeting Canadian PA guidelines (Tremblay et al., 2017). Therefore, the questionnaire selected for the current study must include four levels of intensity: sedentary, light, moderate, and vigorous.

The final questionnaire considered was the IPAQ Long Version (IPAQ, 2002), that can be administered by telephone or in-person interviews (IPAQ, 2002). Developed by PA assessment experts, the IPAQ Long Version estimates adults’ METs over the last 7 days in 4 contexts including job-related PA, transportation PA, housework, leisure-time PA, and time spent sitting (IPAQ, 2002). Within each of these contexts, respondents record how many days, hours, and minutes in the last 7 days they engaged in no, light, moderate, and vigorous PA (Booth, 2002; Craig et al., 2003). The validity and reliability of the IPAQ has been investigated extensively in several contexts (Craig et al., 2003; Gauthier, Larivière, & Young; 2009; Hagströmer, Oja, & Sjöström, 2007; Kolbe-Alexander, Lambert, Harkins, & Ekelund, 2006). Though researchers have found strong relationships between IPAQ data and objective methods of measurement such as accelerometry (Craig et al., 2003; Hagströmer et al., 2007), Rzewnicki, Auweele, and De Bourdeaudhuij (2003) discovered a presence of over-reporting amongst participants in
their study. Out of 50 participants, 23 reported some amounts of walking, moderate, or vigorous activity when they should have reported none (Rzewnicki et al., 2003). Similarly, Johnson-Kozlow, Sallis, Gilpin, Rock, and Pierce’s (2006) study comparing adults’ PA between the IPAQ and ActiGraph accelerometers also discovered an overestimation of PA by 24% and an underestimation of sedentary time by approximately 2 hours per day. Fortunately, Rzewnicki et al. (2003) posit that over-reporting of PA can be reduced if the researcher administering the IPAQ has knowledge surrounding over-reporting, and directly probes participants during response time. The IPAQ Long Version was ultimately chosen as the instrument for collecting educators’ recent PA in the current study (see Appendix B for the IPAQ).

**OSRAC-P**

Physical activity patterns in young children are notably different compared to youth and adults, where it is described as intermittent bouts of activity (Sigmund, De Ste Croix, Miklanova, & Fromel, 2007). Consequently, Loprinzi and Cardinal (2011) propose that instrumentation that provides accurate measures of children’s PA is necessary to ensure these intermittent bouts are captured in measurement.

Popular methods of PA measurement in young children include direct observation, doubly labelled water, pedometers, accelerometers, and self-report measures such as questionnaires (Loprinzi & Cardinal, 2011). Many factors contributed to the choice of measurement tool used within this study including measurement cost, assessment period, researcher expertise, and contextual information needed (Loprinzi & Cardinal, 2011). Obtaining information about the context of children’s PA was necessary
to make inferences about the effectiveness of the educator’s resource (SEESAW) – and as a result, direct observation was the type of method chosen.

As defined by Loprinzi and Cardinal (2011), *direct observation* is a method where trained observers objectively record children’s natural PA behaviour, electronically or using paper-and-pencil form. Advantageously, direct observation collects, “contextually rich data” to recognise factors related to the children’s behaviour (Loprinzi & Cardinal, 2011, p. 20). Though direct observation can also collect data regarding activity intensity and type, McKenzie (2002) notes the most prominent disadvantage is the time-consuming nature of the method, but despite this, it is the most appropriate for the topic under investigation.

Various direct observation instruments have been developed to measure children’s PA while providing contextual information such as level, type, and location of PA (Loprinzi & Cardinal, 2011), including:

i) Behaviours of Eating and Activity for Children’s Health: Evaluation System (BEACHES; McKenzie et al., 1991); 

ii) The System for Observing Play and Leisure Activity in Youth (SOPLAY; McKenzie 2002); and 

iii) Observation System for Recording Physical Activity in Children – Preschool (OSRAC-P; Brown et al., 2006).

Each of these instruments was considered for this study and is described below.

BEACHES records a target child’s eating, PA, and sedentary behaviours, in addition to related environmental characteristics (McKenzie et al., 1991). While BEACHES records PA intensity, which relates to the current study, the procedure
requires the observer to record behaviour on a target child for at least 2 hours to achieve high reliability and evidence of validity (McKenzie et al., 1991). Due to time constraints in the data collection process and the nature of a typical day in a childcare setting (i.e., structured schedule of the daily routine, as informed by the CCEYA [2014]), BEACHES was not the chosen observation instrument.

SOPLAY does not focus on a target child, but rather, multiple children’s PA behaviour and corresponding contexts at once (Loprinzi & Cardinal, 2011). Observer training is extremely thorough, and researchers have access to multiple resources including a training DVD that introduces the tool, provides practice, and gives training on assessment (McKenzie, 2006). Despite this advantage, Hughes (2017) notes SOPLAY is intended for the observation of school-aged children and would be difficult to adapt for preschool-aged children in a childcare context.

The final observation tool considered was the OSRAC-P. This tool was developed by merging three different observational tools including CARS (Puhl, Greaves, Hoyt, & Baranowski, 1990), CASPER II, and the Observational System for the Environmental Determinants of Physical Activity in Preschool Children (Brown et al., 2006).

The OSRAC-P allows the observer to collect information on a focal child’s activity intensity, type and context of activity, location, group composition, activity initiator, and prompts. To use this tool, observers employ momentary time sampling to, “watch a child for a five-second observation interval and then, during the next 25 seconds, record one code for each of the eight variables” (CPARG, 2012, p. 3). Observers can only use the OSRAC-P after they have memorised the tool’s categories and codes and demonstrated this knowledge in quizzes provided by Brown et al. (2006) in the
OSRAC-P training manual (see Appendix C for OSRAC-P Training Manual). Once the observer has achieved 100% accuracy across 2 days of quizzing, they begin in situ training, which Brown et al. (2006) state is practice using the tool in childcare centres. Upon successful completion of in situ training by establishing 90% interobserver agreement, the observer can then conduct research using the tool (CPARG, 2012).

According to Loprinzi and Cardinal (2011), the OSRAC-P has been validated against accelerometry and has demonstrated strong evidence of reliability. Given the strong reliability and validity of the tool, and simplicity in observer training and protocol, the OSRAC-P was chosen as the instrument to collect data surrounding children’s PA behaviours in this study (Hughes, 2017; Loprinzi & Cardinal, 2011).

**Variables and modifications.** There are 8 categories within the OSRAC-P, including:

i) Level of PA;

ii) PA type;

iii) Location;

iv) Indoor educational/play context;

v) Outdoor/gym educational play context;

vi) Initiator of activity;

vii) Group composition; and

viii) Prompt for PA (Brown et al., 2006).

Within each category are accompanying codes and their corresponding name and definitions (Brown et al., 2006).
With permission from one of the tool’s developers, Pate et al. (2016), a modified version of the OSRAC-P was developed by the Principal Student Investigator (PSI), and all modifications were completed prior to observer training and data collection. The original codebook was modified to coincide with this study’s contextual differences within each category, which are described below (see Appendix D for Modified Codebook).

**Level of physical activity.** This category represents 5 levels of children’s intensity which the OSRAC-P training manual states are classified by the speed and vigorousness of movement, assistance with movement, movement repeated, and involvement of any additional weight (Children’s Physical Activity Research Group [CPARG], 2012). The 5 levels in the original tool include: i) stationary/motionless, ii) stationary with movement of limbs or trunk, iii) slow-easy movement; iv) moderate movement; and v) fast movement (Brown et al., 2006).

**Modification.** Levels were modified to coincide with the Canadian 24-Hour Movement Guidelines for the Early Years (0-4 Years) in order to make inferences about the observed children meeting the suggested guidelines (Tremblay et al., 2017). Brown et al.’s (2006) definition of stationary/motionless complimented Tremblay et al.’s (2017) definition of sedentary, which is essentially no major movement; therefore, the name was modified to sedentary. As defined in the OSRAC-P training manual, stationary with movement of limbs or trunk considers movements such as standing up and holding a moderately heavy object while standing, while slow-easy movement includes walking at slow pace and slow crawling (CPARG, 2012). Light intensity in early childhood has been classified as activities such as standing and painting, and slow walking (Cliff & Janssen,
2011; Tremblay et al., 2017). Following this definition, it was logical to combine the stationary with movement of limbs or trunk and slow-easy movement categories to become light activity. Finally, moderate movement and fast movement were combined into moderate-to-vigorous activity to coordinate with MVPA activity recommendations in the movement guidelines (Tremblay et al., 2017). All modifications and definitions for the PA level are available in the modified codebook (see Appendix D).

**Physical activity type.** This category consists of identifying from among 19 types of activity the focal child is engaged in at the highest PA level recorded (CPARG, 2012). These types of activity include:

- Climb; Lie down; Rocking on an object; Swim;
- Crawl; Pull/push; object; Throw;
- Dance; Rough and Rolling; Walk;
- Jump/Skip; tumble; Running; Other; and
- Riding an object; Sit/squat/kneel; Can’t Tell (Brown et al., 2006).

**Modification.** The only modification to this category included the removal of swim to reflect the characteristics of the participating childcare site. Modifications and definitions for the PA type are available in the modified codebook (see Appendix D).

**Location.** This category refers to the physical location of the focal child during the observation. There are 4 possible codes which include: i) inside; ii) outside; iii) transition; and iv) can’t tell (Brown et al., 2006). No codes were modified in this category, and definitions can be found in the modified codebook (see Appendix D).

**Physical activity context (indoor and outdoor).** This category refers to the context in which the focal child was engaging in at the highest level of PA (CPARG,
Within this category, there are 18 codes for indoor play activity, and 15 codes for outdoor play activity:

<table>
<thead>
<tr>
<th>Indoor Play</th>
<th>Outdoor Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art; Snack;</td>
<td>Ball; Socio-Props;</td>
</tr>
<tr>
<td>Books; Sociodramatic;</td>
<td>Fixed; Teacher Arranged;</td>
</tr>
<tr>
<td>Gross Motor; Teacher Arranged;</td>
<td>Game; Time Out;</td>
</tr>
<tr>
<td>Group/Circle Time; Time Out;</td>
<td>Open Space; Wheel;</td>
</tr>
<tr>
<td>Large Blocks; Transition;</td>
<td>Pool; Other;</td>
</tr>
<tr>
<td>Manipulative; Videos;</td>
<td>Portable; N/A; and</td>
</tr>
<tr>
<td>Music; Other;</td>
<td>Sandbox; Can’t Tell (Brown et al., 2006);</td>
</tr>
<tr>
<td>Nap; N/A; and</td>
<td>Snacks;</td>
</tr>
<tr>
<td>Self-Care; Can’t Tell.</td>
<td></td>
</tr>
</tbody>
</table>

Modification. First, several codes were removed to reflect the environmental and philosophical characteristics of the participating childcare site including manipulative, teacher arranged (indoor), time out (indoor), videos, fixed, open space, pool, portable, socio-props, teacher arranged (outdoor), time out (outdoor), and wheel. Second, specific code names were modified to coincide with terms that are more common in the field of early childhood education (Gestwicki, 2011; Hohmann, Wiekart, & Epstein, 2008). For instance, sociodramatic was changed to dramatic play; group/circle Time became circle time; large blocks was modified to block play; and snacks became eating. Lastly, indoor and outdoor categories were combined to create a final list of 18 codes. Though the OSRAC-P identifies that each play context is specific to the indoor and outdoor settings, the participating childcare site did not separate these contexts in their program; therefore, they were combined into one category: play context (CPARG, 2012). Definitions for PA context are available in the modified codebook (see Appendix D).
**Group composition.** This category is defined by the interaction amongst individuals, categorised by whom it is with and in proximity to. It is important to note that the OSRAC-P states, “group composition is not dependent on explicit social interaction or engagement with the same materials” (CPARG, 2012, p. 32). According to Brown et al. (2006), there are 6 codes which include: i) solitary; ii) one-to-one adult; iii) one-to-one peer; iv) group with adult; v) group with peers; and vi) can’t tell (Brown et al., 2006). No modifications were made for group composition, and definitions can be found in the modified codebook (see Appendix D).

**Prompt for physical activity.** As described by Brown et al. (2006), prompts are educator’s behaviours that purposefully increase or decrease the likelihood of children’s response in PA. These prompts are explicit, observable behaviours which may be given prior to or after children respond (CPARG, 2012). There are 6 difference prompt codes in the OSRAC-P which include: i) no prompt; ii) teacher prompts to increase/maintain PA; iii) teacher prompts to decrease/stop PA; iv) peer prompts to increase/maintain PA; v) peer prompts to decrease/stop PA; and vi) can’t tell. No modifications were made for group composition, and definitions can be found in the modified codebook (see Appendix D).

**Initiator of activity.** This category is defined by who selected the activity the focal child engaged in and considers the following three codes: i) adult; ii) child; and iii) can’t tell (Brown et al., 2006). No modifications were made for group composition, and definitions can be found in the modified codebook (see Appendix D).

**Coder training.** The PSI, who was also the observer, underwent training following the OSRAC-P training manual (CPARG, 2012), which occurred between
September and October 2018. In correspondence with the training protocol, the observer first memorised each of the 8 categories and assessed their content knowledge using the quizzes provided in the OSRAC-P Manual (CPARG, 2012). While the manual strongly recommends observers complete in situ training (i.e., actually using the tool in a live preschool setting), Brown et al. (2006) states that the process can be adapted for local research site circumstances. Given the time constraints and the scheduled October launch of the SEESAW program to childcare sites across the Niagara region, the observer replaced in situ training with 5 hours of video observation, akin to the protocols adapted by researchers in McIver et al.’s (2016) study. The video utilised for observer training was a public observational video of preschool children in a childcare setting (Scott, 2018). Further, the OSRAC-P indicates that at this stage, each focal child should be, “observed and recorded by two observers concurrently and independently” (p. 4), until an inter-rater reliability of > 90% is achieved (Hughes, 2017). The nature of the current study only allowed for the PSI to record observations; thus, an interobserver agreement score and inter-rater reliability was absent and is discussed as a limitation of the study. However, when observers are highly trained and follow a specific protocol, direct observation can provide valid and reliable estimates of the PA behaviour of children (Loprinzi & Cardinal, 2011).

_Coding focal child._ There are general rules outlined in the OSRAC-P training manual that apply to observing each focal child (CPARG, 2012). For instance, the researchers must position themselves within 10 to 15 feet of the focal child, and discreetly reorient themselves should the focal child move out of view (CPARG, 2012). The focal child must be observed for 5-second intervals, and then recorded for 25
seconds, using Dell Axim handheld computers (Brown et al., 2006). In the current study, this device was not available; therefore, the PSI recorded observations on a checklist using the paper-and-pencil method. Only the highest level of PA was recorded during the 5-second observation interval (CPARG, 2012). If the researcher believed they had missed a code or incorrectly coded a particular variable, the OSRAC-P manual states they should record the interval number and necessary changes within the notes section of the data sheet (CPARG, 2012).

**Procedure and Data Collection**

Once clearance was granted by the Brock University Research Ethics Board (File #18-010 - HARWOOD), 3 childcare site supervisors within the Niagara Region were contacted via electronic correspondence (see Appendix E for Electronic Correspondence to Supervisors; Appendix F for Formal Letter of Invitation for Educators). All 3 site supervisors expressed no interest in participation; consequently, the PSI contacted 3 alternate childcare site supervisors within the same region. One supervisor responded and agreed to share consent materials (see Appendix G for Educator Consent Form), interview questions (see Appendix H for Interview 1 Questions and Appendix I for Interview 2 Questions), and the questionnaire (see Appendix B) with three educators, as well as share consent materials (see Appendix J for Parent Consent Form and Appendix K for Child Assent Form) and the observational tool (see Appendix C) with 12 preschool children’s parents. Once educators and parents received the research materials and parents provided written consent, the PSI scheduled the first set of semi-structured interviews and child observations prior to SEESAW implementation in October 2018. Interviews and observations were repeated 4 months later in February 2019.
Interviews

In October 2018, the PSI conducted the first set of one-on-one semi-structured interviews with each educator in a private room within their childcare site. Once written consent was obtained, the educators completed the International Physical Activity Questionnaires Long Version (IPAQ). During the IPAQ, the PSI recorded notes to utilise in the analysis and results. Upon completion of the IPAQ, the PSI began audio recording, and the interview commenced. Educators responded to 14 questions pertaining to their perceptions, knowledge, practices, and beliefs of PA and SEESAW. These interviews lasted between 20 and 30 minutes in length.

In February 2019, the PSI conducted the second set of one-on-one semi-structured interviews with each educator in a private room within their childcare site. Educators provided verbal ongoing consent and once again completed the IPAQ. Once the questionnaire was completed, the PSI audio recorded educators’ responses to 10 questions. These questions focused on educators’ knowledge and practices surrounding PA, and their perceptions of the effectiveness of SEESAW on PA behaviours in themselves and the preschool children in their care. Interviews lasted between 20 and 45 minutes in length.

Audio recordings were collected using an audio recorder and stored on the PSI’s password-protected computer. Challenges arose with one participant in both sets of interviews. Given her role as a ‘float educator’ in the childcare site (i.e., an educator who moves between classrooms wherever assistance is needed), time constraints hindered her ability to provide in-depth responses.
Teddlie and Tashakkori (2009) recommend a combination of interviews and questionnaires in a single research study because it brings breadth and depth to the phenomenon under investigation. The additional quantitative component in this study was direct observation of children’s PA behaviours.

**Observations**

In October 2018, the Observation System for Recording Physical Activity in Children – Preschool (OSRAC-P) was utilised to collect data on children’s PA behaviours. Verbal assent was provided by each focal child prior to observations. Observations occurred between 8:00 a.m. and 3:00 p.m. across 2 days in each season, allowing for scheduled lunch and nap times not to be observed or used in the tally of PA scores. Twelve children were observed, and each focal child was observed for 30 minutes using a momentary time sampling observation system (Brown et al., 2006). The same procedures were repeated in February 2019, as a means of mirroring the data collection that occurred in a similar study conducted by Soini et al. (2014).

**Data Processing**

Preparing quantitative and qualitative data for analysis involved the conversion of all raw data into more readable forms (Creswell & Plano Clark, 2007). Once data was entered into the appropriate software, data cleaning occurred to remove any data entry errors (Creswell & Plano Clark, 2007). As this study was a triangulated convergent design, quantitative and qualitative analyses occurred separately. This section will discuss the data cleaning that occurred within each instrument prior to analyses, as well as the process of analysis for the interviews, direct observations, and questionnaires.
Data Cleaning

When entering raw data, it was important to complete the process of data cleaning to ensure further accuracy within the analysis (Creswell & Plano Clark, 2007). Tabachnick and Fidell (2007) indicate that it provides the foundation for any subsequent analysis and decision making, which the researcher can more easily interpret.

**Interview transcripts.** Interview audio-recordings were transcribed verbatim by the PSI in the transcription software InqScribe. Upon completion of the transcription, the PSI provided each educator with their transcript to complete *member checking*, which was the technique used to validate participants’ responses (Creswell & Plano Clark, 2007; Leavy, 2017). Educators were given a week to complete this process, and then returned the transcripts to the PSI. None of the participating educators requested corrections or modifications to this data set.

**IPAQ.** The IPAQ (2002) has specific data cleaning and processing guidelines because other approaches would result in variability and could reduce the comparability of data. Data was carefully entered into a Microsoft Excel spreadsheet that automatically scored the data (Razif, 2015). In accordance with the data processing guidelines, responses given in hours and minutes were converted to minutes (IPAQ, 2005). A chief rule is to exclude data that are unreasonably high, and therefore, activity bouts greater than 3 hours were truncated to no more than 180 minutes (IPAQ, 2005). Further, data was excluded if the sum of all walking, moderate, and vigorous time variables was greater than 960 minutes (IPAQ, 2005). This did not apply to the data in this study, and therefore, no data was excluded.
OSRAC-P. Data from each focal child’s checklist was carefully entered into a Microsoft Excel spreadsheet. Currently, no specific guidelines exist for the data cleaning and processing of the OSRAC-P (McIver et al., 2016). The PSI reviewed the data 3 times to ensure it coincided with the checklists and corrected any data entry errors in Microsoft Excel. Moderate activity and vigorous activity were combined to represent moderate-to-vigorous PA to coincide with the PA guidelines for the early years (Tremblay et al., 2017).

Data Analysis

Following a concurrent form of analysis for the triangulation design, quantitative and qualitative data analyses occurred separately, yet concurrently (Creswell & Plano Clark, 2007). Once analysed, the data was merged compared in the discussion section (Creswell & Plano Clark, 2007).

Qualitative Analysis

Thematic analysis was conducted to analyse interview transcripts using the qualitative software program NVivo 12. Maguire and Delahunt (2017) define thematic analysis as the identification process of themes within qualitative data. The objective was to identify themes that addressed the following 3 research questions:

i) What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?

ii) Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

iii) How effective is the SEESAW resource from educators’ perspectives?
Following Braun and Clarke’s (2006) phases of thematic analysis, once the PSI was familiarised with the data, initial codes were generated in NVivo 12 using an in vivo coding technique (Saldana, 2009). In vivo coding is the process of selecting a word or short phrase from the participants’ transcript (Saldana, 2009). This technique was appropriate for the current study because it allowed the researcher to make interpretations of participants’ everyday lives, and then record frequencies of phrases (Saldana, 2009). Continuing with Braun and Clarke’s (2006) phases of thematic analysis, the codes were reviewed and searched for potential themes and sub-themes that were reviewed. Lastly, themes and sub-themes were defined and organised with their corresponding codes and quotations in a table in Microsoft Excel (Braun & Clarke, 2006). Once themes and sub-themes were defined, NVivo 12 was used to generate word frequencies of codes within each sub-theme.

**Quantitative Analysis**

Data from the International Physical Activity Questionnaire Long Form was calculated in Microsoft Excel using the IPAQ scoring protocol (IPAQ, 2002). Once Metabolic Equivalents (METs) were calculated, they were statistically analysed in the statistical software program SPSS (25.0). Data from the OSRAC-P (Brown et al., 2006) was transferred from Microsoft Excel and statistically analysed in SPSS (25.0). The objective was to compare questionnaire data and observational data from Autumn and Winter to answer the following research question: How does SEESAW impact educators’ and preschool children’s PA behaviours?

**IPAQ.** The PSI used the coding spreadsheet (Razif, 2015) to calculate the total MET-minutes educators engaged in specific domain PA and overall walking, moderate
PA, vigorous PA, and sitting behaviours. Once total Autumn and Winter MET-minutes from each PA intensity and domain were transferred into SPSS (12.0) as scale variables, inferential statistics were used to compare Autumn and Winter PA intensity and domain means (Creswell & Plano Clark, 2007).

According to the IPAQ (2005) Scoring Protocol, there are two forms of output from scoring the data. Educators’ responses can be scored as *categorical variables* or *continuous variables* (IPAQ, 2003). Scoring the data categorically results in individuals’ activity levels being classified as either *low activity*, *moderate activity*, or *high activity*. Alternatively, by scoring educators’ data as *continuous* variables, their reported minutes of PA are converted into MET-minutes. It is important to note that MET-minutes had to be calculated in order to categorise educators’ PA into either *low*, *moderate*, or *vigorous* PA. Individuals’ PA levels are categorised as *low* in cases where no or little PA was reported. The IPAQ (2005) noted that levels were categorised as *moderate* when individuals reported:

Three or more days of vigorous intensity activity and/or walking of at least 30 minutes per day, or five or more days of moderate intensity activity and/or walking of at least 30 minutes per day, or five or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total PA of at least 600 MET minutes a week. (p. 6)

Further, individuals’ activity level was categorised as *high* if they reported vigorous intensity activity on at least 3 days totaling 1500 MET-minutes per week, or 7 or more days of any combination of level activities totaling at least 3000 MET-minutes per week (IPAQ, 2005).
Table 1

*MET Values Associated with Each Physical Activity Category*

<table>
<thead>
<tr>
<th>Activity Domain</th>
<th>Physical Activity Intensity/Type</th>
<th>MET Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>Walking</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>Vigorous</td>
<td>8.0</td>
</tr>
<tr>
<td>Active Transportation</td>
<td>Walking</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>Cycling</td>
<td>6.0</td>
</tr>
<tr>
<td>Domestic and Garden</td>
<td>Vigorous</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Moderate (yard work)</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>Moderate (indoor chores)</td>
<td>3.0</td>
</tr>
<tr>
<td>Leisure Time</td>
<td>Walking</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>Vigorous</td>
<td>8.0</td>
</tr>
<tr>
<td>Sitting</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**OSRAC-P.** Observations from the checklist were summed for each variable, and only variables that accounted for at least 2.5% of observations (McIver et al., 2016) in that domain were exported to SPSS (12.0) as continuous variables.

Inferential statistics were employed to discover the relative impact of SEESAW on children’s PA behaviours. A paired-samples t-test explored differences in variables between Autumn and Winter, while a Pearson $r$ correlation was used to determine statistically significant relationships between PA intensities and independent variables associated with SEESAW (i.e., group composition, teacher prompts, and initiator of PA). Further, a simple linear regression was used to verify only the statistically significant relationships between predictor variables (Creswell & Plano Clark, 2007). All inferential statistical tests were conducted using a confidence interval of 95%, with an alpha level of $< 0.05$.

**Methodological Assumptions and Limitations**

In this mixed-methods study, the researcher used the *convergence model*, which is a variant of the triangulation design (Creswell & Plano Clark, 2007). This was an appropriate methodological assumption because it allowed for the collection and analysis of each type of data separately yet concurrently, whereas other mixed-methods designs are sequential in nature (Creswell, 2015). If only educators’ perceptions regarding SEESAW were collected, there would be a lack of information regarding changes in children’s and educators’ PA behaviours.

The primary methodological limitation surrounds the measurement of SEESAW. If SEESAW were an independent variable, a *repeated-measures design* would have been employed, which is a more reputable design for determining statistically significant
relationships (Soini et al., 2014). Although relationships between PA intensities and variables that reflect components of SEESAW can still be explored, conclusions cannot state a positive or negative relationship between PA intensities and the resource itself.

**Ethical Considerations**

As a study with human participants, securing Brock University Research Ethics Board approval was mandatory before the commencement of any research activity. According to O’Reilly, Ronzoni, and Dogra (2013), there are 4 guiding principles that inform research with human participants:

i) Respect for autonomy;

ii) Justice;

iii) Beneficence; and

iv) Non-maleficence.

*Respect for autonomy* means to ultimately accept participants’ actions and decisions throughout the research study (O’Reilly et al., 2013). In this study, educators were made aware that for confidentiality purposes, a pseudonym had to be used in place of their name. Educators were allowed to either consent or not consent to any part of the research activities including the completion of the interviews and questionnaires. More specifically, educators were asked if they were comfortable being audio recorded during interviews; if they said no, they would not be recorded. All educators in this study provided consent for being audio recorded. O’Reilly et al. (2013) indicate that respect for autonomy is especially important for children because they can, in fact, make their own decisions, despite their age. To respect children’s autonomy, the PSI acquired verbal assent from each child prior to each observation and did not direct children’s movement.
Justice as a guiding principle is defined as the moral obligation researchers have to participants (O’Reilly et al., 2013). In the context of research, this means treating all participants equitably, without prejudice or discrimination (O’Reilly et al., 2013). Given the nature of the study and questions surrounding participation in PA, educators were at risk of feeling embarrassed about their PA habits. To manage this risk at each stage of research, educators were reminded that a lack of participation in PA does necessarily equate to being unhealthy. O’Reilly et al. (2013) note that justice for children means recognising that they are not a homogenous group, and instead, have individual characteristics that should be seen without bias and discrimination.

Beneficence is the third guiding principle that O’Reilly et al. (2013) define as goodness toward participants and society in general. This regards the benefits that are related to the study (O’Reilly et al., 2013). The potential benefits for the participants involved in the study included obtaining knowledge and awareness of the importance of PA for one’s self and for children in early childhood contexts. The interviews are specifically beneficial because Tucker et al. (2011) found that preschool educators who were interviewed regarding PA became increasingly aware of the importance of PA. Lamming et al. (2017) found that this awareness can lead to the development of a healthier and happier community, where adults and children are increasingly active together. Further, results from this study, when shared with Niagara Region Public Health department, could potentially contribute to current Niagara Region public health promotion strategies of how to increase PA in early childhood contexts (McKay & Nigro, 2016).
Lastly, *non-maleficence* is the guiding principle that aims to lower any risks possibly associated with the study (O’Reilly et al., 2013). Educators in this study were subjected to risks regarding their emotional well-being and social status. To manage this risk, each consent form informed educators that they could terminate their participation at any point should they feel any discomfort and/or emotional upset. Social risks in this study included loss of privacy within the dissemination of results. The interview gathered educators’ information regarding their name, age, professional title, gender, level of education, and years of experience. To manage this risk of information breach, the PSI respectfully asked participants to select a pseudonym of their choice to protect their confidentiality. Due to the low sample size of educators, their identity would have been compromised if their age and years of experience was included in the dissemination of results, and therefore, the PSI did not include this information. Child participants were at risk for loss of privacy as well while being observed, because their name and PA behaviours were recorded. This risk was mitigated by assigning all children a number throughout the data collection process. Children’s PA behaviours were analysed in their entirety, and therefore, it was not applicable to reveal each child’s identity in the dissemination of results.

**Summary of Methodology and Procedures**

This chapter provided a detailed description of the methodology and procedures in this study. A convergent triangulation mixed-methods design was chosen to explore the effectiveness of SEESAW on educators’ beliefs and practices and children’s PA behaviours in a centre-based childcare (Creswell & Plano Clark, 2007; Leavy, 2017). Data collection and data analyses were centered on the following research questions:
i) How does SEESAW impact preschool children’s physical activity behaviours?

ii) What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?

iii) Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how? and

iv) How effective is the SEESAW resource from educators’ perspectives?

The following chapter, Chapter Four, will provide a presentation of the results from the study.
CHAPTER FOUR: PRESENTATION OF RESULTS

This study examined SEESAW implementation’s effect on preschool children’s physical activity (PA) behaviours. Moreover, it explored educators’ beliefs and practices surrounding PA, in relation to their own PA engagement and that of the children in their care. In this chapter, the researcher presents findings from a convergent triangulation mixed-methods study that sought to answer the following research questions:

i) How does SEESAW impact preschool children’s physical activity behaviours?

ii) What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?

iii) Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

iv) How effective is the SEESAW resource from educators’ perspectives?

Data was gathered in one childcare site through semi-structured interviews, adult physical activity questionnaires (IPAQ Long Form), and direct observations of children’s PA behaviours (OSRAC-P). Qualitative analysis included a thematic analysis of interview transcripts, while quantitative analysis employed descriptive and inferential statistics of questionnaire and observation data.

Outline of Results

In the first section of this chapter, a brief profile of educator participants and child participants are highlighted, including various demographic information. Resultant from the design of the study, quantitative and qualitative results will be presented separately and then integrated in the final section of this chapter. Qualitative results will discuss
findings from a thematic analysis of educator interview transcripts. This analysis revealed 5 overarching themes in relation to PA: i) practices; ii) beliefs; iii) knowledge; iv) barriers; and v) facilitators. Quantitative results will review descriptive and inferential statistical findings of differences in educator’s self-reported PA, and children’s observed PA between Autumn and Winter. A paired-samples t-test of children’s PA behaviours found statistically significant changes in gross motor and standing behaviours. A Pearson r correlation found statistically significant relationships between specific PA intensities and variables related to SEESAW. These relationships were explored further in simple linear regressions.

Results from both analyses will be merged in a final discussion, under the heading, Integration and Interpretation of Findings, to discuss how the qualitative results contribute to the understanding of the quantitative results (Leavy, 2017).

**Participants’ Demographic Profiles**

The participants in this study consisted of Registered Early Childhood Educators (RECEs) (N = 3), and preschool children between the ages of 2.5 and 4 years of age (N = 12). Two educators were employed full-time in a preschool classroom, and one was employed as a part-time float educator, working mostly in preschool classrooms. Educators were asked to indicate their highest level of education, and 100% reported college level education. Their ages and years of experience were recorded during data collection, but not included in results due to risk of loss of confidentiality. The following pseudonyms were chosen by the educators, which will be used throughout the dissemination of results: Sara, Rose, and Danily. Children’s identities were unrelated to the aim of the study and were therefore excluded from the results.
Qualitative Findings

Educators were interviewed in both Autumn and Winter to explore their beliefs and practices surrounding PA prior to the implementation of SEESAW, and 4 months after implementation commenced. The qualitative findings were the result of thematic analyses of educator interview transcripts from Autumn and Winter. This section will present findings from each interview separately, and then discuss similarities and differences that were found in the comparison of themes from each season. In vivo coding produced 5 overarching themes in relation to PA: i) practices; ii) beliefs; iii) knowledge; iv) barriers; and v) facilitators. Within each theme, Sara, Rose, and Danily expressed similar and different responses that will be discussed further below.

Autumn Interviews

The first set of semi-structured interviews occurred in early October 2018, prior to the implementation of SEESAW Phase Two: Physical Activity. Educators had received training of the SEESAW Phase One: Healthy Eating module in April 2018. This training introduced the importance of healthy eating in early childhood and provided educators with resources to implement healthy eating activities in their classrooms. Questions in the first interview were guided by the overarching research questions, and asked educators to provide their definition of PA and knowledge surrounding PA guidelines, as well as express their beliefs, practices, and knowledge surrounding PA.

Practices. One major theme found throughout the transcripts was the practices educators engage in related to PA. Though Sara, Rose, and Danily expressed different practices, there were 3 common sub-themes found:

i) Engagement in physical activities at work;
ii) Use of resources to increase children’s PA (e.g., SEESAW); and

iii) Continuous professional learning.

**Engagement in physical activities at work.** When analysing the interview transcripts, it became evident that educators regularly discussed the various types of PA they engage in at work. In vivo coding revealed all educators engage in either some or all of the following activities: yoga, games, music and singing, rough and tumble play.

**Use of resources to increase children’s physical activity.** Through in vivo coding of the Autumn interview, one educator described their use of Pinterest as a resource, “I’ll pull up on Pinterest, things that I can research for them to move and grow their gross motor skills” (Rose, Transcript 1, Line 18). Likewise, Sara and Danily expressed interest in using resources if they were available.

**Continuous professional learning.** Two educators reported attending continuous professional learning workshops. The topics of these workshops, however, did not surround PA, and although all attended SEESAW Phase One training, this workshop focused solely on healthy eating and gardening in early learning contexts.

**Beliefs.** Secondly, educators also expressed their beliefs surrounding five sub-themes related to PA:

i) Their definition of PA;

ii) The importance of PA;

iii) Children move innately;

iv) Educator roles regarding PA; and

v) Parental roles regarding PA.
Physical activity means moving. Educators were asked to provide personal definitions of PA. The commonality that existed in their definition was that PA means ‘to be moving.’ Educators defined it as:

Moving, to be moving, to keep movement, and to be exercising... to strengthen gross motor, that’s what I think of. when I think of PA, I think of gross motor... I don’t think of us casually walking from place to place as doing physical activity. I think of it, it seems more of a 'going to gym class', know what I mean? (Rose, Transcript 1, Line 12)

Physical activity is beneficial. Each educator reiterated many times throughout the interview that PA is important in early childhood because it provides countless physical health benefits:

I think it’s SO important for them to be physically active... so important... they have so much energy that they need to get out, and it helps regulate their self-emotions... it helps so much throughout the day... and it’s like, if it’s getting too loud or too rowdy in here, let’s move it to the active room, or lets go outside... and suddenly it’s a whole new environment for them. (Rose, Transcript 1, Lines 29-31)

Moreover, learning benefits were fully recognised as a facet of PA. Rose stated, “I think it’s awesome to tire them out or keep them busy... it’s teaching them balance, and how to navigate through life without having stoppers and blockers, and stuff like that, that inhibit them from moving forward” (Rose, Transcript 1, Lines 35-37).

Physical activity and sedentary habits are learned behaviours. Educators expressed that exposure to PA and sedentary behaviours shape how active and inactive
children are as they age and develop. The most significant examples of this sub-theme appeared in Sara’s transcripts:

What you instill in children at a young age is what sticks with them as they go through childhood and into their adult life … Kids watch everything we do, and it’s easy to ask a child to do something, but if they see you doing it, they’re more likely to follow your lead. I think that it’s a learned behaviour to be inactive … it’s what your exposed to that you learn to just sit and watch tv, or how you’re conditioned in your home life … if you’ve grown up not having physical activity, then you almost have to retrain yourself to become physically active, but if you’re active all through your childhood, you just do it out of enjoyment… its normal for you. (Sara, Transcript 1, Lines 20, 39, 41-42)

*Children move innately.* In contrast to learned behaviours, educators noted that movement in children is innate, and children were born to move. This is shown by Danily when they note that, “When kids are born, they need to move... they were born to move” (Transcript 1, Line 45).

*Educator’s role.* Sara, Rose, and Danily spoke frequently about what they believe their role is in relation to PA. Educators expressed strong beliefs that they need to support and encourage each other to use resources, role model and encourage PA behaviours, engage in PA alongside children, and introduce and foster safe risk taking in active play:

I think it’s important for us to role model to them, to be interactive with them and show them, and not just stand there and tell them to do something, and ask them to do running, but to show them and be involved with them because that gets them so much more excited and then you’re role-modeling the actual behaviour for
them. It’s not enough for me to just say 'hands over your head', I have to do it with them and help them do it, and then you’re holding certain stretches and stuff... so definitely takes a lot of the educator to be involved with it. (Rose, Transcript 1, Lines 42-47)

**Parental role.** When discussing the importance of PA, educators expressed strong beliefs about parents’ role in engaging children in and exposing their children to PA. Educators emphasised the active role parents must undertake to foster PA. For example, Danily stated, “Get em into soccer, get em into sports... but the parents have to be motivated to take them” (Danily, Transcript 1, Line 14).

**Knowledge.** Educators in this study were asked about their knowledge of the Canadian Physical Activity Guidelines for the Early Years (Tremblay et al., 2018) and how many minutes children should be engaging in PA, as well as knowledge of the SEESAW PA resource. Responses to these topics resulted in two corresponding sub-themes:

i) PA guidelines; and

ii) SEESAW.

**Physical Activity Guidelines.** Each educator reported having no knowledge of the PA guidelines. Further, when asked how many minutes they think children should be engaging in PA according to the guidelines, educators’ responses varied from 30 minutes to 3 hours. None of the educators appeared quite sure of the recommendations. Sara stated, “I know that children should be getting at LEAST 30 minutes of PA daily... I know 30 minutes of actual structured physical activity time is what I’ve heard they recommend” (Sara, Transcript 1, Lines 11-13).
SEESAW. Educators were asked if they knew anything about the aim of SEESAW Phase Two: Physical Activity. Danily reported having little knowledge about Phase One: Healthy Eating, but no knowledge about Phase Two. Rose stated she used the healthy eating resource from Phase I, and that her and Danily were anticipating the PA workshop and resource.

Barriers and facilitators. Throughout each interview, educators reported both barriers and ideas related to ways to facilitate PA that corresponded to the levels of the social-ecological model:

i) Intrapersonal/individual;

ii) Interpersonal;

iii) Physical environment; and

iv) Structural and organisational levels (Bethancourt, Rosenberg, Beatty, & Arterburn, 2014; McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis, Owen, & Fisher, 2008).

See Table 2 for reported barriers and facilitators from Autumn interviews at various levels in the social-ecological model.

Intrapersonal/individual. Barriers and facilitators coded at this level are related to characteristics of children, educators, and parents such as knowledge, attitudes, personality, and use of technology (Bethancourt et al., 2014). Only one facilitator was coded at this level related to the provision of having appropriate clothing for both children and adults. The most frequently coded barrier at this level was technology use. Consistently, all three educators perceived technology as a detriment to high levels of PA in children. This is instanced with Danily stating,
Oh my god... with all the technology, they need physical activity… and more technologies out there; I think [ParticipACTION’s] low grade for children’s PA is because of technology and phones; I don’t know how to work my cell phone...yet my kids know. (Danily, Transcript 1, Lines 67-69)

Interpersonal. This level included barriers and facilitators related to children’s formal and informal social networks, such as peers, parents, and educators (Sallis et al., 2008). Barriers coded at this level included educators’ and parents’ lack of confidence and knowledge surrounding risky PA. A supportive mentor (e.g., supervisor) appeared to be one of the most commonly perceived facilitators of PA:

Our [supervisor] coming down to relieve us or be an extra hand when we’re tossing kids from room to room… very supportive… and a supportive supervisor really makes a difference. Her encouraging us to go out in a little bit of rain makes a difference… (Rose, Transcript 1, Lines 65-66)

Additionally, Rose noted that guest PA professionals would positively affect children’s PA and educator’s competency of PA:

Having somebody come in and tell us you know this is what we could do and kind of do a workshop here or show us with the kids... but yeah to have that resource come in and do that with the kids and show the educators how it could be implemented... that would be most helpful. (Rose, Transcript 1, Lines 207-209)

Physical environment. This level of the model pertained to barriers and facilitators such as weather and proximity to parks. Facilitators at this level included large residential property, proximity from school/home to parks, nature and natural
environments, open space in childcare, additional equipment, music activities, rough and tumble play, close proximity to workshops, and active transportation.

Various barriers were coded at this level such as proximity to parks, location of workshops, type of residence, and transportation. The most frequent barrier reported was lack of space:

Space in childcare centres is a barrier sometimes, there’s no barriers with that here because of the active room, but at some sites sometimes there is a barrier with an indoor space like if it’s a rainy day...you don’t have that big running space other places... (Sara, Transcript 1, Lines 70-73)

**Structural/organisational.** This level related to barriers and facilitators such as childcare policies and childcare centre interventions (e.g., schedule policies and implementation of PA interventions). Educators commented on structural and organisational barriers and facilitators the most throughout the interviews. Regarding barriers, routine in childcare centres was the most reported. Routine in this context included the time of day due to the childcare policies requiring 2 hour-long outdoor play periods (CCEYA, 2014):

Barriers are the time of the day... the routine of it, when you’re sitting for an activity, or when we only have our outside time in the morning, the kids that get dropped off after that time, or if they’re having a late morning, they’re not going to get a full day of [PA]... and so that’s a barrier... time restrictions, time limits, sometimes at the end of the day they’re waking up from their nap at 230, we get down [to the active room] at 3, then they’re picked up at 315... so they don’t even
get the amount of time being physical that we want them to be, or that they need to be. (Rose, Transcript 1, Lines 132-137)

Regarding facilitators at this level, educators perceived *interventions, resources, and pre-service education* to promote PA behaviours:

I could definitely see them being effective absolutely because with a big group of 14 preschoolers and maybe 10 of them are still playing and 4 of them are kind of just kicking the rocks by the fence... I can definitely see an intervention helping them get excited to go back outside... because there’s always a few children who would rather be inside... I think having a tool like SEESAW for educators to refer to, and for ECEs struggling, you can hand it off... to have as a reference, to have something tangible, to have something that says 'this is something you can do right now, today' absolutely, I think that will be helpful. Especially when you’re in the busyness of your own day and your own mind, what can I do to get these kids moving, what kind of activity can I come up with today, you’re racing through it and have staff support you as well... really helpful and easy... would definitely make a big difference. (Rose, Transcript 1, Lines 156-159; 182-183)
Table 2

*Reported Barriers and Facilitators from Autumn Interviews at Various Levels in the Social-Ecological Model*

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal/Individual Level</strong></td>
<td></td>
</tr>
<tr>
<td>• Lack of appropriate clothing for child</td>
<td>• Appropriate clothing</td>
</tr>
<tr>
<td>• Technology use</td>
<td></td>
</tr>
<tr>
<td>• Gender of child</td>
<td></td>
</tr>
<tr>
<td><strong>Interpersonal Level</strong></td>
<td></td>
</tr>
<tr>
<td>• Lack of parental guidance</td>
<td>• Peer interaction/friends at daycare</td>
</tr>
<tr>
<td>• Educator knowledge of PA</td>
<td>• Educator involvement in activity</td>
</tr>
<tr>
<td>• Educator confidence</td>
<td>• Parental encouragement</td>
</tr>
<tr>
<td>• Parental fear</td>
<td>• Supportive supervisor</td>
</tr>
<tr>
<td><strong>Physical Environmental Level</strong></td>
<td>• Support from co-workers</td>
</tr>
<tr>
<td>• Space</td>
<td>• Guest PA instructors</td>
</tr>
<tr>
<td>• Weather</td>
<td>• Positive parental perspective</td>
</tr>
<tr>
<td>• Proximity to parks</td>
<td>• Educator personality</td>
</tr>
<tr>
<td>• Location of workshops</td>
<td></td>
</tr>
<tr>
<td>• Type of residence</td>
<td></td>
</tr>
<tr>
<td>• Transportation</td>
<td></td>
</tr>
<tr>
<td>• Sitting activities</td>
<td></td>
</tr>
<tr>
<td><strong>Structural and Organisational Level</strong></td>
<td></td>
</tr>
<tr>
<td>• Routine in childcare</td>
<td>• Pre-service education about PA</td>
</tr>
<tr>
<td>• Cost of activities and sports</td>
<td>• Convenient resources for educators</td>
</tr>
<tr>
<td></td>
<td>• Interventions</td>
</tr>
<tr>
<td></td>
<td>• SEESAW</td>
</tr>
</tbody>
</table>
Winter Interviews

The second set of semi-structured interviews occurred in late February 2019, after SEESAW Phase Two: Physical Activity had been implemented for 4 months. Rose and Danily received training at the workshop in late October 2018, but Sara did not. This 3-hour training introduced the importance of PA in early childhood, outlined the *Canadian Physical Activity Guidelines for the Early Years* (Tremblay et al., 2017) and provided educators with resources to implement physical activities in their classrooms. Interview questions in the second interview were altered to reflect the overarching research questions, and specifically, to explore educators’ perceptions regarding the effect SEESAW had on children’s PA behaviours. The purpose of asking similar questions was to reveal if any changes in educators’ perceptions occurred after SEESAW had been implemented. Despite minor changes in questions, the analysis resulted in the same overarching themes and their sub-themes: i) practices; ii) beliefs; iii) knowledge; iv) barriers; and v) facilitators.

It is important to note that between Autumn and Winter interviews, educators received training on PA in natural environments, as well as additions to the outdoor environment within the childcare including the addition of a wooden child-sized house, a mud kitchen, wooden posts, and various tree stumps. The naturalised playground expert\(^1\) that visited the childcare centre provided educators with training surrounding naturalised environments and the practical application of physical activities in the outdoor environment. Some research indicates that natural playgrounds with multiple and

\(^1\) The name of the trainer has been eliminated from the transcript to insure anonymity. The company Bienenstock is a designer of naturalized playgrounds, and information is publicly available on the website http://www.naturalplaygrounds.ca.
complex play affordances offer greater opportunities for PA (Harwood et al., 2017; Storli & Hagen, 2010).

Additionally, it is important to note that Sara did not participate in the SEESAW Phase Two: Physical Activity training, and therefore, she was unable to respond to questions in the second interview regarding the effectiveness of SEESAW. However, Sara did participate in the training that Bienenstock provided; thus, her general perceptions of PA were included in the analysis and reporting of results.

**Practices.** The amount of in vivo codes surrounding educators’ practices significantly increased in amount and diversity in the Winter interview transcripts. Educators expressed an increased engagement in PA at work and increased involvement in continuous professional learning. The following consistent sub-themes from the Autumn interviews were found yet again in the Winter transcripts:

i) Engagement in physical activities at work;

ii) Use of resources to increase children’s physical activity; and

iii) Continuous professional learning:

*Engagement in physical activities at work.* Educators reported engaging in more diverse types of physical activities such as pretend play, relay races, obstacle courses, and gross motor movements. Rose narrated,

I'm setting up obstacle courses – that's been our number one thing. We have a few of our preschoolers who can actually lift up the benches and help drag them along and then they set up how they want their 'ponds' (their jumping ponds). We've really been trying to incorporate more. (Rose, Transcript 2, Lines 48-51)
Moreover, educators appeared to more fully integrate PA throughout all aspects of programming:

> I know throughout the day when we're getting a little bit stir crazy, ok let's get up and do a dance, or like, let's pretend we're monsters walking from the active room you know, we'll take big giant steps. (Rose, Transcript 2, Lines 176-178)

**Use of resources to increase children’s physical activity.** Despite being asked if they utilised the SEESAW resource book, educators reported utilising alternate resources such as Facebook, the internet, and Pinterest. Only Danily and Rose reported using the SEESAW resource kit. Sara did not, but she did express interest in using it in her practice moving forward. Rose reported use of more resources to engage children in PA:

> I'm not just on Pinterest anymore looking for crafts and stuff, it's more, what can I do to get the kids moving today, how can I get them involved in big body movements? How is this gonna benefit them further down the line? (Rose, Transcript 2, Lines 205-252)

**Continuous professional learning.** In addition to the SEESAW workshop that Rose and Danily attended, Sara, Rose, and Danily each received in-centre training on naturalised environments from Bienenstock. The educators tended to emphasise and discuss the Bienenstock training more than the SEESAW workshop; perhaps the trainer, the novel content of this particular workshop, and the close timing between the training and interviews affected the interview discussion in this way. Rose explained the following about the training:

> She was talking about big body movement and having less fine motor skills so they can have those opportunities to do that. And I was just like, woah I didn't
realise that as an educator, I was shutting those opportunities down… I was just like, here's an activity, here's this one. But it's more about how they get there… My conversations with the trainer just changed everything, how I should expose children to it. (Rose, Transcript 2, Lines 15-18; 23)

**Beliefs.** Winter interviews asked educators to comment on how their beliefs surrounding PA had changed after SEESAW had been implemented. The following sub-themes were a result of thematic analysis:

i) PA means more than moving;

ii) PA is beneficial;

iii) Physical activity and sedentary are learned behaviours;

iv) Children move innately; and

v) The educator’s role regarding PA.

Educators did not discuss their beliefs surrounding parental roles about children’s PA and therefore, that corresponding sub-theme, which was prevalent in the August interviews, was omitted. The only sub-theme that altered from the first interview was PA means more than moving.

_Physical activity means more than moving._ Thematic analysis in this study revealed that educators no longer believe PA meant ‘just moving,’ and instead, their definitions expanded to include a focus on the educator:

[My definition] changed in a way that it's not my view of it, it's more about the experience of getting there and not just if they can do that jump, but how we can provoke them to get there… it's more about how they get there. (Rose, Transcript 2, Lines 8-9; 18)
Physical activity is beneficial. In the second interview, educators spoke more in-depth about their beliefs regarding the benefits of PA. Educators narrated a belief that PA was beneficial for self-regulation, developing healthy habits, better sleep and peer interaction, and was beneficial for children with Autism Spectrum Disorder (ASD):

Oh my gosh, benefits all around the board. Self-regulation skills, so much, yeah, I think it helps with their emotional regimen. Because I have children that are on the spectrum and undiagnosed, and when we are doing more physical things with them, that they are more involved and more focused on that. (Rose, Transcript 2, Lines 127-129)

Physical activity and sedentary habits are learned behaviours. Sara expressed the remaining belief that PA and sedentary behaviours are learned:

If you don't have that exposure as a child, then perhaps later if you're overweight or for health reasons you're trying to become more active, it might seem like harder work. Whereas, if you've always had a healthy lifestyle and been active from childhood, it's more likely to stay with you. (Sara, Transcript 2, Lines 27-30)

Children move innately. Rose and Danily remained rooted to their belief that preschool-aged children are innately physically active. This belief was consistent from the outset to the end of the study.

Educator’s role. Similar to the Autumn transcripts, codes that appeared in this sub-theme included educators’ role modeling PA behaviours and engaging in PA with children. However, in the second interview, educators also expressed a need for educators to document children’s PA, and teach parents about the importance of PA and safe risks for young children:
I just think the education to the parents, sharing the types of activities in class, having some interactive type - maybe a day where parents come play outside or that sort of thing… We should be documenting the types of activities that the kids are doing and sharing it with the parents and that would hopefully be an educational piece to bridge that gap between what they're doing here and what they're not doing at home. I mean, some children probably are getting some PA at home…so just sharing those ideas with them. (Sara, Transcript 2, Lines 78-79; 82-86)

Interestingly, the Winter interviews did not contain references to parental role.

**Knowledge.** Educators were asked to comment on any changes in their knowledge related to the *Canadian Physical Activity Guidelines for the Early Years* (Tremblay et al., 2017). Notably, the SEESAW workshop does include information specific about these guidelines. Although educators reported knowledge of the guidelines’ existence, specific understanding of the contents of the guidelines remained unchanged from the onset of the study. Educators’ knowledge remained inaccurate. For instance, Rose stated that children should obtain, “at least three hours, if not more” (Rose, Transcript 2, Line 46), while Sara stated 60 minutes, and Danily estimated 3 to 5 hours.

**Barriers and facilitators.** During the second interview, educators reported sub-themes of barriers and facilitators related to PA that related again to the levels of the social-ecological model (Bethancourt et al., 2014; McLeroy et al., 1988). Educators reported these based on their beliefs, as well as what they have experienced while employed in childcare settings or as a parent. See Table 3 for a compilation of all reported barriers and facilitators.
Table 3

Reported Barriers and Facilitators from Winter Interviews at Various Levels in the Social-Ecological Model

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal/Individual Level</strong></td>
<td></td>
</tr>
<tr>
<td>• Child’s preference to weather</td>
<td>• Educator practices</td>
</tr>
<tr>
<td>• Stage of development/ASD</td>
<td>• Guest PA instructors</td>
</tr>
<tr>
<td>• Technology use</td>
<td>• Parental encouragement of active transportation</td>
</tr>
<tr>
<td>• Lack of appropriate clothing</td>
<td>• Educator positive attitude of PA</td>
</tr>
<tr>
<td><strong>Interpersonal Level</strong></td>
<td>• Educator knowledge of PA</td>
</tr>
<tr>
<td>• Parental negative reinforcement</td>
<td></td>
</tr>
<tr>
<td>• Lack of adult direction</td>
<td>• Educator practices</td>
</tr>
<tr>
<td>• Educators that focus on product over process</td>
<td>• Educator positive attitude of PA</td>
</tr>
<tr>
<td>• Lack of educator reflective practice</td>
<td>• Parental encouragement of active transportation</td>
</tr>
<tr>
<td>• Educator lack of knowledge on outdoor play</td>
<td>• Educator knowledge of PA</td>
</tr>
<tr>
<td>• Educator lack of knowledge surrounding PA with ASD</td>
<td>• Educator positive attitude of PA</td>
</tr>
<tr>
<td>• Educator lack of confidence</td>
<td>• Educator knowledge of PA</td>
</tr>
<tr>
<td>• Educators who value traditional practices</td>
<td>• Educator positive attitude of PA</td>
</tr>
<tr>
<td><strong>Physical Environmental Level</strong></td>
<td>• Educator positive attitude of PA</td>
</tr>
<tr>
<td>• Lack of equipment</td>
<td>• Natural environment &amp; materials</td>
</tr>
<tr>
<td>• Cheap equipment that breaks easily</td>
<td>• Outdoor environments</td>
</tr>
<tr>
<td>• Parents’ proximity to activities</td>
<td>• Warm weather</td>
</tr>
<tr>
<td>• Mixed age groups in certain spaces</td>
<td>• Appropriate equipment</td>
</tr>
<tr>
<td>• Inclement weather</td>
<td>• An ‘active room’</td>
</tr>
<tr>
<td>• Lack of outdoor space at home</td>
<td>• Natural environment &amp; materials</td>
</tr>
<tr>
<td>• Far proximity from home to parks</td>
<td><strong>Structural and Organisational Level</strong></td>
</tr>
<tr>
<td><strong>Structural and Organisational Level</strong></td>
<td></td>
</tr>
<tr>
<td>• Lack of funding for childcare centre</td>
<td>• Pre-service education about PA</td>
</tr>
<tr>
<td>• Inclement weather policies</td>
<td>• Scheduling PA in routine</td>
</tr>
<tr>
<td>• Gap between what’s learned in workshops to practice</td>
<td>• Workshops for educators</td>
</tr>
<tr>
<td>• Building policies for building/adding materials to infrastructure</td>
<td>• Free activities for families</td>
</tr>
<tr>
<td>• Routine policies in childcare</td>
<td>• Involvement in organised sports</td>
</tr>
<tr>
<td></td>
<td>• Conveniences resources for educators</td>
</tr>
</tbody>
</table>
Intrapersonal/individual. Technology use remained a prominent barrier narrated by the educators in the second interview. In addition to children’s use of technology, clothing challenges for specific types of weather (e.g., no coat in cold weather), preference to weather, and children’s individual development were reported as barriers:

With potty training it's hard too because if you're tobogganing, the kid has to go to the bathroom, you don't want to put them back in a diaper because they don't like it or you can't make the brain change over like that again. (Danily, Transcript 2, Lines 160-162)

Educators did not mention any interpersonal/individual aspects that would facilitate more PA in the second interview.

Intrapersonal. In vivo codes found at this level related to the social networks of children, which include parents and educators. Barriers that were found include lack of adult direction, educators’ lack of knowledge on ASD and PA, educators’ lack of confidence, and educators who value traditional practices. Rose specified and stated:

I feel like maybe because I'm not an EA, or maybe because I haven't studied [ASD], it's almost like you're reluctant to engage in physical activity with them. Some of them can be so violent, aggressive, or emotional that you are seeing people trying to deter from that. But if you embrace it in the proper way, I feel like it can be very empowering for that child. Like, okay this is how I move my body? … I think co-parenting, with other educators, trying to get co-workers on board with safe risks. It would be me implementing an activity one way, and then if I'm not there, the rules change for it. I understand because maybe you're not gonna be as active or involved as I was in that activity, so it makes you more
nervous. But then it puts up a barrier with that activity and for that child that is told sometimes they can do it but now they're being told it's not safe now. (Rose, Transcript 2, Lines 167-171; 214-218)

Facilitators at this level included *parental encouragement of active transportation, educators maintaining a positive attitude toward PA, and educators’ knowledge of PA*. Danily explained that parental encouragement of active transportation includes parents walking with their children to go school instead of driving, for instance.

The most prominent facilitator found at this level was having *guest PA instructors* visit the childcare centre and lead PA activities for the children. Rose stated, “if [guest instructors could] implement an activity with the children, having more exposure for coworkers, then I think that would be more comforting and reassuring, even for children” (Rose, Transcript 2, Lines 232-234).

**Physical environment.** Educators reported several barriers within the physical environment that negatively affected children’s PA including *a lack of equipment, cheap equipment that breaks easily, parents’ proximity to activities, mixed age groups in certain spaces, inclement weather, lack of outdoor space at home, and far proximity from home to parks*. Proximity to activities and from home to parks regards the distance between places, where closer proximity was perceived to promote increased PA. Rose identified having age-appropriate equipment as a facilitator for PA:

Having the flow of the classrooms too has been challenging because our door connects to the toddler room. So sometimes we'll have a mix of the children, same in the active room, at the end of the day so then it's having those barriers too
because sometimes there's rules for the younger ones, where my preschoolers it's not even a thought or worry for them. (Rose, Transcript 2, Lines 223-227)

**Structural/organisational.** At the final interview, educators also discussed how policies inside and outside of childcare contexts influenced PA. A *lack of funding for childcare centres, inclement weather policies, gaps between what is learned in workshops and educator practices, and building policies for altering infrastructure* were all listed as barriers to encouraging children’s PA. Facilitators included *improved pre-service education about PA, increased scheduling of PA in routine, continuous professional development for educators, free community activities for families, and involvement in organised sports*. The most reported facilitator at this level was the *availability of convenient resources* for educators:

> Having more resources for us as educators so we're not just sitting there thinking what we can do now and it can be difficult to come up with it on the spot and especially if it's the rush of the day and ones in and ones out and two in... and the daily routine. (Rose, Transcript 2, Lines 340-342)

**Differences Between Autumn and Winter Interviews**

Each sub-theme consisted of in vivo codes that were highlighted throughout the thematic analysis process. These codes were recorded as frequencies, as seen in Table 4, in order to view any distinct changes in how often each sub-theme appeared between Autumn and Winter.
Table 4

*Frequency of Qualitative Themes and Sub-Themes in Autumn and Winter*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sub-themes</th>
<th>Frequency (N)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Autumn</td>
<td>Winter</td>
</tr>
<tr>
<td>Practices</td>
<td>Engagement in physical activities at work</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Use of resources to increase children’s PA (incl. SEESAW)</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Continuous professional learning</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Beliefs</td>
<td>Physical Activity Means Moving</td>
<td>3</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Physical Activity Means More than Moving</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Physical Activity is Beneficial</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Physical Activity and Sedentary are Learned Behaviours</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Children Move Innately</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Educator’s role</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Parental role</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Physical Activity Guidelines</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SEESAW</td>
<td>3</td>
<td>–</td>
</tr>
<tr>
<td>Barriers</td>
<td>Individual/Intrapersonal level</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Interpersonal level</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Physical environment</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Structural/Organisational</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Facilitators</td>
<td>Individual/Intrapersonal level</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Interpersonal level</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Physical environment</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Structural/Organisational</td>
<td>7</td>
<td>23</td>
</tr>
</tbody>
</table>
In Table 4, frequencies in educators’ engagement in physical activities did not increase dramatically; however, their use of resources did, from 1 in Autumn to 7 in Winter. This is logical in the sense that SEESAW was implemented between Autumn and Winter interviews, and it was assumed that educators would utilise the resource. Continuous professional learning was noted by the educators an additional time between Autumn and Winter; given the educators’ participation in various workshops and trainings surrounding PA, this noted increase in their discussion was also expected. Contrastingly, educators’ knowledge of the PA guidelines remained unchanged between Autumn and Winter interviews despite explicit training.

Prior to the implementation of SEESAW in October 2018, educators defined PA as ‘moving,’ whereas in February 2019, they defined PA as ‘more than moving.’ Furthermore, their beliefs regarding their role and the benefits of PA increased since the Autumn interview.

After SEESAW was implemented, educators’ perceived barriers to individual/intrapersonal, interpersonal, and physical environment levels increased, while structural/organisational barriers decreased. Four months after SEESAW was implemented, perceptions of facilitators to PA increased at each level.

**Quantitative Findings**

Educators completed the International Physical Activity Questionnaire (IPAQ) prior to the implementation of SEESAW in October 2018, and again 4 months later in February 2019.

Following the completion of interviews in both October and February, preschool children’s PA was also individually observed in the chosen childcare site using the
Observational System for Recording Physical Activity in Children- Preschool (OSRAC-P). The educator questionnaire and observations of children’s PA behaviours sought to answer the following research question: How does SEESAW impact children’s and educators’ PA behaviours? According to educators in previous studies (Bruijns, 2018; Gehris et al., 2015; Goldfield et al., 2012; Martyniuk & Tucker, 2014; Tsangaridou, 2017), increased training and resources surrounding PA would impact children’s PA behaviours. Therefore, it was hypothesized that SEESAW would significantly impact children’s PA levels, engagement in physical activities, type of play context, location of PA, prompts to PA, and initiator of activity. Further, it was hypothesized that educators’ PA would also be impacted because according to the social-ecological model, health behaviour is influenced by an individual’s environment (Bethancourt et al., 2014; Stokols, 1996).

The display of findings occurs in the following sections, followed by an interpretation and explanation of the findings in the final sections of this chapter.

**IPAQ**

Educator’s total MET-minutes per week for each domain and intensity were calculated using the coding spreadsheet (Razif, 2015). Below, this section describes each educators’ MET-minute sums in work, transport, domestic/garden, leisure-time, and sitting domains, and walking, moderate, and vigorous intensities. Once total Autumn and Winter MET-minute sums were calculated, educators’ PA levels were classified according to the IPAQ categorical scores according to the scoring protocol, for the purpose of determining whether educators met PA guidelines or not (ParticipACTION, 2018).
**Rose.** In Table 5, there was no significant change in Rose’s MET-minute sums in work and transport between Autumn and Winter. Rose did report a large increase in MET-minutes within the domestic and garden domain, and lower sitting minutes in Winter. Researcher notes during Rose’s completion of the IPAQ revealed this was due to her packing in preparation of moving to a new house. Further, Rose’s reported vigorous MET-minutes increased dramatically between Autumn and Winter (see Table 5). According to the IPAQ (2005), Rose’s PA behaviours are classified as *high* because her total PA intensity surpassed 3,000 MET-minutes per week.

**Sara.** In Table 5, work, transport, and leisure-time MET-minute sums appeared to decrease, while sedentary behaviours remained the same for Sara. Sara’s walking and moderate PA intensities decreased between Autumn and Winter, while her vigorous levels remained the same. Overall, Sara’s MET-minutes exceeded 3,000 MET-minutes per week, and therefore, her PA behaviours are characterised as *high*.

**Danily.** In Table 5, there was no noteworthy change in work MET-minute sums or walking and vigorous intensities for Danily. Danily reported a dramatic increase in transport MET-minutes and overall sitting minutes. During the questionnaire, Danily stated that she walks more during cold months because she knows getting fresh air is important. Similarly, her MET-minutes for walking and vigorous intensities increased. Danily’s domestic and garden MET minutes decreased significantly between Autumn and Winter, and it was noted during the questionnaire that she engages in much less outdoor gardening activities in the Winter.
Table 5

*Total Sums of PA Intensity in MET-Minutes/Week in Autumn and Winter*

<table>
<thead>
<tr>
<th>PA Intensity</th>
<th>Participant</th>
<th>Sara</th>
<th>Danily</th>
<th>Rose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autumn Winter</td>
<td>Autumn Winter</td>
<td>Autumn Winter</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>3861 2228</td>
<td>4181 6534</td>
<td>5049 4356</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>4470 3660</td>
<td>11040 5400</td>
<td>8040 12420</td>
<td></td>
</tr>
<tr>
<td>Vigorous</td>
<td>1440 1440</td>
<td>3840 4320</td>
<td>0 2400</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9771 7328</td>
<td>19061 16254</td>
<td>13089 19176</td>
<td></td>
</tr>
</tbody>
</table>
Educators’ work, transport, domestic and garden, leisure-time, sitting, and intensity MET-minutes were transferred into SPSS (12.0) as scale variables. First, descriptive statistics were employed to obtain domain and intensity means, and inferential statistics were used to compare overall Autumn and Winter PA means (Creswell & Plano Clark, 2007).

A paired-samples t-test was conducted to compare educators’ MET-minutes in each domain and intensity in Autumn and in Winter, which can be found in Table 6 and Table 7. Findings were not statistically significant between these means.
Table 6

*Overall Domain Means and Paired t-Test Statistics in Autumn and Winter*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Mean MET-Minutes/Week</th>
<th>Mean SD</th>
<th>Mean Difference</th>
<th>95% CI</th>
<th>Sig  (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>7370.00</td>
<td>8080.00</td>
<td>2522.92</td>
<td>-719.00</td>
<td>.674</td>
</tr>
<tr>
<td>Transport</td>
<td>634.70</td>
<td>1501.67</td>
<td>1809.56</td>
<td>-866.97</td>
<td>.494</td>
</tr>
<tr>
<td>Domestic and Garden</td>
<td>5960.00</td>
<td>4840.00</td>
<td>8461.40</td>
<td>1120.00</td>
<td>.840</td>
</tr>
<tr>
<td>Leisure-Time</td>
<td>1879.00</td>
<td>711.00</td>
<td>1009.23</td>
<td>1168.00</td>
<td>.184</td>
</tr>
<tr>
<td>Sitting</td>
<td>1180.00</td>
<td>840.00</td>
<td>307.90</td>
<td>340.00</td>
<td>.196</td>
</tr>
</tbody>
</table>
Table 7

Overall PA Intensity Means and Paired t-Test Statistics in Autumn and Winter

<table>
<thead>
<tr>
<th>PA Intensity</th>
<th>Mean MET-Minutes/Week</th>
<th>Mean SD</th>
<th>Mean Difference</th>
<th>95% CI</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autumn</td>
<td>Winter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>4364.67</td>
<td>4376.67</td>
<td>2083.66</td>
<td>-9.00</td>
<td>.995</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[-5185.11, 5167.11]</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>7850.00</td>
<td>7160.00</td>
<td>5011.08</td>
<td>690.00</td>
<td>.834</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[-11758.21, 13138.21]</td>
<td></td>
</tr>
<tr>
<td>Vigorous</td>
<td>1760.00</td>
<td>2720.00</td>
<td>1268.96</td>
<td>-960.00</td>
<td>.321</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>[-4114.76, 2194.76]</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13973.67</td>
<td>14252.50</td>
<td>5033.30</td>
<td>-278.83</td>
<td>.932</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[-12782.25, 12224.58]</td>
<td></td>
</tr>
</tbody>
</table>
OSRAC-P

Observations from the OSRAC-P were summed for each variable, and only variables from either Autumn or Winter that accounted for at least 2.5% \((N = 12)\) of observations were exported to SPSS (12.0) as scale variables. The purpose of this was to dismiss low-observed variables that would not reflect changes in PA behaviours between Autumn and Winter. McIver et al.’s (2016) study observing children’s PA using the OSRAC-P, for instance, only presented results where at least 30 or more observations were recorded. Due to the minimal number of observations in the current study, this study replicated McIver’s (2016) procedure with fewer observations. Variables included in the analysis can be found in Table 8.

The same 12 children were observed in Autumn and Winter, producing a total of 6,270 observations for both seasons. The mean age was excluded from analysis for confidentiality purposes, but all children were of preschool age according to the site’s age policy.

A paired-samples t-test compared the differences in variables between Autumn and Winter. There was no statistically significant difference in intensity levels between seasons, but there was a small decrease in the light intensity means.

Means in types of physical activities varied between Autumn and Winter, and while there was a dramatic increase in lying down behaviours from October 2018 to February 2019, it was not statistically significant \((.231, p = < .05)\). There was, however, a significant decrease in standing behaviours between Autumn and Winter \((.008*, p = < .05)\).
While there was no statistical significance found in PA engagement in indoor and outdoor environments between Autumn and Winter, there was a dramatic increase in outdoor means, from 7.67 to 21.08, respectively. Indoor means dramatically decreased from 30.00 to 15.08, respectively. This suggests that despite educators’ perceived Winter weather as a barrier to PA, children were more active outdoors in the Winter.

Regarding play context, observation means varied, and while art decreased dramatically between seasons, it was not statistically significant (.167, \( p = < .05 \)). There was a significant increase in gross motor behaviours from October to February (.050*, \( p = \leq .05 \)). Dramatic play means decreased between Autumn (9.67) and Winter (5.92), which was interesting because SEESAW provides plenty of dramatic play physical activities.

The location of children’s PA behaviours varied between indoor, outdoor, and transition spaces, and while PA within each of these spaces increased, it was not statistically significant. There were also no significant differences in group compositions, prompts to PA, and initiator of PA variables between the seasons. The paired-samples t-test results suggest that although there was a significant increase in gross motor play contexts and a significant decrease in standing behaviours, there was no significant impact on children’s intensity levels.
Table 8

*Observed variable means and paired t-test statistics in Autumn and Winter*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>Mean difference</th>
<th>Sig. (2-tailed)</th>
<th>95% CI</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Autumn</td>
<td>Winter</td>
<td>SD</td>
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<tr>
<td><strong>PA Level</strong></td>
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<tr>
<td>Sedentary</td>
<td>13.58</td>
<td>16.08</td>
<td>15.02 -2.500</td>
<td>.576</td>
</tr>
<tr>
<td>Light</td>
<td>13.25</td>
<td>9.75</td>
<td>12.73 3.500</td>
<td>.361</td>
</tr>
<tr>
<td>MV</td>
<td>13.17</td>
<td>14.08</td>
<td>18.14  -917</td>
<td>.864</td>
</tr>
<tr>
<td><strong>PA</strong></td>
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<td></td>
<td></td>
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<tr>
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<td>2.33</td>
<td>8.22  -2.000</td>
<td>.417</td>
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<tr>
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<td>.08</td>
<td>.718  .167</td>
<td>.438</td>
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<tr>
<td>LD</td>
<td>.67</td>
<td>3.50</td>
<td>7.73  -2.833</td>
<td>.231</td>
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<tr>
<td>RT</td>
<td>1.83</td>
<td>.00</td>
<td>4.33  1.833</td>
<td>.170</td>
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<tr>
<td>RO</td>
<td>.08</td>
<td>3.33</td>
<td>11.27  -3.250</td>
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<td>3.08</td>
<td>8.63  -500</td>
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<td>18.53  -3.083</td>
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<td>3.92</td>
<td>8.53  8000</td>
<td>.008*</td>
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<tr>
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<td>4.67</td>
<td>8.60  .750</td>
<td>.768</td>
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<tr>
<td>Other PAa</td>
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<td>5.37  -1.833</td>
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<td>.167</td>
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<td>3.83</td>
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<td>4.25</td>
<td>10.95  6.750</td>
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<td><strong>Location</strong></td>
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<tr>
<td>Indoors</td>
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<td>15.08</td>
<td>25.77  14.917</td>
<td>.070</td>
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<tr>
<td>Outdoors</td>
<td>7.67</td>
<td>21.08</td>
<td>23.54  -13.417</td>
<td>.074</td>
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<tr>
<td>TS</td>
<td>2.33</td>
<td>3.83</td>
<td>10.64  -1.500</td>
<td>.635</td>
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</tbody>
</table>
Table 8
(continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th></th>
<th>Mean Difference</th>
<th>Sig. (2-tailed)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autumn</td>
<td>Winter</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group Composition</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1-1 A</td>
<td>3.08</td>
<td>9.67</td>
<td>15.64</td>
<td>-6.583</td>
<td>.173 [-16.517, 3.351]</td>
</tr>
<tr>
<td>1-1 P</td>
<td>4.83</td>
<td>2.92</td>
<td>7.19</td>
<td>1.917</td>
<td>.376 [-2.653, 6.486]</td>
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<td>GWA</td>
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<td>10.42</td>
<td>16.81</td>
<td>-3.667</td>
<td>.466 [-14.344, 7.011]</td>
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<tr>
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<td>2.83</td>
<td>12.52</td>
<td>4.917</td>
<td>.201 [-3.035, 12.868]</td>
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<td><strong>Prompts</strong></td>
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<tr>
<td>None</td>
<td>32.08</td>
<td>27.08</td>
<td>9.72</td>
<td>5.000</td>
<td>.102 [-1.178, 11.178]</td>
</tr>
<tr>
<td>TP-I</td>
<td>5.00</td>
<td>10.58</td>
<td>12.37</td>
<td>-5.583</td>
<td>.146 [-13.442, 2.276]</td>
</tr>
<tr>
<td>TP-D</td>
<td>1.50</td>
<td>2.17</td>
<td>4.19</td>
<td>-.667</td>
<td>.592 [-3.326, 1.992]</td>
</tr>
<tr>
<td>PP-I</td>
<td>1.42</td>
<td>.17</td>
<td>3.31</td>
<td>1.250</td>
<td>.217 [-.851, 3.351]</td>
</tr>
<tr>
<td><strong>Initiator</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
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<td>12.42</td>
<td>16.26</td>
<td>-7.833</td>
<td>.123 [-18.163, 2.497]</td>
</tr>
<tr>
<td>Child</td>
<td>35.42</td>
<td>27.58</td>
<td>16.26</td>
<td>7.833</td>
<td>.123 [-2.497, 18.167]</td>
</tr>
</tbody>
</table>

*Note.* PA = Physical activity; MV = Moderate to vigorous; LD = Lying down; RT = Rough and tumble; RO = Rocking on an object; DP = Dramatic play; GM = Gross motor; PC= Play context; TS = Transition space; 1-1 A = One to one with adult; 1-1 P = One to one with peer; GWA = Group with adult; GWP = Group with peer; TP-I = Teacher prompts to increase/maintain PA; TP-D = Teacher prompts to decrease/stop PA; PP-I = Peer prompts to increase/maintain PA. a Other physical activity includes: Marching, kicking, kneeling. b Other play context includes: Reading, trains, hide and seek, clean up, puzzle, puppets, being held by the teacher. *p ≤ .05.
Since SEESAW is an educator’s resource, this requires educators to initiate and prompt children to participate in physical activities. A Pearson $r$ correlation test was run for Autumn and Winter observations to determine if there was a significant relationship between specific PA levels (sedentary, light, and MVPA), and variables that reflect components of the SEESAW resource, since SEESAW was not a measurable independent variable. The null hypothesis ($H_0$) is that there is no statistically significant relationship between children’s PA levels and variables that reflect SEESAW, and the alternative hypothesis ($H_1$) is that there is a statistically significant relationship between children’s PA levels and variables that reflect SEESAW.

**Autumn.** After running the Pearson $r$ correlation test, it can be seen that there was a significant relationship between specific variables and children’s PA levels. These variables included *art*, *dramatic play*, and *gross motor* play activities and contexts; *solitary*, *one-to-one with adult*, *one-to-one with peer*, *group with adult*, and *group with peers* group compositions; and *teacher prompts to decrease/stop PA*, and *peer prompts to increase/maintain PA*.

Table 9 illustrates a significant positive relationship between *art* and *light* activity, and a strong negative relationship between *art* and *MVPA*. It was not surprising to find that *art* was positively associated with *light activity* because children are typically stagnant during art experiences, either sitting or standing while only moving limbs (Santrock et al., 2011).
Table 9

Pearson r Correlations of Observed Variables in Autumn

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sedentary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Light Activity</td>
<td></td>
<td>-.393</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. MVPA</td>
<td></td>
<td></td>
<td>-.581*</td>
<td>-.520</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4. Art</td>
<td></td>
<td></td>
<td></td>
<td>-.022</td>
<td>.696*</td>
<td>-.596*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Dramatic Play</td>
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<td>-.207</td>
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<td>.531</td>
<td>.316</td>
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<tr>
<td>6. Gross Motor</td>
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<td>.144</td>
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<td>.237</td>
<td>-.193</td>
<td>-.329</td>
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<tr>
<td>7. Solitary</td>
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<td>-.514</td>
<td>.564</td>
<td>-.022</td>
<td>.306</td>
<td>.028</td>
<td>-.410</td>
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<tr>
<td>8. One-to-one with adult</td>
<td></td>
<td>.159</td>
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<td>.158</td>
<td>-.344</td>
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<td>9. One-to-one with peer</td>
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<td>-.612*</td>
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<td>-.753*</td>
<td>.615*</td>
<td>-.512</td>
<td>-.056</td>
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<td>-.208</td>
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<td>11. Group with peers</td>
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<td>.396</td>
<td>-.009</td>
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<td>.010</td>
<td>.476</td>
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<td>12. TP-D</td>
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<td>-.270</td>
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<td>-.270</td>
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<td>13. PP-I</td>
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<td>-.220</td>
<td>.577*</td>
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<td>-.405</td>
<td>-.323</td>
<td>.808**</td>
<td>-.359</td>
<td>.374</td>
<td>-.270</td>
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</tbody>
</table>

Note. PA = Physical activity; TP-D = Teacher prompts to decrease/stop PA; PP-I = Peer prompts to increase/maintain PA.

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)
Table 10

*Pearson r Correlations of Observed Variables in Winter*

<table>
<thead>
<tr>
<th>Variables</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<th>10</th>
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<th>12</th>
<th>13</th>
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<td>1. Sedentary</td>
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<td>5. Dramatic play</td>
<td></td>
<td></td>
<td></td>
<td>-.403</td>
<td>-.252</td>
<td>-.176</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Gross motor</td>
<td></td>
<td></td>
<td></td>
<td>-.356</td>
<td>-.863**</td>
<td>-.251</td>
<td>-.282</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Solitary</td>
<td></td>
<td></td>
<td></td>
<td>.520</td>
<td>-.299</td>
<td>-.004</td>
<td>.525</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. One-to-one with adult</td>
<td></td>
<td>.033</td>
<td>.548</td>
<td>-.426</td>
<td>-.212</td>
<td>-.182</td>
<td>-.302</td>
<td>-.352</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. One-to-one with peer</td>
<td></td>
<td>-.375</td>
<td>.240</td>
<td>.164</td>
<td>.233</td>
<td>-.149</td>
<td>.094</td>
<td>-.352</td>
<td>-.334</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Group with adult</td>
<td></td>
<td>.101</td>
<td>.199</td>
<td>-.249</td>
<td>.537</td>
<td>.104</td>
<td>-.274</td>
<td>-.605*</td>
<td>-.406</td>
<td>.400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Group with peers</td>
<td></td>
<td></td>
<td>.068</td>
<td>-.245</td>
<td>.119</td>
<td>-.144</td>
<td>.343</td>
<td>-.062</td>
<td>.009</td>
<td>-.304</td>
<td>-.123</td>
<td>-.097</td>
<td></td>
</tr>
<tr>
<td>12. TP-D</td>
<td></td>
<td>-.357</td>
<td>-.021</td>
<td>.347</td>
<td>-.168</td>
<td>-.139</td>
<td>.298</td>
<td>-.192</td>
<td>-.323</td>
<td>.852**</td>
<td>.152</td>
<td></td>
<td>.128</td>
</tr>
<tr>
<td>13. PP-I</td>
<td></td>
<td>.178</td>
<td>-.193</td>
<td>-.019</td>
<td>-.135</td>
<td>.136</td>
<td>.280</td>
<td>.026</td>
<td>-.168</td>
<td>-.205</td>
<td>.073</td>
<td>.352</td>
<td>.153</td>
</tr>
</tbody>
</table>

PA = Physical activity; TP-D = Teacher prompts to decrease/stop PA; PP-I = Peer prompts to increase/maintain PA.

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)
Table 9 also illustrates a strong negative relationship between light activity and one-to-one with peer, and group with peers. Contrastingly, there was a strong positive relationship found between light activity and art, and group with adult; and a significant negative relationship between light activity and solitary. It was also found that teacher prompts child to decrease/stop PA was significantly positively associated with gross motor contexts and when children were one-to-one with adult. More interestingly, peer prompts child to increase/maintain PA was positively associated with dramatic play, and when the group composition was one-to-one peer.

**Winter.** The same variables from Autumn were included in the Pearson r correlation test for Winter to determine if there were significant relationships after SEESAW was implemented. Table 10 illustrates a significant positive relationship between sedentary behaviours and dramatic play. Once again, there was a positive relationship found between light activity and art, and a negative relationship between light activity and solitary. Not surprising, gross motor was found to be positively associated with MVPA, and teacher prompts child to decrease or stop PA was found positively associated when children were engaged in one-to-one play with peer.

Results from seasonal Pearson r correlation tests found no relationship between educator prompts to engage children in any level of PA after SEESAW was implemented. It was surprising to find that children’s engagement in dramatic play in Winter was positively associated with sedentary behaviours, considering SEESAW consists of many dramatic play activities that encourage light activity and MVPA.

A post-hoc bivariate linear regression was conducted for each variable that was either positively or negatively associated with each level of PA to determine if they were
predictors of children’s *sedentary, light, and MVPA* behaviours. Variables tested as predictors for *sedentary* included *dramatic play* and *gross motor*. The null hypothesis (H₀) is that *dramatic play* and *gross motor* are not predictors of *sedentary* behaviours, and the alternative hypothesis (H₁) is that those variables are predictors of *sedentary*. Variables tested as predictors of *light* activity, included *art, solitary, one-to-one with peer, group with adult, and group with peers*. The null hypothesis (H₀) is that *art, solitary, one-to-one with peer, group with adult, and group with peers* are not predictors of *light* activity, and the alternative hypothesis (H₁) is that those variables are predictors of *light* activity. Lastly, variables tested as predictors of *MVPA* included *art, gross motor, and group with adult*. The null hypothesis (H₀) is that *art, gross motor, and group with adult* are not predictors of *MVPA*, and the alternative hypothesis (H₁) is that those variables are predictors of *MVPA*.

**Sedentary behaviour.** As seen in Table 11, there were no significant findings in the correlation between *dramatic play* and *gross motor* and *sedentary* behaviours in Autumn. However, in Winter, there was a medium-to-large effect size in the positive correlation between *dramatic play* and *sedentary* behaviour. This indicates that there was a medium-to-large magnitude in the observed effect, meaning that this relationship was observable (Aljandali, 2016). Further, Table 11 shows no correlation between *gross motor* and *sedentary* in Autumn, and a small-to-medium effect size in the negative correlation between *gross motor* and *sedentary* in Winter. This indicates that there was a small-to-medium magnitude in the observed effect, meaning that this relationship is observable (Aljandali, 2016). These results suggest that SEESAW did not positively
affect children’s MVPA when engaging them in dramatic play activities that were included in the SEESAW resource kit.

**Light activity.** As seen in Table 12, there is a medium effect size in the positive correlation between *group with adult* and *light* activity in Autumn. Further, there is a medium effect size in the negative correlation between *solitary, one-to-one with peer,* and *group with peers* predicting *light* activity in Autumn. However, in Winter, *solitary, one-to-one with peer,* *group with adult,* and *group with peers* do not predict *light* activity at all. A medium-to-large effect size was found in the positive correlation between *art* and *light* activity in Autumn, and a medium effect size in Winter. This indicates that there is a medium-to-large magnitude in the observed effect, meaning that this relationship is observable. These results suggest that SEESAW positively affected children’s light activity by engaging them in art activities.

**Moderate-to-vigorous Activity.** As seen in Table 13, there was a medium effect size predicting the negative correlation between *art* and *MVPA* in Autumn, and no correlation in Winter. There was no correlation found between *art* and *MVPA* in Winter. There was a large effect size in the negative correlation between *group with adult* and *MVPA* in Autumn; however, there was no correlation in Winter. Lastly, there was no correlation between *gross motor* and *MVPA* in Autumn; however, in Winter, a medium-to-large effect size was seen in the positive correlation between those variables. This indicates that there was a small magnitude in the observed effect, meaning that this relationship is observable. These results suggest that SEESAW gross motor activities positively affected children’s MVPA levels.
Table 11

*Simple Linear Regressions Predicting Children’s Sedentary Levels in Autumn and Winter*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Autumn</th>
<th></th>
<th>Winter</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\beta$</td>
<td>95% CI</td>
<td>$p$ value</td>
<td>$R^2$</td>
</tr>
<tr>
<td>Dramatic play</td>
<td>.043</td>
<td>-.207</td>
<td>[-.475, .255]</td>
<td>.518</td>
<td>.358</td>
</tr>
<tr>
<td>Gross motor</td>
<td>.021</td>
<td>.144</td>
<td>[-.787, 1.197]</td>
<td>.655</td>
<td>.422</td>
</tr>
</tbody>
</table>

*Note.* $\beta =$ standardized regression coefficient; CI = Confidence interval.
Table 12

*Simple Linear Regressions Predicting Children’s Light Activity Levels in Autumn and Winter*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Autumn</th>
<th></th>
<th>Winter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\beta$</td>
<td>$95%$ CI</td>
<td>$p$ value</td>
</tr>
<tr>
<td>Art</td>
<td>.484</td>
<td>.696</td>
<td>[.127, .804]</td>
<td>.012</td>
</tr>
<tr>
<td>Solitary</td>
<td>.318</td>
<td>.564</td>
<td>[-.015, .918]</td>
<td>.056</td>
</tr>
<tr>
<td>One to one with peer</td>
<td>.374</td>
<td>-.612</td>
<td>[-1.504, -.070]</td>
<td>.034</td>
</tr>
<tr>
<td>Group with adult</td>
<td>.334</td>
<td>.578</td>
<td>[.003, 1.136]</td>
<td>.049</td>
</tr>
<tr>
<td>Group with peers</td>
<td>.341</td>
<td>-.584</td>
<td>[-1.062, -.011]</td>
<td>.046</td>
</tr>
</tbody>
</table>

*Note.* $\beta =$ standardized regression coefficient; CI = Confidence interval.
Table 13

*Simple Linear Regressions Predicting Children’s MVPA Levels in Autumn and Winter*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Autumn</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Art</td>
<td>.355</td>
<td>-.596</td>
</tr>
<tr>
<td>Group with Adult</td>
<td>.568</td>
<td>-.753</td>
</tr>
</tbody>
</table>

*Note.* $\beta$ = standardized regression coefficient; CI = Confidence interval.
Integration and Interpretation of Findings

According to the convergent triangulated mixed-methods design chosen for this study, Creswell and Plano Clark (2017) suggest that after results are compiled, findings are converged by transforming the data and placing it in either a matrix or in the discussion. Qualitative results were not quantified and transformed into quantitative findings, and therefore, the results are integrated throughout the discussion guided by the 4 research questions.

How does SEESAW impact preschool children’s physical activity behaviours, and how effective is the SEESAW program from educators’ perspective?

During interviews in Winter, educators were asked how effective they think SEESAW has been in impacting children’s PA behaviours. Rose, Danily, and Sara stated that SEESAW had encouraged more engagement in PA, but they also mentioned that they received additional training surrounding PA between Autumn and Winter from Bienenstock’s workshop, among other potential variables. Therefore, it cannot be confirmed that SEESAW was the only factor influencing children’s PA.

Children’s PA behaviours were also observed using the OSRAC-P to answer this research question. A paired-samples t-test of the observed means found a significant decrease in standing behaviours between Autumn ($M = 11.92$, $SD = 7.09$) and Winter ($M = 3.92$, $SD = 3.90$), and a significant increase in gross motor behaviours between Autumn ($M = 3.17$, $SD = 5.98$) and Winter ($M = 12.00$, $SD = 15.03$). Without further analyses, these results suggest SEESAW encouraged less sitting and more gross motor behaviours.

Since SEESAW was not a measurable variable, a Pearson $r$ correlation test was employed to determine if there were any relationships between children’s PA levels and
variables which coincided with the components of SEESAW (i.e., teacher prompts to increase/maintain PA). For the variables that illustrated correlations with the levels of PA, bivariate regression analyses were employed. Findings revealed that dramatic play predicts sedentary behaviour. This finding is alarming; since the SEESAW resource consists of several dramatic play physical activities, it can be inferred that SEESAW either was not used properly or was not used at all. It was also found that art predicts light activity, suggesting that children’s light activity levels will increase if they participate in art activities. This was an interesting finding because the SEESAW resource does not include art-based physical activities. This result suggests that SEESAW was not utilised to engage children in light activity. Finally, the analysis found that gross motor predicts MVPA, suggesting that children’s MVPA levels will increase if they participate in gross motor contexts. There were no correlations found between the group compositions or initiators of activity and PA levels, which are the main variables that are key components in SEESAW.

Although educators stated that SEESAW has been effective, no significant relationship was found between children’s PA levels and variables related to SEESAW. Therefore, it cannot be concluded that SEESAW did or did not affect children’s PA behaviours; instead, it can be inferred.

**What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?**

Thematic analysis of the Autumn and Winter interview transcripts revealed educators’ beliefs and practices surrounding PA. Overall, educators believe PA to be extremely important and advantageous to children’s social, emotional, physical, and
cognitive development. Similar to findings from Gehris et al. (2015), educators reported movement to be innate in children. They also stated though that PA is a learned behaviour, and children’s PA habits depend on what they are exposed to. This finding coincides with Brofenbrenner’s (1977) ecological systems theory, which argues that different environments contribute to children’s development.

Educators further expressed their beliefs regarding their role in promoting PA in children. Ultimately, educators stated that they should be role models of PA behaviour and engage in all physical activities with children. Rose, for instance, quite frequently stated that she believes educators should introduce safe risks to children in order to maximise their emotional and physical development. During interviews in Winter, educators reported attending various workshops surrounding PA, and seemed increasingly confident to implement PA. Unfortunately, child observations revealed no statistically significant increase in educator involvement during children’s engagement in PA.

Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

Throughout Winter interviews, Rose and Danily reported utilising SEESAW to engage children in PA, while Sara had not yet looked at the resource. Despite the increase in frequencies surrounding educators’ engagement in physical activities at work, the IPAQ showed no significant change in their PA levels while at work. However, the theme of engagement in physical activities at work was the result of a thematic analysis of interview transcripts, not a direct measurement of their engagement. While it can be
assumed that educators over-reported the PA they engage in at work, this cannot be measured nor confirmed, given the data collection used in the study.

During SEESAW training, educators were informed about the *Canadian Physical Activity Guidelines for the Early Years*. Prior to this training, Sara, Rose, and Danily reported having no knowledge of these guidelines, and Rose was the only educator to guess the correct amount of minutes preschool children should be engaging in PA. After 4 months of SEESAW implementation, educators were asked about their knowledge of these guidelines again, and a thematic analysis found no change in this knowledge. Based on this finding, it can be inferred that SEESAW training had no impact on educators’ knowledge.

In the Winter interviews, educators revealed that the various workshops and trainings they attended encouraged self-reflection of PA. Rose (Transcript 2) specifically stated:

> We had Bienenstock come in and she was talking about big body movement and having less fine motor skills so they can have those opportunities to do that. And I was just like, woah I didn't realise that as an educator, I was shutting those opportunities down... I was just like, here's an activity, here's this one. But it's more about how they get there. (Lines 15-18)

This contributes to Tucker et al.’s (2011) study where they found that when preschool educators were interviewed and given the opportunity to discuss PA, they became increasingly aware of the importance of PA. The second interview with Rose suggests that this occurred, and she became increasingly aware of the importance of PA.
CHAPTER FIVE: DISCUSSION

This final chapter provides a summary of previous chapters, a discussion of the results, and implications for future practice and research. This study was framed by the social-ecological model, with the belief that children’s physical activity (PA) is directly related to their individual, interpersonal, physical, and structural environments (Stokols, 1996).

Summary of Findings

This study was conducted using a triangulated convergent mixed-methodology (Creswell & Plano Clark, 2007), and investigated the effectiveness of a newly developed educator resource, SEESAW, on preschoolers’ PA. Further, it explored educators’ knowledge and beliefs surrounding PA, and the relation to promoting PA in children. The purpose of this study was to provide insight on a practical resource to assist in the increase of preschool children’s PA.

The study methods and procedures were guided by the following four research questions:

i) How does SEESAW impact preschool children’s physical activity behaviours?

ii) What is the nature of educators’ beliefs and practices in relation to children’s PA and their role in promoting that activity?

iii) Are these beliefs and practices impacted by a resource such as SEESAW, and if so, how?

iv) How effective is the SEESAW resource from educators’ perspectives?
Qualitative data was gathered through one-on-one semi-structured interviews with 3 preschool Registered Early Childhood Educators (RECEs). Findings from these interviews revealed that educators perceived their practice improved between Autumn and Winter. This improvement was the result of increased conversations with professionals and training related to fostering outdoor PA. The educators’ perceived practice and beliefs surrounding PA seemed to be more affected by another training model from Bienenstock that they had experienced in addition to the SEESAW workshop. Perhaps, specific features and components of training models have differentiated effects on fostering changes in educators’ beliefs; thus, future research should examine this as a variable. The impact of such training on educators might change, as well, and therefore, is worth investigating.

Educators’ knowledge of PA guidelines was not impacted by the SEESAW workshop. Educators reported a number of barriers and facilitators to children’s PA, where the most prominent barrier across seasons was the routine of the centre. Routine in the childcare context includes time constraints and strict adherence to the daily schedule. Educators frequently commented, for instance, on the barrier of lack of time to implement and engage children in PA due to scheduling policies. In both of the seasons, educators shared that the PA instructors who came to their centres as guests helped facilitate PA and promoted children’s interest in being active. Rose, for example, noted that it was most impactful when educators were guided through activities with the children, and would find that most advantageous for future continuous professional learning. Educators strongly believed that children’s PA would improve if a professional visited their preschool classrooms and guided the class through activities on a regular
basis. Interestingly, this favouring of a guest or expert seemed to anecdotally provide educators with increased confidence to engage children in PA, filling the gap between knowledge and practice. Further investigation is necessary to discover the impact of these guest instructors, as well as increased pre-service education about PA.

Educators’ PA levels were quantitatively measured using the International Physical Activity Questionnaire Long Version (IPAQ), and children’s PA was measured using the direct observation tool, Observational System for Recording Physical Activity in Children – Preschool (OSRAC-P). The IPAQ was used to compare educators’ beliefs and knowledge of PA with their recent engagement in PA. Findings revealed that all 3 educators’ PA was categorised as high (> 3,000 METs), and they strongly believed PA was important for children’s development in many ways. The OSRAC-P was used to investigate how effective SEESAW was at increasing children’s PA engagement. Between Autumn and Winter, standing behaviours significantly decreased, while gross motor behaviours significantly increased. While this suggests SEESAW may have affected these behaviours, it is important to note that between the two time points, Bienenstock provided educators with training on outdoor PA. Therefore, it cannot be concluded that SEESAW was the sole factor that influenced children’s PA.

**Discussion**

Most of the findings from this study support previous research, including educators’ knowledge of PA guidelines, and need for additional training of PA. Children’s PA levels were also somewhat consistent with literature of preschoolers’ PA in childcare centres, which is discussed further below.
Canadian Physical Activity Guidelines

All 3 educators were unaware of the *Canadian Physical Activity Guidelines for the Early Years* prior to and after the SEESAW workshop. While a single educator estimated the correct amount of minutes preschool children should be engaging in PA, 2 educators estimated incorrect values. Educators’ knowledge of the guidelines coincides with Tremblay et al.’s (2012) finding that only 8% of Canadians are aware of the guidelines, and more recently, LeBlanc et al.’s (2015) finding that general awareness was only 4% among all sources in their data synthesis.

LeBlanc et al. (2015) suggest that knowledge translation is a key mediator for increasing awareness of knowledge of the guidelines. One organisation that makes knowledge translation a priority is ParticipACTION (Faulkner, Yun, Tremblay, & Spence, 2018). Since 2015, ParticipACTION released a mass media campaign entitled, *Make Room for Play*. The goal of this campaign was to increase general awareness of the importance of play in PA (Faulkner et al., 2018). The campaign consisted of 4 30-second ads that were publicised on YouTube, Facebook, television, in movie theatres, and on ParticipACTION’s website (Faulkner et al., 2018). Results of a nationwide survey found that 90% of people who viewed the ads agreed that screen time results in sedentary behaviour, thus decreasing engagement in PA (Faulkner et al., 2018). Further, Faulkner et al. (2018) state that the media campaigns evoked more concern in mothers regarding screen time, and ultimately motivated them to engage their children in increased PA.

Despite the positive impact of this media campaign in 2015 (Faulkner et al., 2018), educators in the current study still reported no awareness of the guidelines. However, this study only consisted of 3 educators, therefore limiting the ability to
conclude whether the general educator population is aware of the PA guidelines. Yet, quite alarmingly, the 3 educators’ level of knowledge about the specific content of the guidelines remained relatively unchanged – even after specific training on the resource.

**Children’s Physical Activity**

Slight changes were observed in children’s sedentary, light, and moderate-to-vigorous PA between October 2018 and February 2019. While findings were not statistically significant, children engaged in more sedentary behaviour during Winter observations ($M = 16.08$, $SD = 8.51$), than Autumn observations ($M = 13.58$, $SD = 12.90$). This finding was not surprising, and was in line with previous research examining seasonal differences in preschoolers’ PA (Soini et al., 2014; Tucker & Gilliland, 2007). Using the OSRAC-P as a tool to measure children’s PA, Soini et al.’s (2014) study examined the differences between association of context variables and children’s PA. Results indicate children are significantly more time sedentary in Winter (Silva, Santos, Welk, & Mota, 2011; Soini et al., 2014).

Winter in Canada typically consists of extreme temperatures and plentiful snowfall, which can serve as a barrier to physical activity for many Canadians (Statistics Canada, 2011). The Child Care and Early Years Act (CCEYA; 2014) requires children in childcare centres for more than six hours spend at least two hours each day outside, weather permitting (47c). Outdoor play is important because it offers natural stimuli (i.e., flowers), promotes risky play that helps children develop confidence, and builds children’s immunity (Bento & Dias, 2017). Each childcare centre has individual inclement winter weather policies and procedures, and therefore play outside in winter weather is under the discretion of the centre’s supervisor (CCEYA, 2014). Similar to
findings from Gubbels (2014), all educators in the current study listed winter weather as a barrier to physical activity because of ‘the centre’s inclement weather policy’ and ‘children’s lack of appropriate clothing’. It was unclear what centre’s inclement weather policy was, however, Danily stated typically educators refrain from going outdoors if the temperature reaches ≤ −20°C.

Unfortunately, the result of inclement winter weather results in increasingly more time spent indoors, which previous studies have found a contributor to sedentary behaviour in young children (Gubbels et al., 2012; Hughes, 2017). Soini et al. (2014) found when temperatures reached −20°C or lower, preschool children were allotted less outdoor play time, and less time spent engaged in MVPA. While the outdoor environment is an ideal setting to engage children in PA (Lewis et al., 2016), extreme cold weather can pose a risk to young children’s health (Statistics Canada, 2011). Thus, finding ways to promote PA indoors is important.

There are various resources available online for educators to increase children’s PA in Winter, whether it is indoors or outdoors. One resource by ParticipACTION (2013), Dark or Dreary? How to Keep Kids Active When Days Are Short or Inclement, outlines practical ways to engage children in PA indoors and outdoors during Winter. Similarly, ParticipACTION released a position statement on active outdoor play, which outlines the importance of engaging in active play in nature and outdoors in any weather (Tremblay et al., 2015). A lack of awareness of these resources may serve as an inhibitor to educators engaging children in more PA during Winter (Goldfield et al., 2012).
Additional Education, Training, and Resources

Educators in this study reported a strong need for additional pre-service and in-service education regarding children’s PA, including continuous professional learning opportunities and resources. These findings are not surprising and are consistent with the literature.

Pre-service education. For years, educators have expressed a need for additional pre-service education regarding PA (Bruijns et al., 2019; Goldfield et al., 2012; Martyniuk & Tucker, 2014; Tucker et al., 2011). All educators in the current study narrated that they would have benefited greatly from increased education surrounding PA in their pre-service educational programs. Specifically, Rose stated that she only learned about physical literacy on a single day during her 2 years in the ECE program, and this greatly limited her knowledge on the subject. It is important to note that physical literacy and PA are separate subjects. According to Dudley (2018), physical literacy surrounds the knowledge of movement, motivation for movement, movement competencies, and positive affect of such movement. ECEs should be educated in both PA and physical literacy in order to provide children optimal opportunities for growth and development (Dudley, 2015).

Rarely is physical literacy a subject that is taught in pre-service early childhood education (ECE), and when it is, ECE students are not receiving sufficient information about physical literacy (Grove, 2019). Currently, Sport for Life (2019) offers resources, online webinars, and in-person workshops for ECEs to develop their knowledge and skills surrounding physical literacy. While these can potentially improve ECEs’ knowledge and skills, they are not mandatory in pre-service early childhood education. It
would be advantageous to review pre-service ECE curricula across Canada to determine what is specifically taught concerning PA and physical literacy. This could have implications for the implementation of such courses, which would ultimately provide ECEs with adequate knowledge and skills regarding PA and physical literacy. Sufficient training of PA and physical literacy in pre-service education could sufficiently prepare ECEs to connect theory to practice (Goldfield et al., 2012).

Bruijns et al. (2019) suggest that intervening during ECEs’ pre-service education is a more feasible approach to ensuring that they have sufficient knowledge of PA in young children. Currently, no programs for pre-service early childhood education exist to implement and evaluate educators’ knowledge and skills related to PA (Bruijns et al., 2019).

**Continuous professional learning.** In Autumn, Rose, Sara, and Danily all expressed a need for more professional learning opportunities in relation to PA in young children. After 2 educators attended the SEESAW workshop, and received additional training from Bienenstock, educators still identified a need for additional professional development. The need for educator training surrounding PA is also a common finding in the literature (Gehris et al., 2015; Tsangaridou, 2017).

Analogous with findings from Tsangaridou (2017), Rose believed it would be most beneficial to educator practice if professional development was ongoing and directed by experts in the field of PA. Providing educators with opportunities to learn from guest PA instructors and experts is a common need expressed among ECEs (Colemen & Dyment, 2013; Tucker et al., 2011). Educators from Colemen and Dyment
and Tucker et al.’s (2011) studies, for instance, expressed a desire for qualified guest experts to deliver in-service PA workshops.

Educators in the current study stated that Bienenstock’s in-service continuous professional development increased their knowledge of PA outdoors, as well as children’s risk-taking behaviours. This was an interesting finding because Grove (2019) states that according to Dr. Dawn Clark, in-service training is not effective and cannot change beliefs, attitudes, and behaviours in such limited time. During the second interview, however, Rose stated that PA is, “something that I have to continuously stay on top of and re-educate myself with. Just since I graduated last year, it seems like so much has changed. Everything is changing constantly” (Transcript 2, Lines 34-36).

Parette, Quesenberry, and Blum (2010) confirm that the role of an ECE is complex, and requires training that is meaningful, ongoing, and centered on new theories and current research. RECEs in Ontario are required to complete the College of Early Childhood Educator’s (CECE; 2017a) continuous professional learning program. The CECE is program involves the completion of a self-assessment tool, professional learning plan, and record of professional learning (CECE, 2017b). Further, the goal of the program is to facilitate and support ongoing acquisition of knowledge and skills in the field of early childhood education (CECE, 2017b).

Regarding professional learning opportunities, various organisations across Ontario offer training to ECEs. Some of these organisations include Early Childhood Community Development Centre (ECCDC) in the Niagara Region, The Halton Resource Connection (THRC) in Halton, and Affiliated Services for Children and Youth (ASCY) in Hamilton. Professional learning offered from these organisations often occur on-site
(e.g., at the ECCDC), and cost RECEs a fee to attend. Typically, experts in the field guide the training, and topics vary from child health and wellness to educator professionalism. Regarding PA and physical literacy, in-person training is rarely offered for RECEs. Currently, the only organisation that offers regular workshops on PA and physical literacy, including one specific to ECEs, is Sport for Life (2019).

The CECE (2017b) states that when implemented appropriately, continuous professional learning can positively affect RECEs’ practice. This provides important implications for offering regular training to RECEs to improve their knowledge and skills surrounding PA and PL. It is important that this training is continuous, informative, and practical – otherwise, it is not effective (Grove, 2019).

Unfortunately, ECEs have reported barriers associated with in-person professional learning (Tucker et al., 2011). In the current study, educators stated that cost and location of training is a barrier to their own knowledge and implementation of PA in childcare settings. While webinars on PA and physical literacy are most often available for RECEs, the design often lacks interaction between professionals, an essential component of improving practice (CECE, 2017b). It might be worthy, then, to investigate alternate delivery methods of cost-effective training, in addition to improved pre-service education surrounding PA and physical literacy.

Resources. One of the most frequently cited barriers to PA is the lack of resources available for educators (Martyniuk & Tucker, 2014; Tsangaridou, 2017; Tucker et al., 2011). Goldfield et al. (2012) argue these resources may contribute to increased PA engagement in young children attending childcare.
The purpose of the SEESAW initiative is to provide educators with a practical, easy-to-use resource for engaging children in PA (NCPC, 2018). Prior to the implementation of SEESAW, educators shared their belief that the resource would be incredibly useful and could potentially increase preschoolers’ PA. Although Danily and Rose reported regular use of the tool 4 months after it had been introduced, their use of SEESAW was not objectively measured. Furthermore, only minor significant changes occurred in children’s PA between Autumn and Winter, and no significant relationships were found between variables that reflect SEESAW (i.e., teacher prompts), and children’s PA. However, educators’ reported use of the tool, children’s PA levels, and behaviours did not significantly change between Autumn and Winter observations. These results suggest that objective measurement of SEESAW is needed to determine its effectiveness.

Since educators also received training from Bienenstock during Autumn and Winter, this study can suggest that SEESAW was not the primary factor in children’s PA and educators’ beliefs and practices. Further research is needed to explore the effectiveness of such resources on both educators’ knowledge and beliefs and on children’s PA.

**Implications for Practice**

Despite the inconclusive findings regarding the SEESAW resource itself as a promotor of children’s PA, this study presents possibilities for future implementation of such a tool. While the resource itself was not an intervention designed to create sustainable change in children’s PA in childcare centres, it can be utilised as more of a practical resource for educators when needed. Resources are valuable in promoting PA
because most often they provide educators with step-by-step directions (Tsangaridou, 2017). Thus, having the resource may support educators in their programming, providing them with possible physical activities to implement daily.

The study also includes implications for practice, specifically relating to increasing RECEs’ knowledge of the Canadian PA guidelines. Given that the educators of this study remained largely unaware of these guidelines, more frequent, targeted marketing of these guidelines is needed. Faulkner et al. (2018) found that ParticipACTION media campaigns positively influence parental behaviours and perceptions surrounding PA. Therefore, frequent and continued media campaigns should be employed more often and on additional social media platforms such as Instagram and Twitter to achieve this aim with educators.

**Implications for Future Research**

Several implications for future research are garnered from the findings of this study. First, it would be most beneficial to assign the SEESAW resource specific variables. SEESAW was not a measurable variable in this study, which significantly reduced reliability and validity in the study and therefore limited the type of statistical analyses employed. A quasi-experimental design would have provided significant results surrounding the effectiveness of such a resource on children’s PA (Creswell & Plano Clark, 2007). In further regard to the current study design, Osbourne (2013) suggests that due to the separate data points within a mixed-methods design, not all points provide equally reliable data that can undermine the replicability of a study. This issue can be addressed by forming a research team with expertise in qualitative and quantitative
research (Osbourne, 2013). Therefore, future studies should employ SEESAW as an intervention given to educators in a quasi-experimental group.

This study aimed to recruit a homogenous sample of 6 RECEs, and 48 preschool-aged children. Given the lack of response and limited time for recruitment of participants, only 3 RECEs and 12 children participated. Future research focused on the SEESAW resource (or any such resource/program) should also include a larger sample size (Creswell & Plano Clark, 2007). Here, the small sample size of 12 preschoolers limited the quantitative findings significantly. Likewise, it would be advantageous in future studies to obtain qualitative data from more than 3 educators. Moreover, sample sizes of both children and educators should be nationally representative samples in order to make inferences about the effectiveness of SEESAW on a general more diverse population.

The measurement of children’s and educators’ PA was not without limitations. Firstly, direct observation requires researchers to closely watch participants without altering their environment (Salkind, 2010). One significant limitation to observation is the Hawthorne effect, which means participant’s behaviour alters once they become cognizant they are being observed (Salkin, 2010). In the current study, the researcher obtained verbal assent from each child prior to observing, and observed within approximately 10 to 15 feet of each focal child. During observations, children regularly approached the researcher to join in the child’s play experience. While it is unclear whether or not children altered their behaviour because of the researcher, it is important to note that it was a possibility and therefore should be considered when examining the recorded behaviours. Salkin (2010) suggests that researchers can overcome the
Hawthorne effect if they immerse themselves in the observed environment prior to data collection so participants become familiar with their presence.

The OSRAC-P indicates that each observation should be recorded by “two observers concurrently and independently” (CPARG, 2012, p. 4), until an inter-rater reliability of > 90% is achieved (Hughes, 2017). The nature of the current study only allowed for one researcher to record observations, thus an interobserver agreement score and inter-rater reliability were absent, ultimately reducing the validity and reliability of child observations. Future research utilizing the OSRAC-P must involve at least two observers to provide considerably greater validity and reliability.

Educators’ PA was measured using the IPAQ, and while that has previously produced reliable results (Bandmann, 2008; Booth, 2000; Sylvia et al., 2014), researchers have found a presence of over-reporting amongst participants in their studies (Johnson-Kozlow et al., 2006; Rzewnicki et al., 2003). Further issues with self-report questionnaires surround interviewer bias, where participants feel influenced by the interviewer to report increased levels of PA in fear of embarrassment (Bandmann, 2008). These limitations can be addressed by utilising accelerometers and direct observation of children’s and adults’ PA. These measurements can provide accurate results if interpreted appropriately (Truelove et al., 2018; Vanderloo et al., 2016).

Finally, barriers arose in relation to qualitative and quantitative data analyses. Sara’s interview transcripts were significantly less detailed than the other educators’, therefore providing limited information to analyze. This was due in part to Sara’s role as a float educator, which resulted in briefer interviews than the others who were employed as full-time staff. Regarding quantitative data, the researcher’s lack of knowledge
surrounding statistical analysis and SPSS posed as noteworthy barriers to reporting meaningful results. Variables from the OSRAC-P were entered into SPSS as continuous variables, therefore limiting the type of statistical test used to find the strength of association between each variable (Creswell & Plano Clark, 2007). Ultimately, it was challenging to analyze OSRAC-P data appropriately because SEESAW was not a measurable variable.

**Conclusion**

Preschool-aged children in centre-based childcare are not meeting Canadian Physical Activity Guidelines, which poses a risk to their overall development (Tremblay et al., 2017). The current study investigated the effectiveness of SEESAW on preschool children’s PA. Employing a triangulated convergent mixed-methods design, this study found children’s standing and gross motor behaviours significantly changed after SEESAW was implemented. Children essentially stood less and engaged in gross motor more. While 2 educators reported use of SEESAW, and all reported positive beliefs about the effectiveness of the tool, no significant results were found when variables associated with SEESAW were tested as predictors to children’s activity. Therefore, no conclusions can be made to say SEESAW was effective at increasing children’s PA. Regarding educators’ PA, the IPAQ data revealed no significant increase in PA between Autumn and Winter; rather, Rose, Danily, and Sara’s PA levels were rated as high for both seasons according to the IPAQ (2005). This suggests that despite the tool, they led active lifestyles in line with their beliefs regarding PA.

Educators in this study also provided insight on barriers and facilitators to PA in childcare, which contributes to the literature and provides implications for future practice.
and research. Barriers to PA included technology, lack of space and equipment, and lack of adult direction. The most prominent barriers reported were the lack of training, knowledge, and pre-service education that educators received regarding PA, as well as the policies surrounding routine within childcare. Rose offered that additional outdoor times could increase children’s PA; however, due to the structure of childcare, this is not always feasible. Facilitators to PA included play in nature and natural environments, educator involvement, and appropriate clothing for children. The most prominent facilitators reported were ongoing in-service professional learning opportunities led by experts in PA, as well as resources available to them and pre-service education.

It is most important to note the perceived lack of pre-service education surrounding PA and physical literacy (Bruijns et al., 2019; Goldfield et al., 2012; Martyniuk & Tucker, 2014; Tucker et al., 2011). Future considerations for practice should include the implementation of such pre-service education, as well as feasible, ongoing professional learning, and the implementation of PA and physical literacy in early childhood curricula. Further research is needed to explore the relationships between objectively measured resources, and its impact on children’s PA, educators’ PA knowledge, and educators’ PA skills. A pragmatic paradigm supports findings of this study because it allows for results to be both somewhat true and false (Johnson et al., 2007). Therefore, although statistically SEESAW did not significantly alter children and educator’s PA, it can be inferred that it encouraged PA, with the support of educator’s beliefs and perceptions.
Enhancing Physical Activity Through SEESAW

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ENHANCING PHYSICAL ACTIVITY THROUGH SEESAW


doi:10.1111/obr.12315

doi:10.1016/j.ssmph.2017.11.004


Appendix A

SEESAW Resource Kit

Figure A1. One of 22 SEESAW activity cards within the resource kit.
Figure A2. Power off… and Play! (Healthy Kids Community Challenge Niagara, 2018) book included in the SEESAW resource kit.
Figure A3. Where the Wild Things Are (Sendak & Schickele, 1963) book in the SEESAW resource kit.
Phase 2
Supporting Physical Activity
Resources and Ideas

Play outside

Having the appropriate clothes for the weather: There is nothing worse than being too cold, wet or hot. So it is important to have the appropriate clothes available. Have a choice of items which are fixed with belts, gloves and scarves. Send home a letter asking families to send in waterproof coats, mud boots and warm outerwear. Outerwear can be hung out along with the use of garbage bags with arms and head holes cut in. Tie at the bottom around child’s body and most of their clothes will stay dry.

Layer clothing: Layer children’s clothing if they do not come dressed appropriately for the outdoors. Providing insulation with a waterproof blanket allows them to store spare clothes and hats for rainy and snowy days and plastic bags for the disposed wet stuff.

Weather Activities: Check out these on-line resources for weather day activities.
https://www.pro-templates.co/weekend-activities-for-preprimary/kids

Windy Day Outdoor Activities

HOLI reference: In addition to providing physical benefits, active play outdoors strengthens hand-eye coordination, fine-motor skills such as perceiving, attending, creating problem solving, and complex thinking. (p. 29)

Activities: (Use below for templates and on-line resources)
- Make pinwheels to spin
- Rits bubbles and see where the wind takes them **
- Make and fly paper planes
- Make streamers for wind dancing
- Let off balloons in the wind
- Make and fly a kite **
- Be a superhero using your coat as a cape
- Make a windsock **
- Make music with wind chimes **
- Make and sell a beet **

Windsock

Materials:
- Large plastic bottle or circular container
- Plastic bag
- Decorative tape and ribbon
- string or wool

How to make
Cut the bottom and top off your circular container or bottle to make a cylinder wound 6 inch or 15 cm in depth (this is the opening of the windsock)
Rip a hole in each side of your cylinder to thread your string through to make a handle or hook for hanging your windsock.
Using a plastic bag (see used a black sock cut out a tube shape the boys wanted ours to be finished), make sure that the long edges are all lined together, but the ends need to be loose so the wind can blow through.
Attach your bag to the cylinder at one end or other with tape or staples.
Decorate your windsock. You could get stripes on, paint it or even use ribbon to add streamers.

Check out these on-line resources for more windsock ideas.
https://www.123forfree.com/2013/02/make-windsocks-craft-ideas-for-kids.html

Figure A4. Resource and idea booklet in the SEESAW resource kit.
Physical activity for 0-18 month olds

Physical activity is important for all children – even infants who are just starting to develop their movement skills.

For babies aged 0-18 months, physical activity is all about exploration, experiencing simple movements and learning about the world.

**Guidelines**
**Physical Activity Guidelines**
- Infants should be physically active several times daily.

**Canadian Sedentary Behaviour Guidelines**
- Adults should minimize the time infants spend being sedentary (doing very little physical movement) during waking hours. This includes prolonged sitting or being restrained (e.g., stroller, high chair) for more than 1 hour at a time.
- For those under 2 years, screen time (e.g., TV, computer, electronic games) is not recommended.

**Benefits**
Physical activity helps babies to be healthy, alert, relaxed and happy. Physical activity also helps your baby:
- Stimulate their senses
- Be easier to soothe
- Have better sleep habits
- Improve their digestion
- Learn new skills and experience new emotions
- Build connections in the brain which help with development
- Set the stage for future movement skills

**Skills to Develop**
Here are some physical skills you can help your baby with during the first year:
- **0-3 months**: neck control, reaching, grabbing, arm and leg movements
- **4-6 months**: rolling over, sitting, pushing with their legs
- **7-9 months**: moving forward (crawling or scooting), moving objects between hands, standing
- **10-12 months**: cruising (walking while holding onto furniture), playing with balls
- **12-18 months**: walking up stairs, pushing and pulling objects while walking forward

*There are general guidelines only. Every baby develops differently.*

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**Figure A5.** Example of physical activity guideline provided in the SEESAW resource kit.
8 ways to tell if your child is physically literate

How do you know if your child is developing physical literacy? Here are eight simple tests. If you answer yes to a question, chalk one up for physical literacy. If you answer no, your child probably needs some attention in that area.

1. Forward roll
   Can your child do a forward roll on the floor? The forward roll is a basic gymnastic movement that shows your child has developed a reasonable degree of flexibility and coordination, as well as proprioception (knowing where the body is as it moves through space).

2. One-leg balance test
   Ask your child to stand on one foot for 30 seconds. Get them to put their hands on their hips and lift the knee of their non-standing leg as high as possible. If they start hopping all over the place or falling over, they need to work on balance. Then try the other foot.

3. Swim (comfortable in water)
   Can your child swim? Swimming is at the core of water sports and is an essential skill for lifetime safety around the water (important when you consider that 75% of our planet’s surface is covered in water).

4. Throw a ball
   It may seem a bit corny, but the ability to throw a ball is a good measure of a child’s overall coordination, and it’s an essential skill used in many sports.

5. Strike an object
   Can your child hit a ball with a bat? A puck with a hockey stick? A badminton bird with a racquet?

6. Land from jumping
   Watch your child as they jump from a low bench or your deck. Do they land with their knees aligned above their feet and sink smoothly into a squat? Or do their knees collapse inwards and their legs wobble around?

7. Flat-footed squat
   Can your child do a flat-footed squat from a standing position and then stand up again? This movement indicates flexibility, coordination, balance, and strength.

8. Confidence to try sports
   Is your child confident when trying new physical activities or sports? Kids who have a reasonable degree of physical literacy are eager to try new sports and activities.

Physical literacy is one of the most important gifts we can give our children. By developing physical literacy, children gain the skills and the confidence to be active for life.

Figure A6. Physical literacy information sheet within the SEESAW resource kit.
Active play and physical literacy everyday.

Help me develop physical literacy and I will be
ACTIVE FOR LIFE

Figure A7. Active for Life (2018) PA photo cards.
Appendix B

International Physical Activity Questionnaire (Long Form)

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE
(October 2002)

LONG LAST 7 DAYS SELF-ADMINISTERED FORMAT

FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health–related physical activity.

Background on IPAQ
The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

Using IPAQ
Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

Translation from English and Cultural Adaptation
Translation from English is encouraged to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at www.ipaq.ki.se. If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

Further Developments of IPAQ
International collaboration on IPAQ is on-going and an International Physical Activity Prevalence Study is in progress. For further information see the IPAQ website.

More Information
More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at www.ipaq.ki.se and Booth, M.L. (2000), Assessment of Physical Activity: An International Perspective. Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

LONG LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised October 2002.
INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous and moderate activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?
   □ Yes
   □ No ➔ Skip to PART 2: TRANSPORTATION

The next questions are about all the physical activity you did in the last 7 days as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, heavy construction, or climbing up stairs as part of your work? Think about only those physical activities that you did for at least 10 minutes at a time.
   _____ days per week
   □ No vigorous job-related physical activity ➔ Skip to question 4

3. How much time did you usually spend on one of those days doing vigorous physical activities as part of your work?
   _____ hours per day
   _____ minutes per day

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads as part of your work? Please do not include walking.
   _____ days per week
   □ No moderate job-related physical activity ➔ Skip to question 6

LONG LAST 7 DAYS SELF-ADMINISTERED version of the IPAQ. Revised October 2002.
Appendix C

Observational System for Recording Physical Activity in Children: Preschool

(OSRAC-P)  
OSRAC-P Training Manual for Observers

The OSRAC-P Coding System was initially developed in 2002. It is a combination of three different observational systems, the CARS [by Jackie Puhl et al.], the CASPER II [by William H. Brown, Samuel L. Odom, Ariane Holcombe, and Grant Youngquist for the Early Childhood Research Institute on Inclusion (ECRII)] which was funded by the Early Education Programs for Children with Disabilities (EPCD) of the U.S. Department of Education (Grant #H024K40004), and the Observational System for the Environmental Determinants of Physical Activity in Preschool Children Study [which was funded by Gerber Foods]. William H. Brown, M. João Almeida, Karin A. Pfeiffer, and Kerry L. McIver made the modifications and developed the OSRAC-P during the summer of 2003, while funded by the National Institutes of Health (NIH), National Institute of Child Health and Human Development (NICHD, Grant #R01 HD43125-01). Jon Tapp developed the Interval Manager System (INTMAN) for the Dell Axim X5 handheld computers.
Appendix D

Modified Codebook

Modified OSRAC-P Codebook

### Categories/Variables

#### A. Intensity of Physical Activity

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Definition</th>
<th>Movements Include</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sedentary</td>
<td>Sitting motionless for a prolonged amount of time&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Sleeping, lying, standing, sitting, squatting for prolonged amounts of time, kneeling, sitting in wagon</td>
</tr>
<tr>
<td>2</td>
<td>Light</td>
<td>Light movement (only arms/only legs)</td>
<td>Standing with only limbs moving, moving an object while sitting/standing, throwing, being pushed on a swing, hanging from object, digging in sand</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>Moderate movement&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Walking (brisk), marching, crawling, skipping, hopping, jumping up and down, rolling, riding object, independent swinging, rough and tumble play, climbing</td>
</tr>
<tr>
<td>4</td>
<td>Vigorous</td>
<td>Vigorous movement&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Climbing up and down stairs, running, galloping, bicycle riding, jumping rope, sustained participation in sports,</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
<td>Unsure of intensity</td>
<td>Unsure of intensity</td>
</tr>
</tbody>
</table>

#### B. Physical Activity

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl</td>
<td>Climb</td>
</tr>
<tr>
<td>Cr</td>
<td>Crawl</td>
</tr>
<tr>
<td>Da</td>
<td>Dance</td>
</tr>
<tr>
<td>Ju</td>
<td>Jump</td>
</tr>
<tr>
<td>Sk</td>
<td>Skip</td>
</tr>
<tr>
<td>Ly</td>
<td>Lying down</td>
</tr>
<tr>
<td>R &amp; T</td>
<td>Rough &amp; tumble (wrestling)</td>
</tr>
<tr>
<td>Ri</td>
<td>Riding an object (bike)</td>
</tr>
<tr>
<td>Ro</td>
<td>Rocking on an object (Seesaw)</td>
</tr>
<tr>
<td>Roll</td>
<td>Roll</td>
</tr>
<tr>
<td>Ru</td>
<td>Run</td>
</tr>
<tr>
<td>Si</td>
<td>Sit</td>
</tr>
<tr>
<td>Sq</td>
<td>Squat</td>
</tr>
<tr>
<td>St</td>
<td>Stand</td>
</tr>
<tr>
<td>Sw</td>
<td>Swing</td>
</tr>
<tr>
<td>Th</td>
<td>Throw</td>
</tr>
<tr>
<td>Wa</td>
<td>Walk</td>
</tr>
<tr>
<td>Other</td>
<td>Other - Physical activity observed not on list</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
</tr>
</tbody>
</table>
### Modified OSRAC-P Codebook

#### C. Play Context

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Art</td>
<td>Art activity – painting/drawing/colouring/cut &amp; paste</td>
</tr>
<tr>
<td>B</td>
<td>Books</td>
<td>Reading/Listening to others or audio book</td>
</tr>
<tr>
<td>Ba</td>
<td>Ball</td>
<td>Throwing balls/objects treated as a ball</td>
</tr>
<tr>
<td>BL</td>
<td>Block play</td>
<td>Large block activities</td>
</tr>
<tr>
<td>CT</td>
<td>Circle time</td>
<td>Activities that occur in large group settings</td>
</tr>
<tr>
<td>D</td>
<td>Dramatic play</td>
<td>Engaging in dramatic play with pretend play materials</td>
</tr>
<tr>
<td>E</td>
<td>Eating</td>
<td>Eating during snack or lunch times</td>
</tr>
<tr>
<td>GM</td>
<td>Gross motor</td>
<td>Any activity that requires large muscle movement: jumping, running</td>
</tr>
<tr>
<td>M</td>
<td>Music</td>
<td>Activities that are musically focused: singing, dancing, playing instruments</td>
</tr>
<tr>
<td>N</td>
<td>Nap time</td>
<td>Sleeping/resting</td>
</tr>
<tr>
<td>OG</td>
<td>Organized game</td>
<td>Games such as: Duck duck goose, what time is it Mr. wolf, tag, Freeze dance, board games, games with closed-ended materials</td>
</tr>
<tr>
<td>S</td>
<td>Sandbox</td>
<td>Activities in sand either indoor or outdoor</td>
</tr>
<tr>
<td>SC</td>
<td>Self-care</td>
<td>Washroom/wash hands, etc.</td>
</tr>
<tr>
<td>SGT</td>
<td>Small group time</td>
<td>Activities that occur in small groups of four or less</td>
</tr>
<tr>
<td>T</td>
<td>Transition</td>
<td>Preparing for next step in routine such as: nap, lunch, outdoor time</td>
</tr>
<tr>
<td>O</td>
<td>Other</td>
<td>Context not on list – please describe</td>
</tr>
<tr>
<td>N/A</td>
<td>Not applicable</td>
<td>Did not see</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
<td>Unsure of context</td>
</tr>
</tbody>
</table>

#### D. Location of Activity

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>In</td>
<td>Indoors</td>
<td>Inside of the childcare centre</td>
</tr>
<tr>
<td>Out</td>
<td>Outdoors</td>
<td>Outside of the childcare centre</td>
</tr>
<tr>
<td>Tr</td>
<td>Transition space</td>
<td>This includes in cubby areas, bathroom, against the wall inside or outside</td>
</tr>
<tr>
<td>N/A</td>
<td>Not applicable</td>
<td>Did not see</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
<td>Unsure of location</td>
</tr>
</tbody>
</table>
**Modified OSRAC-P Codebook**

### E. Group Dynamic

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Solitary/Alone</td>
</tr>
<tr>
<td>1-1 A</td>
<td>One to one with Adult</td>
</tr>
<tr>
<td>1-1 P</td>
<td>One to one with Peer</td>
</tr>
<tr>
<td>GA</td>
<td>Group with adult</td>
</tr>
<tr>
<td>GWP</td>
<td>Group with peers</td>
</tr>
<tr>
<td>N/A</td>
<td>Not applicable/Did not observe</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
</tr>
</tbody>
</table>

### F. Prompt of Activity

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>No teacher prompts</td>
</tr>
<tr>
<td>TP-I</td>
<td>Teacher prompts child to increase/maintain physical activity</td>
</tr>
<tr>
<td>TP-D</td>
<td>Teacher prompts child to stop/decrease physical activity</td>
</tr>
<tr>
<td>PP-I</td>
<td>Peer prompts child to increase/maintain physical activity</td>
</tr>
<tr>
<td>PP-D</td>
<td>Peer prompts child to stop/decrease physical activity</td>
</tr>
<tr>
<td>N/A</td>
<td>Not applicable/Did not observe</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
</tr>
</tbody>
</table>

### G. Initiator of Activity

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Adult initiated</td>
<td>Adults tells focal child to do activity</td>
</tr>
<tr>
<td>C</td>
<td>Child/peer initiated</td>
<td>Focal child or peer selects activity</td>
</tr>
<tr>
<td>N/A</td>
<td>Not applicable</td>
<td>Did not see</td>
</tr>
<tr>
<td>U</td>
<td>Unsure</td>
<td>Unsure of initiator</td>
</tr>
</tbody>
</table>
Appendix E

Electronic Correspondence to Supervisors

E-mail Subject line: Master’s Thesis Study - Enhancing Physical Activity through SEESAW:
   Exploring Effectiveness and Educators’ Perceptions

Good afternoon,

I, Jaime Barratt (Principal Student Investigator), from the Master of Education program at Brock University, am conducting a study that explores educators’ perceptions of physical activity, SEESAW, and the effectiveness of such a resource. We are asking you to invite preschool educators employed at your centre, and children attending your centre to participate in this study.

As a centre recognized for supporting research, I am inquiring about your willingness to share information about this research project and collect consent from your educators and families. I am recruiting for two preschool Registered Early Childhood Educators (RECEs), and 16 preschool children aged 2.5 to 4 years.

With consent of the RECEs, they will be required to partake in a 30 to 40-minute interview. This interview will occur once between September/October, and then once again in November/December at a time and place most convenient to them in their workplace. Additionally, educators will be asked to complete a questionnaire regarding their physical activity in the past seven days. With consent of the parents, each of the 16 children involved in the study will be observed for 20 minutes, on a day most convenient to the RECE.

Please note all research activities (completion of questionnaire and interview) are not considered part of participants’ "paid employment hours" and are outside of these hours (unpaid).

Additionally, it is important to note that participation is not an expectation of employment.

I have attached the interview questions and questionnaire, as well as the observational tool SEESAW Physical Activity Observation Checklist for reference. The purpose of the interview and questionnaire is to develop an understanding of RECE’s perceptions regarding their own physical activity, as well as the physical activity of children in your care.

There are both benefits and risks associated with participation in the study, I have attached this information in the Informed Consent Form. Should any educator accept or reject participation in this study, please have them contact me using the contact information provided below.
If you have any questions about this study or require further information, please contact Jaime Barratt or Debra Harwood, using the contact information provided below. This study is awaiting approval from the Ethics Board. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca.

Thank you for your time, and I am looking forward to hearing from you.

**Principal Student Investigator:**
Jaime Barratt  
Dept. of Undergraduate and Graduate Studies  
Brock University  
905-802-1369  
jb15kw@brocku.ca

**Faculty Supervisor:**
Debra Harwood, Faculty Supervisor  
Department of Education  
Brock University, St. Catharines, Ontario  
Tel: 905-688-5550 ext. 5873  
dharwood@brocku.ca
Appendix F

Formal Letter of Invitation for Educators

Date: TBA

Project Title: Enhancing Physical Activity through SEESAW: Exploring Effectiveness and Educators’ Perceptions

Principal Student Investigator: Jaime Barratt, Master of Education Candidate
Department of Undergraduate and Graduate Studies, Brock University

Faculty Supervisor: Dr. Debra Harwood, Associate Professor
Department of Education, Brock University

I, Jaime Barratt, Master of Education Candidate, from the Department of Undergraduate and Graduate Studies, Brock University, invite you to participate in a research project entitled Enhancing Physical Activity through SEESAW: Exploring Effectiveness and Educators’ Perceptions.

The purpose of this study is to understand educators’ experiences with and perceptions of physical activity, their experiences using the SEESAW initiative developed by Niagara Children’s Planning Council, as well as their insights related to children’s physical activity while in their care. Eligible participants include educators who hold membership with the College of Early Childhood Educators, and thus, must be Registered Early Childhood Educators. Further, participants can be of any race, ethnicity, gender, developmental ability, and must be between the ages of 18 and 69 years.

You will be asked to participate in a one-on-one interview on two separate occasions. The first interview will consist of 14 questions and take approximately 30 to 40 minutes of your time. The second interview will consist of 12 questions and take approximately 25 to 35 minutes of your time. During both interviews, you will be asked about your thoughts regarding physical activity for yourself and for children in childcare settings, any barriers you or the children in your care may experience participating in physical activity, as well as your knowledge and perceptions about the newly developed resource, SEESAW. After completing the interview, you will be asked to complete a questionnaire that consists of 27 questions asking about your own physical activity habits in the past 7 days.

Additionally, during the months previously stated, I will be observing 8 children in your care for 20 minutes each. Child participants can be of any race, ethnicity, gender, developmental ability, and must be between the ages of 2.5 and 4 years. These children will be observed using the SEESAW Physical Activity Observation Checklist, for their physical activity behaviours including level, type, materials involved, who initiated the activity, and where it occurs.
All interview and questionnaire procedures will be conducted individually in a private setting in your workplace, and child observations will occur within the RECEs classroom. All procedures will occur once September/October on a date of your choosing, and then again in November/December on a date of your choosing. Please note all research activities (completion of questionnaire and interview) are not considered part of participants' "paid employment hours" and are outside of these hours (unpaid). At completion of the study, a summary of the results will be sent electronically to your e-mail address.

You may experience some discomfort due to the nature of the topic and the questions being asked, which might include feeling as if you partake in inadequate amounts of physical activity. In this event, emotional support can be provided by Strive Niagara (905-735-2566), Niagara Distress Center (905-688-371, www.distresscentreniagara.com), and https://niagara.cioc.ca. Please remember that not participating in physical activity does not mean you are not healthy; should you feel uncomfortable with answering any questions in the interview and questionnaire, you will be able to skip them.

Your participation will help understand how educators view physical activity in childcare settings, and whether the resource SEESAW assists the increase of children’s physical activity levels. The interviews are specifically beneficial because Tucker, Zandvoort, Burke, and Irwin (2011) found that preschool educators who were interviewed regarding physical activity, became increasingly aware of the importance of physical activity. This awareness as found by Lamming et al. (2017), can lead to the development of a healthier and happier community, where adults and children are increasingly active together. Further, results from this study when shared with Niagara Region public health, could potentially contribute to current Niagara Region public health promotion strategies of how to increase physical activity in early childhood contexts (McKay & Nigro, 2016).

If you would like to participate in this study, please let the Principal Student Investigator know of your interest using the contact information provided below. She will then respond with prospective dates and times to schedule the one-on-one interview and questionnaire.

This study has been reviewed and was provided ethical clearance through Brock University’s Research Ethics Board (18-010 – HARWOOD).

If you have any pertinent questions about your rights as a research participant, please contact the Brock University Research Ethics Officer (905-688-5550 ext. 3035, reb@brocku.ca). If you have any questions, please feel free to contact me. Thank you.

Principal Student Investigator:
Jaime Barratt
Dept. of Undergraduate and Graduate Studies
Brock University
905-802-1369
jb15kw@brocku.ca

Faculty Supervisor:
Debra Harwood, Faculty Supervisor
Department of Education
Brock University, St. Catharines, Ontario
Tel: 905-688-5550 ext. 5873
dharwood@brocku.ca
Appendix G

Educator Informed Consent Form

Date: TBA

Project Title: Enhancing Physical Activity through SEESAW: Exploring Effectiveness and Educators’ Perceptions

INVITATION
You are invited to participate in a study that involves research. The purpose of this study is to explore the perceptions that educators hold about physical activity, SEESAW, and the effectiveness of such a resource on children’s physical activity behaviours.

WHAT’S INVOLVED
As a participant, you will be asked to participate in a one-on-one interview with the Principal Student Investigator (PSI). The first interview will occur with you and the Principal Student Investigator on two separate occasions in a private setting in your workplace either before/after your shift or on your lunch break; once in September/October, and then again in November/December. The first interview will involve 14 questions, and the second interview will involve 12 questions, both regarding your role as an educator, how physically active you and the children in your care are, and the SEESAW resource. The first interview (including the questionnaire) should last approximately 30 to 40 minutes, while the second (including the questionnaire) will last approximately 25 to 35 minutes. With your permission, I will audiotape during the interview. The recording is to accurately record the information you provide and will be used for transcription purposes only. If you choose not to be audiotaped, I will take notes instead. Upon completion of each interview, I will ask you to complete a questionnaire that consists of 27 questions related to your physical activity habits in the past 7 days. The purpose of two separate interviews is to discover any changes or similarities between perceptions and behaviours after SEESAW has been implemented for three months. Please note all research activities (completion of questionnaire and interview) are not considered part of participants' "paid employment hours" and are outside of these hours (unpaid).

POTENTIAL BENEFITS AND RISKS
The potential benefits for the participants involved in the study include obtaining an increased awareness and understanding of the importance of physical activity for self and for children in early childhood contexts. The interviews are beneficial because Tucker, Zandvoort, Burke, and Irwin (2011) found that preschool educators who were interviewed regarding physical activity, became increasingly aware of the importance of physical activity. This awareness as found by Lamming et al. (2017), can lead to the development of a healthier and happier community, where adults and children are increasingly active together. Further, results from this study when shared with Niagara Region public health, could potentially contribute to current Niagara Region public health
promotion strategies of how to increase physical activity in early childhood contexts (McKay & Nigro, 2016).

There also may be risks associated with participation such as emotional upset. Specifically, during interviews, educators might feel embarrassed of their own physical activity habits. You can terminate your participation at any point should you feel any discomfort and/or emotional upset. Additionally, emotional support can be provided by Strive Niagara (905-735-2566), Niagara Distress Center (905-688-3711 www.distresscentreniagara.com), and https://niagara.cioc.ca. Please remember that not participating in physical activity does not mean you are not healthy; should you feel uncomfortable with answering any questions in the interview and questionnaire, you will be able to skip them.

You may also be at risk for loss of privacy during the interview process. The interview contains questions regarding the following personal identifiers: name, age, professional title, gender, level of education, employment status, and years of experience.

Lastly, you might feel obligated to participate due to the circumstance where directors will be forwarding you the participant materials (invitation and consent). It is important to note that participation is not an expectation of employment.

CONFIDENTIALITY
Your study data will be handled as confidentially as possible. The interview will not be anonymous due to the personal identifiers that will be given, but the PSI will assign your personal identity a numerical code and pseudonym to ensure confidentiality. Information is not anonymous in the data collection process however, your identity will remain confidential throughout analysis. In the findings, only your name in form of a pseudonym, level of education, and your years of teaching experience will be discussed. The interview audio tapes will be recorded on an audio recorder, and once the PSI obtains the necessary audio recordings, she will listen to the recordings with headphones and transcribe the recordings on a document. Once all of the data is transcribed, the audio-recordings will be permanently deleted. The transcriptions will be secured on the PSI’s password-protected computer. This data, along with data from the questionnaire (after being scanned and uploaded) will be stored in the same password-protected computer until the study is completed, at which point they will be permanently deleted.

Loss of privacy to you, as well as risk of revealing childcare centre names will be mitigated by assigning you and other personal identifiers (professional title (RECE), age, gender, and employment status) a unique numerical code, and pseudonym. All other information you provide throughout the interview process, including the questionnaire, will remain confidential. The Principal Student Investigator will store all information collected, on her password-protected computer and assign each participant a unique numerical code and pseudonym that will ensure confidentiality.

If results of this study are published or presented, individual names and other personally identifiable information will be used in the form of pseudonyms. The pseudonym
assigned to you in the analysis will not be similar to your legal name. One day after the interview has been completed, I will e-mail you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or clarify any points that you wish. You will be given 72 hours to review and return the transcript to me (via e-mail), from the time it is provided to you. If the 72 hours passes and you have not returned the reviewed transcript, I will analyze the transcript as is.

There are limits to the confidentiality of your information due to the circumstances of which you were recruited to participate. The identity of any participant will not be revealed to the director or colleagues of your centre, however, given the small sample size, it might be possible for colleagues to trace particular statements back to your identity. It is also important to note that the level of education and years of teaching experience discussed in the results might reveal your identity to colleagues. Additionally, since the one-on-one interview will occur in a private room in your workplace, colleagues might be aware of your participation in the study. However, despite the limits to confidentiality discussed above, the data itself will remain confidential.

**VOLUNTARY PARTICIPATION**

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. To consent in participating in the interview and questionnaire, please sign below. If you choose to participate, we will proceed with the interview and questionnaire. If you choose not to participate in either the interview or questionnaire, you can simply tell the Principal Student Investigator and all participation will be nullified. Further, you may decide to withdraw from this study at any time and may do so without any penalty.

The TCPS2 states that if a participant withdraws consent, the participant can also request the withdrawal of their data.

**ACCESS TO RESEARCH INFORMATION**

The interview audio tapes will be recorded on an audio recorder, and once the PSI obtains the necessary audio recordings, she will listen to the recordings with headphones and transcribe the recordings on a document. Once all of the data is transcribed the audio-recordings will be destroyed. The transcriptions will be secured on the PSI’s password-protected computer. This data, along with data from the child observations, will be stored in the same password-protected computer until the study is completed, at which point they will be deleted and destroyed.

**PUBLICATION OF RESULTS**

Results of this study may be shared with Niagara Region Public Health, published in professional journals and presented at conferences. Feedback about this study will be available upon completion (expected July 2019). You will receive a summary of the results via e-mail address.

**CONTACT INFORMATION AND ETHICS CLEARANCE**

If you have any questions about this study or require further information, please contact
Jaime Barratt or Debra Harwood, using the contact information provided above. This study is awaiting approval from the Ethics Board. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca.

Thank you for your assistance in this study. Please keep a copy of this form for your records and e-mail a signed copy of the consent form to the Principal Student Investigator.

If you have any concerns or questions about your rights as a participant or about the way the study is being conducted you may contact:

**Principal Student Investigator:**
Jaime Barratt
Dept. of Undergraduate and Graduate Studies
Brock University
905-802-1369
jb15kw@brocku.ca

**Faculty Supervisor:**
Debra Harwood, Faculty Supervisor
Department of Education
Brock University, St. Catharines, Ontario
Tel: 905-688-5550 ext. 5873
dharwood@brocku.ca

*This study has been reviewed and was provided ethical clearance through Brock University’s Research Ethics Board (18-010 – HARWOOD).*
Appendix H

Interview 1 Questions

PERCEPTIONS OF SEESAW AND PHYSICAL ACTIVITY
Jaime Barratt, Master of Education student
(Department of Graduate and Undergraduate Studies – Brock University)

1. Please describe your role in your workplace (What is your professional title)?
2. Can you please state the gender you identify with, and your age?
3. How many years of experience have you had working with young children?
4. Can you describe the highest level of education you have completed?
5. What is your definition of physical activity?
6. Can you please tell me what you know about Canada’s physical activity guidelines for preschoolers (ParticipACTION included)? Do you know how many minutes per day they should be engaged in physical activity?
7. Thinking about children at the preschool age between 2.5 and 4 years old, what are your beliefs about children participating in physical activity? How important do you think it is for children to be physically active?
8. Thinking about educators in childcare settings, what are your beliefs about adults participating in physical activity with children? How important do you think it is to encourage physical activity as an educator?
9. What are some of the trends you have noticed in childcare settings that pertain to children’s physical activity? Do you think children are generally active/inactive?
10. Can you please describe any barriers (if any) that you and the children in your care encounter when it comes to being physically active in childcare settings?
11. Have you ever implemented or heard of interventions that help increase children’s physical activity in childcare settings? Do you think interventions are effective?
12. Can you please tell me what you know about the newly developed initiative, SEESAW? (This includes Phase 1 Healthy Eating and Phase 2 Physical Activity).
13. ParticipACTION’s 2018 report card revealed that Canadian children and youth scored D+ on overall physical activity. Do you think an initiative like SEESAW can help improve this grade? How do you think SEESAW would be in increasing children’s physical activity levels in childcare settings?
14. Please share any additional information that you think is important about your perceptions of physical activity.
Appendix I

Interview 2 Questions

PERCEPTIONS OF SEESAW AND PHYSICAL ACTIVITY
Jaime Barratt, Master of Education student
(Department of Graduate and Undergraduate Studies – Brock University)

1. In the first interview I asked for your definition of physical activity. Can you please tell me your definition of physical activity now, after SEESAW has been implemented?
2. In the SEESAW workshop, you received information about Canada’s physical activity guidelines for preschoolers. Do you know how many minutes per day they should engage in physical activity?
3. What do you perceive the benefits of physical activity to be? (This could either be mentally, physically, etc.)
4. How effective do you believe SEESAW has been when implementing physical activities with the children in your care?
5. Thinking about the barriers that yourself and children in your care experience when engaging in physical activity, do you think SEESAW has minimized those barriers? Why or why not?
6. How do you think SEESAW has impacted your own physical activity behaviours?
7. How do you think SEESAW has impacted the physical activity behaviours of children in your care?
8. How has SEESAW changed or altered your overall perspective about the importance of physical activity, if at all?
9. Can you please describe what aspects of SEESAW you found to be the most and least helpful in regard to increasing children’s physical activity levels?
10. In your opinion, what is needed in childcare settings to increase physical activity behaviours? (This can be in both children and adults)
Appendix J

Parent/Guardian Consent Form

Parent/Guardian Information and Child Consent Form

Date: TBA

Project Title: Enhancing Physical Activity through SEESAW: Exploring Effectiveness and Educators’ Perceptions

Dear Parent/Guardian:

This letter is an invitation to consider your child/ren as a participant in a research project being conducted in their childcare classroom. The project entitled, “Enhancing Physical Activity through SEESAW: Exploring Effectiveness and Educators’ Perceptions” is led by Principal Student Investigator, Jaime Barratt and supervised by Dr. Debra Harwood of Brock University.

The purpose of this study is to explore the perceptions that educators hold about physical activity, SEESAW, and the effectiveness of such a resource on children’s physical activity behaviours.

Child participants will be observed during program time in their childcare on two separate occasions, once in October and again between December/January. Each observation will last 20 minutes, where the Principal Student Investigator will make notes using the self-made SEESAW Physical Activity Observation Checklist. This tool is used to look for children’s physical activity behaviours including level, type, materials involved, who initiated the activity, and where it occurs.

There are no anticipated direct benefits to the children. Benefits described are to society/scientific community. There also may be risks associated with participation such as emotional upset. Specifically, during observation, children might feel as though they are being watched too closely and become intimidated. In this case they can refuse participation by stating so. Refusal to participate will involve no penalty and the participant may discontinue participation at any time without penalty or loss of benefits.

To ensure confidentiality, your child’s name will only be signed on the consent form and not used throughout the study. Instead, your child will be given a pseudonym (nickname) in the dissemination of findings that is untraceable back to your child. Although information is not anonymous in the data collection process, the identity of your child will remain confidential throughout analysis and findings. The observations will be recorded on the Principal Student Investigator’s password-protected iPad. The observations will be transferred onto the PSI’s password-protected computer and be
ENHANCING PHYSICAL ACTIVITY THROUGH SEESAW

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secured and stored until the study is completed, at which point they will be permanently deleted. Participation in this study is voluntary. If you wish, you may decline to have your child participate by informing the Principal Student Investigator using the contact information provided. To consent your child participating in observations please sign below. If you choose to have your child participate, I will proceed with the observations. Further, you may decide to have your child withdraw from this study at any time and may do so by contacting the Principal Student Investigator without any penalty. Your child may also withdraw from the study at any point by doing the following indicators: saying ‘no’, ‘stop’, ‘stop watching me’, or ‘go away’, and hiding from the Principal Student Investigator’s view.

The TCPS2 states that if a participant withdraws consent, the participant can also request the withdrawal of their data.

Results of this study may be shared with Niagara Region Public Health, published in professional journals and presented at conferences. The Principal Student Investigator and Faculty Supervisor will also have access to the data. Feedback about this study will be available upon completion (expected July 2019). You will receive a summary of the results via e-mail address.

If you have any questions about this study or require further information, please contact Jaime Barratt or Debra Harwood, using the contact information provided above. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca. If you have any concerns or questions about your rights as a participant or about the way the study is being conducted, please ask. If you have questions at a later date about the research you may contact:

<table>
<thead>
<tr>
<th>Principal Student Investigator:</th>
<th>Faculty Supervisor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaime Barratt</td>
<td>Debra Harwood, Faculty Supervisor</td>
</tr>
<tr>
<td>Dept. of Undergraduate and Graduate Studies</td>
<td>Department of Education</td>
</tr>
<tr>
<td>Brock University</td>
<td>Brock University, St. Catharines, Ontario</td>
</tr>
<tr>
<td>905-802-1369</td>
<td>Tel: 905-688-5550 ext. 5873</td>
</tr>
<tr>
<td><a href="mailto:jb15kw@brocku.ca">jb15kw@brocku.ca</a></td>
<td><a href="mailto:dharwood@brocku.ca">dharwood@brocku.ca</a></td>
</tr>
</tbody>
</table>

This study has been reviewed and was provided ethical clearance through Brock University’s Research Ethics Board (18-010 – HARWOOD).
CONSENT FORM

I agree to have my child participate in this research study as previously described. I have made this decision based on the information that I have read in the Parent/Guardian Information and Child Consent Form. I have read and understand the above explanation of the purpose and procedures of the project. I have also received a signed copy of the information and consent form. My questions have been answered to my satisfaction and I agree to participate in this study.

I understand that my child can refuse participation at any time because participation is voluntary. Despite close observations of your child, the childcare program will run as it would normally and there will be no disruption to their learning.

I am aware that access to all data collected and child observations will be restricted to the Principal Student Investigator and Faculty Supervisor. I am aware that personal identifiers including place of enrollment, name, age, and gender will be kept confidential and given a numerical identifier as well as a pseudonym.

I understand there is a risk of my child feeling embarrassed about being closely observed. Please remember that they can say no to being observed and will be excluded from the study.

I agree to have my child(ren) participate in this project.

☐ YES  ☐ NO

Parent Name: ____________________  Child: ____________________ (Please print)

Child: ____________________ (Please print)

Child: ____________________ (Please print)

Parent Signature: _______________  Date: ____________________
Appendix K

Child Assent Form

Date: TBA

Project Title: Enhancing Physical Activity through SEESAW: Exploring Effectiveness and Educators’ Perceptions

Principal Student Investigator: Jaime Barratt, Master of Education Candidate
Department of Undergraduate and Graduate Studies, Brock University

Faculty Supervisor: Dr. Debra Harwood, Associate Professor
Department of Education, Brock University

Verbalized to child(ren) at commencement of each observation:

Hello, my name is Jaime Barratt. I am trying to find out how much exercise you get when you play. I would like to watch you for 20 minutes while you play normally. You can say no and ask me to stop watching at any point. May I watch you during your play?