Environmental Changes Following the Implementation of the Childcare Physical Activity (PLAY) Policy

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Abstract

Environmental factors such as the infrastructure and equipment in childcare centres can influence the physical activity levels of young children. This study explored if implementing the Childcare Physical Activity (PLAY) policy resulted in unintended environmental changes that were conducive to physical activity in childcare. Childcare centres were randomized to an experimental ($n = 5$) or control ($n = 4$) condition. Three Environment and Policy Assessment and Observation Self-Report (EPAO-SR) tools were used to measure 12 best practice items in relation to the childcare environment and early childhood educators’ (ECEs) practices. Descriptive statistics and mixed-effects logistics regression models were used to explore the best practice items from pre-intervention to 6-months post-intervention. The models indicated no evidence of an association between groups and best practice items ($p > .004$). Additional research is warranted to explore the impact of implementing childcare policies on the environment and ECEs’ practices.

**Keywords:** childcare environment, early childhood educators, physical activity, policy, young children, preschooler, toddler
Summary for Lay Audience

Environmental factors such as the natural infrastructure and equipment in childcare centres can either support or limit opportunities for indoor or outdoor play among young children. These play opportunities influence the physical activity levels of young children. This research was conducted to explore the impact of a childcare physical activity policy on early childhood educators’ physical activity practices and the policy’s subsequent or unintended impact on the childcare environment. Five childcare centres implemented an 8-week evidence-informed physical activity policy, while an additional four centres continued their standard care. This study involved the use of three surveys which explored topics related to the physical environment of childcare centres, the actions the staff take to promote physical activity, the activities that children engaged in, and the classroom environment. At the beginning of the study, directors completed one of the three surveys, which assessed the centre’s physical environment characteristics (i.e., outdoor equipment and natural infrastructure) as well as its physical activity and screen-viewing policies. Early childhood educators completed the other two surveys before, during, after the intervention, and 6 months later. These tools assessed the daily indoor and outdoor activities that children engaged in as well as the physical activity practices of staff. Directors reported slight differences in the presence of outdoor equipment and natural infrastructure between the two groups. Twelve items were measured and analyzed from the two staff surveys. These 12 items were known as best practices and had topics pertaining to physical activity, sedentary time, and outdoor play and learning, which could all be further grouped into the
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broader categories of childcare environment or early childhood educators’ practices. Results from this study indicate that there was no relationship between intervention and control centres for the 12 best practice items. In other words, no apparent differences were observed in the childcare environment or in early childhood educators’ practices between the two groups. Future research should aim to better understand the impact of implementing a childcare physical activity policy on the childcare environment and in early childhood educators’ practices.
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Chapter 1: Introduction and Literature Review

Physical inactivity is widely recognized as a global problem (World Health Organization [WHO], 2020a) due to its ties with numerous non-communicable diseases including overweight/obesity, cardiovascular disease, and type 2 diabetes (González, Fuentes, & Márquez, 2017). Recent estimates in 2018 indicate that 40 million children who were 5 years and younger were overweight or obese (WHO, 2020b). Childhood overweight or obesity can have implications on a child’s self-esteem, school attendance and achievements, as well as social interactions (e.g., they may experience a greater chance of being bullied; WHO 2018). Although it is important to note that physical inactivity is just one factor related to obesity, physical inactivity among young children is detrimental given its association with numerous adverse health consequences which can persist and manifest into a child’s later life (Singh, Mulder, Twisk, van Mechelen, & Chinapaw, 2008).

In 2012, Timmons and colleagues conducted a systematic review which explored the impacts of physical activity on health outcomes in young children (aged 0-4 years) such as adiposity; bone, skeletal, psychosocial, and cardiometabolic health; as well as motor skill and cognitive development (Timmons et al., 2012). Specific to toddlers, they discovered that greater levels of physical activity were associated with positive bone and skeletal health. Among preschoolers, they found that increased physical activity was correlated with lower measures of adiposity and cardiometabolic risk factors in addition to increased measures of motor skill development and psychosocial health (Timmons et al., 2012). Carson et al. (2017) updated this review and reported slightly different
relationships. For instance, Carson et al. (2017) determined that physical activity did not produce favourable outcomes for adiposity and distinguished between the effects of physical activity among different study designs. In experimental studies, physical activity had positive impacts on motor and cognitive development as well as psychosocial and cardiometabolic health. However, across observational studies, physical activity resulted in improved motor development, fitness, and bone and skeletal health (Carson et al., 2017). Despite the differences, it is clear that regular participation in physical activity among young children provides numerous positive health effects (Carson et al., 2017; Timmons et al., 2012).

24-Hour Movement Guidelines

In 2017, the Canadian Society for Exercise Physiology (CSEP) released the Canadian 24-Hour Movement Guidelines for the Early Years (0-4 years) which encompasses recommendations for three movement behaviours: physical activity, sedentary behaviour, and sleep (Tremblay et al., 2017a). Placing an emphasis on energetic play, these guidelines recommend a minimum of 180 minutes of physical activity, at any intensity throughout the day, for both toddlers and preschoolers. For the preschool cohort, 60 minutes of these 180 minutes should be accumulated via active play from a higher intensity. In addition, recommendations for sedentary behaviours from the 24-Hour Movement Guidelines suggest that: 1) young children (0-4 years) should not be restrained or sitting for more than 1 hour at a time, 2) screen-time should be limited to only 1 hour a day, and 3) children younger than 2 years should not be engaging in sedentary screen-time (Tremblay et al., 2017a).
Physical Inactivity Among Young Children

Physical inactivity is defined as, “an insufficient physical activity level to meet physical activity recommendations” (Tremblay et al., 2017b, p. 9). A common misbelief is that young children are sufficiently active; however, recent research suggests that children are insufficiently active (Pate, McIver, Dowda, Brown, & Addy, 2008; Tucker, 2008). While a systematic review conducted by Tucker (2008) determined that 54% of preschoolers (aged 2-6 years) were physically inactive and Pate and colleagues (2008) reported that 493 children between 3 and 5 years of age were inactive for more than 80% of their time in preschool, more recent studies suggest the contrary. A cross-sectional study of a nationally representative sample of Canadian preschoolers (aged 3-5 years) indicated that only 16% of young children did not meet the recommended physical activity guidelines (Colley et al., 2013). Comparably, Chaput and colleagues’ (2017) study, consisting of a combined analysis of children’s three movement behaviours (i.e., sleep, physical activity, and sedentary behaviour), determined that 38% of preschool-aged children (3-4 years) were not meeting the recommended physical activity guidelines. It is apparent that there is some variability in the reported physical activity levels of young children, thus rendering a true picture of physical activity behaviours of toddlers and preschoolers challenging (Bornstein, Beets, Byun, & McIver, 2011; O’Brien, Vanderloo, Bruijns, Truelove, & Tucker, 2018). According to Colley and colleagues (2013), the predominant focus of research studies on non-objective measures of physical activity is a plausible explanation for these differing results. Other researchers have suggested that these inconsistent findings may arise from the
differences in objective measurement standards (e.g., accelerometer processing including cut-points applied) that account for the variability in activity levels (Bornstein et al., 2011; O’Brien et al., 2018). Despite the varied statistics of physical inactivity in the literature, physical inactivity is a concern within the paediatric population due to evidence indicating a negative correlation between physical activity and age. In particular, researchers have suggested that between 3 and 4 years of age, a 50% reduction in children’s physical activity levels is observed, which decreases even further by the time children reach 5 years of age (Taylor et al., 2009).

**Sedentary Behaviours Among Young Children**

Sedentary behaviours are activities characterized by low body movement and energy expenditure (Salmon, Dunstan, & Owen, 2008). Specifically, it refers to any waking behaviour in a seated, reclined, or lying posture with an energy expenditure of ≤1.5 metabolic equivalents (Tremblay et al., 2017b). Some examples of these behaviours include using electronic devices (e.g., television, computer, phone, or tablet); reading or writing; or sitting while commuting in any form of mobilized transportation (Salmon et al., 2008; Tremblay et al., 2017b). In recent years, sedentary behaviour has been increasingly studied among researchers as an independent construct from physical activity (LeBlanc et al., 2012; Tucker, Vanderloo, Burke, Irwin, & Johnson, 2015). This interest stems from outcomes in the literature purporting independent and disconcerting effects of sedentary behaviours on young children’s adiposity levels, cognitive development, and psychosocial health (LeBlanc et al., 2012).
Several studies have consistently reported that young children spend a significant proportion of their waking hours sedentary (Colley et al., 2013; Pereira, Cliff, Sousa-Sá, Zhang, & Santos, 2019). For instance, Colley and colleagues (2013) reported that children 3-4 years of age spend 50% (~6 hours/day) of their waking hours sedentary. Similar results were also noted in Pereira et al.’s (2019) systematic review and meta-analysis, which concluded that children (aged 1-6 years) were spending 51% of their waking hours sedentary. However, in another review, considerable variation was found in the prevalence estimates of preschoolers’ (aged 2-5 years) sedentary time, which was said to range from 34% to 94% (Hnatiuk, Salmon, Hinkley, Okely, & Trost, 2014). Similar to physical activity, the true prevalence of sedentary time among young children may be difficult to capture (Downing, Hnatiuk, & Hesketh, 2015; Hnatiuk et al., 2014); this large discrepancy may be attributed to non-uniform measurement (e.g., accelerometry and direct observation) used to track sedentary behaviour (Hnatiuk et al., 2014; Pereira et al., 2019).

A common proxy for sedentary time among young children is screen-viewing, of which, researchers have determined that about 90% of children are exposed to before they turn 2 (Zimmerman, Christakis, & Meltzoff, 2007). Increased television viewing is typically associated with increased adiposity, decreased psychosocial health, in addition to delayed cognitive (Colley et al., 2013; LeBlanc et al., 2012; Pereira et al., 2019; Poitras et al., 2017) and motor skill development (Poitras et al., 2017). Further exploring the relationship between sedentary behaviour and cognitive development, Carson and colleagues (2015) determined that among children aged 0-5 years, higher screen-time
had more negative associations (38%) with cognitive development than positive associations (6%), while reading had greater beneficial associations (60%) with cognitive development than negative associations (0%). Similarly, Poitras and colleagues (2017) reported that reading/storytelling had favourable associations with several cognitive development indicators (e.g., language development percentile, receptive language development). Consequently, these findings suggest that different types of sedentary behaviours may present different impacts on cognitive development among young children (Carson et al., 2015; Poitras et al., 2017).

Although certain sedentary behaviours such as reading or storytelling are purposeful and beneficial for children’s cognitive development (Carson et al., 2015; Poitras et al., 2017), much of sedentary behaviour research focuses on screen-time. In Downing and colleagues’ (2015) systematic review of the prevalence of sedentary behaviours among children under 2 years of age, results indicated that approximately 37 to 331 minutes of a child’s day were allocated to screen-time. Among preschool-aged children (3-5 years), Colley et al. (2013) determined that only 18% met the screen-time recommendations (<1 hour per day according to previous guidelines by Tremblay et al., [2012]), while Chaput et al. (2017) reported that less than a quarter (24%) of preschoolers (3-4 years) met the current screen-time recommendations (≤1 hour per day) from the 24-Hour Movement Guidelines (Tremblay et al., 2017a). Notably, while there has been some improvement to the proportion of children meeting screen-time recommendations, there is still a general consensus among researchers that children are exceeding screen-time recommendations (Chaput et al., 2017; Poitras et al., 2017).
Therefore, given the prevalence of sedentary behaviours among young children (Chaput et al., 2017; Colley et al., 2013; Downing et al., 2015; Hnatiuk et al., 2014; Pereira et al., 2019; Zimmerman et al., 2007), the negative implications associated with sedentary time (Colley et al., 2013; LeBlanc et al., 2012; Pereira et al., 2019; Poitras et al., 2017), and the potential for these habits to track into adolescence (Janz, Burns, & Levy, 2005; Jones, Hinkley, Okely, & Salmon, 2013; Pereira et al., 2019), it is vital to establish healthy sedentary behaviour habits in the early years.

**The Importance of Intervening in Childcare Centres**

Over the past few decades, the use of childcare has increased as a result of changes in family compositions due to increased women in the workforce, dual-income families, and lone-parent and step-families (Bushnik, 2006). According to recent national Canadian reports, 60% of children between 0 and 5 years of age participated in some type of formal or informal care (Findlay, 2019). While a variety of childcare arrangements are available, childcare centres are the most widely used, representing 52% of children receiving care (Findlay, 2019). Furthermore, 70% of children who come from families where both parents/guardians work are enrolled in daycare on a full-time basis, which equates to approximately 30 hours/week spent in these centres (Sinha, 2014).

Results from a recent Canadian study indicate that there is a link between hours spent in childcare and the prevalence of overweight/obesity among preschoolers, such that rates of overweight/obesity were higher among children enrolled in centre-based childcare than children who were cared for by their parents (Geoffroy et al., 2013).
While these findings are not conclusive since mixed results have been reported in the literature, high rates of physical inactivity in childcare centres (Henderson, Grode, O’Connell, & Schwartz, 2015; Vanderloo et al., 2014) are a plausible contributor to an increased risk of overweight/obesity among preschoolers. A number of studies have confirmed that childcare centres are not exempt from the growing trend of physical inactivity observed among young children (Chaput et al., 2017; Colley et al., 2013; LeBlanc et al., 2012; Pereira et al., 2019) as low levels of physical activity have been frequently reported among children enrolled in these settings (Henderson et al., 2015; Vanderloo et al., 2014). Specifically, Vanderloo et al. (2014) discovered that children only engaged in moderate-to-vigorous physical activity (MVPA) for 1.54 min/h while in care, which translated to approximately 12 min/day during childcare hours. Similarly, in Henderson and colleagues’ (2015) study which examined environmental correlates in childcare centres associated with MVPA among children aged 3 to 5 years, it was reported that only 14% of children’s time in childcare (27 min) was spent in MVPA. Conversely, in a cross-sectional study which employed an online survey with licensed childcare services in New Zealand, it was reported that most children in childcare services engaged in active play, with only 8% of these services reporting fewer than 3 hours of active play among children (Gerritsen, Morton, & Wall, 2016). Nonetheless, despite the varied results in the literature, the childcare environment is an appropriate venue to promote healthy behaviours given the substantial number of children enrolled in centre-based childcare.
Influences of the Childcare Environment on Children’s Physical Activity Levels

Researchers have identified that 50% of the variability of children’s physical activity levels are a consequence of the childcare environment (e.g., the availability of space and equipment), more so than individual-level factors such as a child’s age, sex, or body mass index among many others (Finn, Johannsen, & Specker, 2002; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004). As a result, it can be said that factors of the childcare environment as well as the indoor/outdoor unstructured play affordances can influence a child’s adoption of healthy physical activity behaviours or of unhealthy sedentary behaviours (Arhab et al., 2018; Copeland, Khoury, & Kalkwarf, 2016; Vanderloo et al., 2014), thus affecting the overall physical activity levels of children.

Consistent across several studies, factors of the childcare environment that affect children’s physical activity levels include the presence of: active opportunities (e.g., structured physical activity, outdoor play), sedentary opportunities (e.g., watching TV, playing video games), sedentary environment (e.g., computers in the classroom, posters promoting physical activity), portable play environment (e.g., balls, hula hoops, riding toys), fixed play environment (e.g., climbing structures, balancing surfaces), staff behaviours (e.g., joining children in play), physical activity training and education (for children, staff, or parents), and physical activity policies (Bower et al., 2008; Dowda et al., 2009; Vanderloo, Tucker, Johnson, Burke, & Irwin, 2015; Vanderloo et al., 2014).

Specific centre characteristics associated with higher MVPA levels among children include greater portable play equipment (Bower et al., 2008; Dowda et al., 2009; Vanderloo et al., 2014), larger playgrounds (Dowda et al., 2009; Gubbels, van Kann,
Jansen, 2012), larger indoor play spaces (Gubbels et al., 2012; Henderson et al., 2015), limited use of electronic devices (Dowda et al., 2009; Vanderloo et al., 2015), and staff encouragement of physical activity indoors (Gubbels et al., 2011; Henderson et al., 2015). However, contrary to findings from previous studies, Copeland and colleagues (2016) indicated that environmental factors such as indoor or outdoor play spaces, fixed or portable play equipment, and staff physical activity training were not significantly associated with children’s MVPA levels in childcare settings.

While increasing physical activity among toddlers and preschoolers can take place in either indoor or outdoor settings, studies have consistently reported that young children accumulate higher levels of physical activity outdoors (Gordon, Tucker, Burke, & Carron, 2013; Mazzucca et al., 2018; Tandon, Saelens, Zhou, & Christakis, 2018; Truelove et al., 2018; Vanderloo, Tucker, Johnson, & Holmes, 2013). According to Vanderloo and colleagues (2013), preschoolers exhibited higher levels of MVPA (5.03 min/h) and total physical activity (31.68 min/h) outdoors than they did indoors (0.54 min/h and 14.42 min/h, respectively). Similar findings were documented in Mazzucca and colleagues’ (2018) study, in which they reported that outdoor play time averaged 67 min/day and children’s time spent in MVPA was typically higher outdoors (21 min) than indoors (3 min). In Tandon et al.’s (2018) comparison study of preschoolers’ indoor and outdoor physical activity levels, they determined that children engaged in greater light and moderate-to-vigorous activities outdoors. As well, they concluded that an additional 5.3 minutes (a total of 9.1 minutes) would need to be spent by a preschooler indoors versus 3.8 minutes outdoors in order to achieve a minute of MVPA. Based on this
finding, it is clear that children should be spending more time outdoors and that greater efforts are required to promote higher physical activity levels among children indoors.

**The Influence of Childcare Centres on Children’s Sedentary Levels**

Like physical activity, the childcare environment is also known to have influences on young children’s sedentary behaviours (Arhab et al., 2018). According to Henderson and colleagues (2015), time allotted for sedentary activities (excluding nap time) constitutes the bulk of a childcare facility’s regular day-to-day schedule. Not surprisingly, high levels of sedentary time have been frequently reported in childcare centres (Tucker et al., 2015; Vanderloo et al., 2014). For instance, Vanderloo et al. (2014) reported in their study an average of 40.64 min/h spent in sedentary activity among preschoolers enrolled in centre-based childcare. Likewise, in a cross-sectional study of the prevalence of sedentary behaviours across three early learning environments, it was determined that preschoolers enrolled in centre-based childcare exhibited the highest rates of sedentary time (41.62 min/hr) compared to children who were home-schooled (40.72 min/hr) or enrolled in full-day kindergarten (39.68 min/hr; Tucker et al., 2015). In centre-based childcare, 24% of the variability of sedentary time arose from the portable play environment subscale. In home-based childcare, the staff behaviours subscale contributed to 54% of sedentary time, and in full-day kindergarten, the sedentary environment, sedentary opportunities, and fixed play environment subscales contributed to 25%, 32%, and 37% of sedentary time, respectively (Tucker et al., 2015).

In summary, the development of healthy sedentary behaviours is dependent on the learning and sedentary environments of childcare centres (Peden, Jones, Costa, Ellis,
& Okely, 2017). Consequently, given the substantial amount of time children spend in centre-based childcare and the significant impact these centres have on children’s healthy development, it is crucial to target activity-based interventions for children in these settings.

**Early Childhood Educators’ Influences on Children’s Physical Activity Levels**

Early childhood educators’ (ECEs), also commonly referred to as childcare providers or childcare staff, are key influencers in young children’s uptake of healthy behaviours. Specifically, ECEs’ physical activity competencies and their associated practices (e.g., the use of prompts to encourage children to increase physical activity or teacher-led physical activities) are known characteristics within the childcare environment that are predictive of the physical activity levels of children enrolled in these centres (Henderson et al., 2015; Van Cauwenberghe, De Craemer, De Decker, De Bourdeaudhuij, & Cardon, 2013; Vanderloo et al., 2014). For instance, staff encouragement of physical activity in indoor play sessions was associated with higher MVPA levels (Henderson et al., 2015). Additionally, researchers discovered that, during preschool hours, the provision of a teacher-led physical activity lesson resulted in lower sedentary levels and higher light physical activity and MVPA levels among young children (Van Cauwenberghe et al., 2013). Similar findings were reported in Gordon et al.’s (2013) meta-analysis, of which they determined that teacher-led interventions have an influence on preschoolers’ MVPA. In Bruijns et al.’s (2019) study, which examined early childhood education candidates’ knowledge, training, and self-efficacy in physical activity and screen-viewing related areas, candidates who had taken one or more
physical activity courses were more confident in their ability to engage children in MVPA. Evidently, the physical activity knowledge and practices of ECEs play a vital role in young children’s engagement of adequate physical activity.

The Importance of Policy Implementation in the Childcare Environment

Policies have great potential to influence health behaviours, including physical activity participation and sedentary behaviour reduction at a population-level (Bellew, Schöeppe, Bull, & Bauman, 2008; Sallis et al., 2006). Yet, as it stands, there is no provincial legislation (in Ontario) in place to specifically support physical activity among children enrolled in centre-based childcare. In Canada, each province/territory is self-regulated in educational and childcare affairs, meaning they provide their own legislation and regulations for the centres’ operations (Ott, Vanderloo, & Tucker, 2019; Vanderloo & Tucker, 2018). A recent legislative review (Vanderloo & Tucker, 2018) of provincial and territorial childcare acts and regulations in Canadian childcare centres indicated that while all provinces have general recommendations for gross motor movement, the majority do not provide specific requirements pertaining to movement intensities. In fact, only 3 out of the 13 provinces/territories (i.e., Northwest Territories, Nunavut, and Nova Scotia) reference daily physical activity in their regulations, and only the Northwest Territories and Nunavut require children to engage in physical activity for a minimum of 30 min/day. In addition, New Brunswick is the only province that has regulations regarding sedentary behaviour (e.g., screen-time), which state that television should not be used during childcare hours (Vanderloo & Tucker, 2018).
**Policy content and prevalence.** In a recent online study, which assessed the physical activity and screen-viewing policies in Canadian childcare centres \((n = 514)\), it was determined that 295 centres (44%) reported having a written physical activity policy in place (Ott et al., 2019). Most of these written physical activity policies were provincially regulated \((n = 227; 42\%)\), while 30% \((n = 163)\) were centre-specific and 8% \((n = 44)\) were regulated by their respective organization. Specific physical activity policy statements included the amount of physical activity time for children; staff behaviour during outdoor play time; and physical activity training for staff, children, or parents. In comparison, 178 centres (29%) reported having a screen-viewing policy. A breakdown of the screen-viewing policies is as follows: 34% were centre-specific \((n = 173)\), 15% were organizational \((n = 75)\), and 7% were provincial \((n = 36)\). Specific statements on these screen-viewing policies included the amount of time children can watch TV/video each day, the amount of time staff spend working on the computer/iPad, and the use of media as a reward/punishment for children (Ott et al., 2019). Although there have been efforts to implement physical activity and screen-viewing policies across Canadian childcare centres, there has been a lot of ambiguity regarding mandating these policies (e.g., the amount or intensity of physical activity).

**International context.** Elsewhere, specific efforts have been undertaken to implement physical activity and screen-viewing policies within childcare. For example, in Wolfenden et al.’s (2011) study, 41% of the sampled childcare centres \((n = 112)\) in New South Wales, Australia had a written physical activity policy in place—of which, 91% supported daily physical activity while only 35% supported limiting screen-time. A cross-
sectional study conducted in 2008-2009 among 50 childcare centres in North Carolina
determined that considerable variation exists with regard to physical activity and
screen-time policies (Erinosho, Hales, Vaughn, Mazzucca, & Ward, 2016). More
specifically, many centres had physical activity policies regarding the amount of outdoor
play time provided (66%) or the amount of active play time provided (55%); however,
few had policies concerning the amount of teacher-led active play time provided (28%).
Comparably, 45% of the centres had screen-time policies regarding limits for watching
TV or videos, while only 10% had policies concerning supervision of children’s media use
(Erinosho et al., 2016). In 2012, 34 childcare centres in South Carolina implemented a
new state-level physical activity policy, which entailed practices such as encouraging
children to be physically active indoors and outdoors, implementing a written physical
activity policy, and requiring teachers to attend physical activity training at least once
per year. Compared to 30 centres in North Carolina that did not implement any policy
changes, centres in South Carolina showed improved centre scores for the fixed play
environment and physical activity training and education subscales (O’Neill, Dowda,
Benjamin Neelon, Neelon, & Pate, 2017). In Gerritsen and colleagues’ (2016) study,
which involved an exploration of the physical activity and screen-viewing policies in New
Zealand childcare centres (n = 237), it was reported that approximately 35% of the
centres had a written physical activity policy, but none of these policies regulated
screen-time.

Policy implementation is proposed to be an effective systems-level approach in
w warranting the adoption of healthy physical activity and sedentary behaviours (Ott et
In other parts of the world such as Australia (Wolfenden et al., 2011), the United States (Erinosho et al., 2016; O’Neill et al., 2017), and New Zealand (Gerritsen et al., 2016), physical activity and screen-viewing policies have been adopted in childcare centres, yet none have been legislated provincially/territorially in Canada (Vanderloo & Tucker, 2018). As a result, one of the next steps in this field involves implementing a childcare physical activity policy to promote healthy physical activity and sedentary behaviours among young children.

**Application of the PRECEDE-PROCEED Model**

The PRECEDE-PROCEED model, developed by Green and Kreuter (2005), adopts an ecological approach to health promotion program planning. It is a two-part model that enables program planners to work “backwards” and develop strategies to achieve the desired goal(s). Consistent with the Ottawa Charter definition of health promotion, the premise of the model involves actively engaging participants to take part in initiatives that aim to better their health. The present study aligned with the outcome evaluation component (phase 7) of the PRECEDE-PROCEED model. An outcome evaluation assesses the effectiveness of an intervention at producing change. Specific to this study, an outcome evaluation involved assessing whether changes occurred in the childcare environment and in ECEs’ physical activity-promoting practices following physical activity policy implementation.

**Study Rationale and Purpose**

Young children’s physical activity levels decrease with age (Taylor et al., 2009) and sedentary behaviours continue to rise (Chaput et al., 2017; Colley et al., 2013;
LeBlanc et al., 2012; Pereira et al., 2019). As such, it is apparent that these two behaviours warrant attention to support health promoting behaviours. The childcare environment plays an important role in influencing the physical activity and sedentary behaviours of young children, which renders it an ideal venue to implement physical activity interventions and policies. While Canada is one of the forerunners for physical activity promotion, it lags behind Australia (Wolfenden et al., 2011), the United States (Erinosho et al., 2016; O’Neill et al., 2017), and New Zealand (Gerritsen et al., 2016), where institutional- or state-level physical activity and sedentary behaviour policies have already been introduced. Currently, Ontario does not have a centre-based childcare policy regarding the physical activity and sedentary levels of young children.

As part of the larger Childcare Physical ActivitY (PLAY) Policy study (Tucker et al., 2019), which entailed examining the impact of a childcare policy on young children’s physical activity and sedentary time, this study explored the unintended short- (at pre-intervention) and long-term (at 6-months post-intervention) effects of the PLAY policy implementation on ECEs’ practices and the childcare environment. For the purposes of this study, the term childcare environment was in reference to childcare centres and entailed an assessment by directors of the centre’s physical environment (e.g., equipment and infrastructure) in addition to assessments by ECEs of the indoor play environment (e.g., availability of portable play equipment) and affordances for physical activity (e.g., posters and books to promote physical activity). Additionally, the term ECEs’ practices entailed the staff’s attitudes and behaviours regarding physical activity (e.g., teacher role during playtime), the amount of physical activity and screen-time
children were provided with, and the staff’s physical activity learning affordances (e.g., formal child physical activity education). Both the childcare environment and ECEs’ practices were explored through 12 best practice items, based predominantly on reports from ECEs, which were centred around physical activity (PA), sedentary time (ST), and outdoor play and learning (OPL). It was hypothesized that childcare centres that adhered to the policy would observe an increase in indoor/outdoor play affordances, a decrease in sedentary opportunities (e.g., screen-time), and a change to ECEs’ current practices (e.g., increased occasions of teacher-led physical activity) from pre- (week 0) to post-intervention (week 8) and at follow-up (6-months post-intervention), while childcare centres assigned to the control condition would observe no change.
Chapter 2: Methods

Study Design and Recruitment

The Childcare PLAY Policy study, a pilot, cluster-randomized controlled trial (registered with the Clinical Trials Registry as NCT03695523, https://clinicaltrials.gov/) examining the activity levels of young children enrolled in centre-based childcare, involved nine licensed childcare centres in London, Ontario that were randomly selected from an online listing of the city’s eligible facilities ($n = 81$) and invited to participate in the study. Childcare centres (the clusters), as opposed to individual participants, were randomly allocated to either the experimental or control condition. Using a single-blind design, five centres implemented an evidence-informed physical activity policy (experimental group), while an additional four centres continued with their regular programming (control group) for the 8-week intervention period. A comprehensive methodological account of the Childcare PLAY study is published elsewhere (Tucker et al., 2019). All study procedures and related documents were approved by the Health Sciences Research Ethics Board at The University of Western Ontario (REB# 111890; Appendix A).

**Experimental condition.** Childcare centres randomly assigned to this condition ($n = 5$) implemented the physical activity policy during the 8-week intervention period. Five centres were recruited for this study to satisfy the sample size calculation and to adjust for the anticipated loss of participants to follow-up or accelerometer non-compliance. Prior to implementing the policy within their classrooms, participating childcare staff from the centres in the intervention group attended a 30-minute training
session in which the characteristics of the study design, the Childcare PLAY policy and its implementation, and the study tools (e.g., questionnaires, accelerometers) were reviewed with them.

**Control condition.** Childcare centres randomly assigned to serve as a control \((n = 4)\) continued with their regular day-to-day programming for the duration of the study. At the end of the study, all childcare centres in this group were given the option to receive a copy of the written physical activity policy along with the accompanying training to implement the policy.

**Recruitment.** Once the centres were randomly selected, the project coordinator contacted the childcare centre directors to invite participation via email, phone, or an in-person meeting. After receiving verbal consent from all participating centres, the project coordinator arranged a meeting at each of the centres to invite participation and describe the study to eligible childcare staff. Letters of information and written consent forms were distributed to directors (Appendix B) and ECEs (Appendix C) at participating childcare centres/classrooms.

**Sample size.** A sample size calculation was generated for the primary outcome variable of the Childcare PLAY study, young children’s physical activity. Consequently, the number of children required for this study also influences the number of ECEs who were eligible to participate. Using a random cluster sampling strategy, 235 children were recruited to satisfy the sample which resulted in nine centres being recruited.

**Inclusion criteria.** Childcare centres were eligible to participate if they: a) operated a centre-based facility that provides care to toddlers/preschoolers in London,
Ontario or surrounding area; b) had ECEs who were willing to participate; c) received parental consent from at least eight children; d) were an English-speaking facility; and e) did not implement an institutional-level physical activity policy. For ECEs, eligibility was determined by: a) full-time employment in a toddler or preschool classroom at a participating childcare centre, and b) fluency in English.

The Childcare PLAY Policy

The Childcare PLAY Policy is an evidence-based written physical activity policy that was guided by the *24-Hour Movement Guidelines for the Early Years* (Tremblay et al., 2017a), the Supporting Physical Activity in the Childcare Environment (SPACE) study (Tucker et al., 2017), and evidence in the literature indicating higher levels of physical activity by children outdoors (Mazzucca et al., 2018; Tandon et al., 2018; Truelove et al., 2018; Vanderloo et al., 2013). The policy consisted of eight items (six regarding physical activity, two regarding sedentary time) which outlined optimal physical activity daily affordances during childcare and included statements such as encouraging higher intensity energy play among children, exposing children to a variety of physical activities, offering a minimum of 120 minutes of outdoor time, or offering shorter and more frequent outdoor sessions. The policy, developed with feedback from experts in the field, was designed to prescribe, with flexibility for each unique centre, ECEs to offer more and higher intensity physical activity daily, while reducing screen-time affordances. See Appendix D for the Childcare PLAY policy.

Data Collection

Data collection occurred predominantly between September 2018 and
December 2018, while the 6-month follow-up period took place from May to June 2019. To obtain information on the childcare environment and ECEs’ practices, directors and ECEs were asked to complete their respective Environment and Policy Assessment and Observation Self-Report (EPAO-SR) questionnaires (mentioned below). At the end of each time point in the study, each participating ECE received a letter of thanks (Appendix E) along with a token of appreciation (a $5 grocery store gift card) as an acknowledgement for their participation in the study.

**Instrument and Tools**

**Demographic questionnaires.** At baseline, ECEs and directors in both experimental and control conditions completed a demographic questionnaire (Appendices F and G, respectively) with items including their sex, age, employment status, years of childcare experience, level of education, and self-reported physical activity levels.

**EPAO-SR Director General Tool** (Ward et al., 2015; Appendix H). The EPAO-SR is a valid self-report tool for assessing childcare environments and policy affordances for nutrition and physical activity. There are five content areas which include child nutrition, infant and preschooler physical activity, outdoor play and learning, screen time, and breastfeeding and infant feeding. With approval from the tools’ creators, this tool was modified to conform with the Canadian context by removing the nutrition subscales. This tool gathers characteristics in the physical environment that may inhibit or promote physical activity and assesses a centre’s current policies on physical activity or sedentary time. At baseline, all participating centre directors were asked to complete the modified
director EPAO-SR questionnaire which consists of two subscales: Childcare Environment (6 items) and Physical Activity Policies (11 items). Information solicited from the director EPAO-SR questionnaire helped to better understand the subsequent unintended impact of implementing the Childcare PLAY policy on a centre’s current physical activity environment and practices.

**EPAO-SR Staff Tools** (Ward et al., 2015). Like the EPAO-SR Director General tool, these self-report tools were adapted for use in the Canadian context with the nutrition subscales removed. At the time of this study’s data collection, the EPAO-SR staff tools that were employed (under the direction of the creators) were still in the process of being validated and were the most updated version available. These tools were used to examine the classroom physical activity environment and physical activity practices of staff. In addition, the tools were used to measure the following 12 best practice items: total amount of indoor, outdoor PA time per day (PA 1); teacher-led PA time (PA 4); availability of portable play equipment (PA 8); posters and books to promote PA (PA 11); PA withheld for longer than 5 minutes (PA 12); teacher role during playtime (PA 13); teachers incorporate PA in classroom routines, transitions (PA 15); formal child PA education (PA 16); teachers talk with children about the importance of PA (PA 17); screen time used as a reward (ST 6); occasions of outdoor playtime (OPL 1); and amount of outdoor playtime (OPL 2).

Participating ECEs from each participating classroom at the centres completed components of two modified EPAO-SR questionnaires: the EPAO-SR Staff-General (Appendix I) with two subscales (Space, Equipment, and Environment [8 items] and
Practices around Physical Activity [3 items]) and the EPAO-SR Staff-Today (Appendix J) with six subscales (Morning Outdoor Activities [7 items], Morning Indoor Activities [8 items], Nap/Rest Time [3 items], Afternoon Outdoor Activities [7 items], Afternoon Indoor Activities [3 items], and Other Activities [3 items]). ECEs were asked to complete the two tools once weekly at the study’s four time points: pre-intervention (i.e., week 0), mid-intervention (i.e., week 4), post-intervention (i.e., week 8), and 6-month follow-up.

In accordance with the scoring protocol outlined in the EPAO-SR-2017 User Manual (Ward et al., 2015), a 4-point scale (ranging from 0 to 3) was used to produce scores for relevant item responses (also known as best practice items) for the two EPAO-SR staff tools. For the physical activity best practice items, a higher score was indicative of greater compliance. On the contrary, best practice items pertaining to screen-time or sedentary activities were reverse-scored, with a higher score indicating less compliance or greater deviance from best practices. The next step to scoring involved grouping similar best practice items into 13 subcomponents to generate a subcomponent score, which is an average of the grouped best practice items. Unfortunately, subcomponent scores could not be generated due to insufficient data. Consequently, it was also not possible to derive the total physical activity score, a sum of the 13-subcomponent scores. Instead, a 50% threshold criterion was applied to the 13 subcomponent categories to determine which best practice items to evaluate and analyze—of this, 12 best practice items fit our criterion for statistical analysis.
Data Analysis

Descriptive statistics were conducted using the Statistical Package for the Social Sciences (SPSS) program (version 25) for the director and ECE demographics data. Frequencies for the 12 best practice items were generated by group (i.e., experimental vs. control). In addition, descriptive statistics were also run for the EPAO-SR Director General tool and analyzed using frequencies.

To objectively identify which childcare environment characteristics or ECE practices may have changed as a consequence of implementing the Childcare PLAY policy, separate mixed-effects logistics regression models were run in R (version 3.4.0) for each best practice item between groups (experimental vs. control) and time (pre-intervention, mid-intervention, post-intervention, 6-months follow-up), all entered as fixed effects. Using the “geeglm” package in R, these mixed-model analyses were used to assess whether there were differences in ECEs’ practices and the childcare environment between the two groups. Interaction terms were evaluated using interaction plots, which allows for visualization of the differential impact of time with each of the two groups. Further to this, we evaluated all possible comparisons amongst the time periods and compared these effects between groups. All statistical tests were two-sided and a Bonferroni correction was used to adjust for multiple comparison bias ($p < 0.05/12 = 0.004$). Additionally, residual distributions were examined to evaluate logistic model assumptions.

Multiple imputation analysis using 10 imputed datasets was performed to allow inclusion of subjects with missing covariate data (up to 10% missing) using the ‘mice’
package in R (van Buuren & Groothuis-Oudshoorn, 2011). Results of the imputed
datasets were combined and the parameter estimates (95% CI) for the adjusted pooled
models were reported. All variables had levels of missing data under 18% (Enders,
2003).
Chapter 3: Results

Participant Demographics

**Directors.** At baseline, directors from the nine participating childcare centres were contacted to provide consent for their participation in the Childcare PLAY policy study; however, only six completed the demographic questionnaire, resulting in a response rate of 66.7%. The mean age of the directors was 46.5 ± 12.42 years; all were female, Caucasian, and employed full-time. Results for the directors’ self-reported physical activity levels were fairly dispersed, with 33.3% indicating spending on average 60 to 89 minutes and an additional 33.3% indicating spending 120 to 149 minutes per week engaged in MVPA. Half (50%) of the directors perceived that they were somewhat of a strong role model for children with regard to physical activity. See Table 1 for complete director demographics.

**Early childhood educators.** At baseline, a total of 56 ECEs, across the nine participating childcare centres, provided consent for their participation in the study; 49 ECEs completed survey data, which resulted in a response rate of 87.5%. The mean age of the ECEs was 34.73 ± 12.04 years; the majority were female (98%) and Caucasian (73.5%) and all were employed full-time (100%). Results were more varied with respect to the ECEs’ self-reported physical activity levels; 32.7% indicated that they spent on average between 30 and 59 minutes, while 22.4% reported spending 60 to 89 minutes per week engaged in MVPA. Additionally, the vast majority (74.5%) of ECEs perceived that they were somewhat of a strong role model for children with regard to physical activity. Of the 49 ECEs who completed survey data, 24 were assigned to the control
condition and the remaining 25 were assigned to the experimental condition. Among ECEs in the control centres, 37.5% indicated that they spent on average between 30 and 59 minutes per week engaged in MVPA. In contrast, among experimental centres, 32% of ECEs reported spending 60 to 89 minutes per week engaged in MVPA. ECEs in both conditions had comparable results in their physical activity role model indications as 73.9% and 75% of ECEs reported that they were somewhat of a strong role model for children among control centres and experimental centres, respectively. See Table 1 for complete ECE demographics.
Table 1

**Participant Demographics of Directors and Early Childhood Educators**

<table>
<thead>
<tr>
<th></th>
<th>Directors</th>
<th>Early Childhood Educators</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total <em>(N = 6)</em></td>
<td></td>
<td>Total <em>(N = 49)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>n</em></td>
<td><em>%</em></td>
<td><em>n</em></td>
<td><em>%</em></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>100</td>
<td>48</td>
<td>98.0</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>6</td>
<td>100</td>
<td>36</td>
<td>73.5</td>
</tr>
<tr>
<td>Arab</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>Latin-American</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Asian</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>12.3</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>6</td>
<td>100</td>
<td>49</td>
<td>100</td>
</tr>
<tr>
<td>Age group responsible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toddler</td>
<td>-</td>
<td>-</td>
<td>22</td>
<td>44.9</td>
</tr>
<tr>
<td>Preschooler</td>
<td>-</td>
<td>-</td>
<td>27</td>
<td>55.1</td>
</tr>
<tr>
<td>Years of experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>30.6</td>
</tr>
<tr>
<td>5-9 years</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>24.5</td>
</tr>
<tr>
<td>10-14 years</td>
<td>2</td>
<td>33.3</td>
<td>8</td>
<td>16.3</td>
</tr>
<tr>
<td>15-19 years</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>20+ years</td>
<td>4</td>
<td>66.7</td>
<td>11</td>
<td>22.4</td>
</tr>
<tr>
<td>Highest education level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>4.1</td>
</tr>
<tr>
<td>College</td>
<td>5</td>
<td>83.3</td>
<td>40</td>
<td>81.6</td>
</tr>
<tr>
<td>University</td>
<td>1</td>
<td>16.7</td>
<td>7</td>
<td>14.3</td>
</tr>
<tr>
<td>Time spent in MVPA per week</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 30 min</td>
<td>1</td>
<td>16.7</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>Time Interval</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>32.7</td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>----</td>
<td>------</td>
</tr>
<tr>
<td>30-59 min</td>
<td>2</td>
<td>33.3</td>
<td>11</td>
<td>22.4</td>
</tr>
<tr>
<td>60-89 min</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>12.2</td>
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<tr>
<td>90-119 min</td>
<td>2</td>
<td>33.3</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>120-149 min</td>
<td>2</td>
<td>33.3</td>
<td>6</td>
<td>12.2</td>
</tr>
<tr>
<td>150+ min</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Role model for children

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>33.3</th>
<th>11</th>
<th>23.4</th>
<th>5</th>
<th>21.7</th>
<th>6</th>
<th>25.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, very much</td>
<td>3</td>
<td>50.0</td>
<td>35</td>
<td>74.5</td>
<td>17</td>
<td>73.9</td>
<td>18</td>
<td>75.0</td>
</tr>
<tr>
<td>Somewhat, could be better</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>2.1</td>
<td>1</td>
<td>4.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Not at all</td>
<td>1</td>
<td>16.7</td>
<td>1</td>
<td>2.1</td>
<td>1</td>
<td>4.3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note.* (-) = not applicable; MVPA = moderate-to-vigorous physical activity. Some values shown may not add up to their respective N values as some individuals chose not to answer certain questions.
EPAO-SR Director General

Nine EPAO-SR Director General questionnaires were administered to directors at baseline for completion—of which, seven responded, resulting in a response rate of 77.8%. Descriptive statistics were used to analyze the survey to determine the possible characteristics in a centre’s physical environment (i.e., equipment and infrastructure) that may promote or inhibit physical activity as well as to examine current physical activity and screen-viewing policies that exist in childcare centres. Directors reported the presence of outdoor toys and equipment available at their centres; basketball hoops and benches differed between the two groups with experimental centres (100%) reporting not having them, and control centres (100%) having them. With regards to the outdoor play area, differences were reported for the presence of grassy area with the majority of experimental centres (66.7%) reporting not having them, and control centres (100%) reporting having them. See Table 2 for complete data pertaining to the outdoor equipment and infrastructure, and Table 3 for data pertaining to electronic devices in childcare centres.

Directors also reported on whether their centre had a physical activity or screen-viewing policy in place; control centres (100%) reported not having a physical activity policy, while the majority of experimental centres (67%) reporting having a physical activity policy. With regards to the presence of a screen-viewing policy, the majority of control centres (75%) indicated not having one, while the majority of experimental centres (67%) indicated having one. The physical activity policy topics reported by directors were fairly consistent between control and experimental centres with the
exception of the topic on *appropriate wear for outdoor play*; control centres (100%) reported not having this topic in their physical activity policies, while experimental centres (100%) reporting having this topic. See Table 4 for complete data pertaining to the physical activity and screen-viewing policies in childcare centres.
Table 2

**Presence of Outdoor Equipment and Infrastructure in Childcare Centres (N = 7)**

<table>
<thead>
<tr>
<th>Outdoor Toys and Equipment</th>
<th>Total</th>
<th>Control</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, n (%)</td>
<td>No, n (%)</td>
<td>Yes, n (%)</td>
</tr>
<tr>
<td>Balancing surfaces</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Basketball hoop(s)</td>
<td>4 (57.1)</td>
<td>3 (42.9)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Benches</td>
<td>4 (57.1)</td>
<td>3 (42.9)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Immovable climbing structures</td>
<td>7 (100)</td>
<td>0 (0)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Garden</td>
<td>6 (85.7)</td>
<td>1 (14.3)</td>
<td>3 (75.0)</td>
</tr>
<tr>
<td>Merry-go-round</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Playhouse</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Sandbox</td>
<td>6 (85.7)</td>
<td>1 (14.3)</td>
<td>3 (75.0)</td>
</tr>
<tr>
<td>See-saw</td>
<td>2 (28.6)</td>
<td>5 (71.4)</td>
<td>2 (50.0)</td>
</tr>
<tr>
<td>Immovable slide</td>
<td>5 (71.4)</td>
<td>2 (28.6)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Small stage or raised deck</td>
<td>6 (85.7)</td>
<td>1 (14.3)</td>
<td>3 (75.0)</td>
</tr>
<tr>
<td>Swinging equipment</td>
<td>0 (0)</td>
<td>7 (100)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Tricycle track or paved area</td>
<td>7 (100)</td>
<td>0 (0)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Tunnels</td>
<td>3 (42.9)</td>
<td>4 (57.1)</td>
<td>2 (50.0)</td>
</tr>
<tr>
<td>Water play area</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of Outdoor Play Area</th>
<th>Total</th>
<th>Control</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, n (%)</td>
<td>No, n (%)</td>
<td>Yes, n (%)</td>
</tr>
<tr>
<td>Large trees</td>
<td>6 (85.7)</td>
<td>1 (14.3)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Small trees</td>
<td>2 (28.6)</td>
<td>5 (71.4)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Climbable trees</td>
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<td>0 (0)</td>
</tr>
<tr>
<td>Shrubs</td>
<td>2 (28.6)</td>
<td>5 (71.4)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Flowering plants</td>
<td>5 (71.4)</td>
<td>2 (28.6)</td>
<td>3 (75.0)</td>
</tr>
<tr>
<td>Ground variation</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Grassy area</td>
<td>5 (71.4)</td>
<td>2 (28.6)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Large, climbable rocks</td>
<td>0 (0)</td>
<td>7 (100)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Hill</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>1 (25.0)</td>
</tr>
<tr>
<td>Shaded area</td>
<td>7 (100)</td>
<td>0 (0)</td>
<td>4 (100)</td>
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Table 3

*Presence of Electronic Devices in Childcare Centres (N = 7)*

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Control</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes n (%)</td>
<td>No n (%)</td>
<td>Yes n (%)</td>
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<tr>
<td>Television</td>
<td>2 (28.6)</td>
<td>5 (71.4)</td>
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<tr>
<td>iPad</td>
<td>4 (57.1)</td>
<td>3 (42.9)</td>
<td>2 (50.0)</td>
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<td>Computer</td>
<td>5 (71.4)</td>
<td>2 (28.6)</td>
<td>3 (75.0)</td>
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<td>Movie Projector</td>
<td>1 (14.3)</td>
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<td>1 (25.0)</td>
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### Table 4

**Physical Activity and Screen-Viewing Policies in Childcare Centres (N = 7)**

<table>
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<th>Type of Policy</th>
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<tr>
<td></td>
<td>Yes, n (%)</td>
<td>No, n (%)</td>
<td>Yes, n (%)</td>
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<tr>
<td>Physical activity</td>
<td>2 (29)</td>
<td>5 (71)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Screen-viewing</td>
<td>3 (43)</td>
<td>4 (57)</td>
<td>1 (25)</td>
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#### Sources Used to Develop Physical Activity Policies

<table>
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<th>Total Yes, n (%)</th>
<th>Control Yes, n (%)</th>
<th>Experimental Yes, n (%)</th>
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</thead>
<tbody>
<tr>
<td>Provincial policy</td>
<td>3 (100)</td>
<td>0 (0)</td>
<td>2 (100)</td>
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<td>School board policy</td>
<td>0 (0)</td>
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<td>0 (0)</td>
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<td>Childcare organization policy</td>
<td>1 (33)</td>
<td>2 (67)</td>
<td>1 (50)</td>
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<tr>
<td>Centre-individualized policy</td>
<td>0 (0)</td>
<td>3 (100)</td>
<td>0 (0)</td>
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<tr>
<td>Other</td>
<td>1 (33)</td>
<td>2 (67)</td>
<td>1 (50)</td>
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#### Physical Activity Policy Topics

<table>
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<tr>
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<th>Total Yes, n (%)</th>
<th>Control Yes, n (%)</th>
<th>Experimental Yes, n (%)</th>
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<tbody>
<tr>
<td>Amount of time provided for indoor PA</td>
<td>1 (25)</td>
<td>3 (75)</td>
<td>1 (50)</td>
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<tr>
<td>Amount of time provided for outdoor PA</td>
<td>3 (75)</td>
<td>1 (25)</td>
<td>1 (50)</td>
</tr>
<tr>
<td>Amount of teacher-led active play provided</td>
<td>1 (25)</td>
<td>3 (75)</td>
<td>0 (0)</td>
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<tr>
<td>Limited prolonged seated time for children</td>
<td>0 (0)</td>
<td>4 (100)</td>
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<tr>
<td>Appropriate wear for outdoor play</td>
<td>2 (50)</td>
<td>2 (50)</td>
<td>2 (100)</td>
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<tr>
<td>Ways to encourage children’s PA</td>
<td>2 (50)</td>
<td>2 (50)</td>
<td>1 (50)</td>
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<tr>
<td>Not removing PA or playtime</td>
<td>2 (50)</td>
<td>2 (50)</td>
<td>1 (50)</td>
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<tr>
<td>Rewarding playtime for good behaviour</td>
<td>0 (0)</td>
<td>4 (100)</td>
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#### Physical Activity Education Topics

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<td>PA training/professional development for staff</td>
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<td>1 (50)</td>
<td>-</td>
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<tr>
<td>PA education for parents</td>
<td>0 (0)</td>
<td>2 (100)</td>
<td>-</td>
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<tr>
<td>Methods to Inform Staff about Physical Activity Policies</td>
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<td>-------------------------------------------------------</td>
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<tr>
<td>Centre handbook</td>
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<td>1 (20)</td>
<td>2 (67)</td>
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<tr>
<td>Staff orientation handbook</td>
<td>4 (80)</td>
<td>1 (20)</td>
<td>2 (67)</td>
</tr>
<tr>
<td>Newsletter/formal letter</td>
<td>2 (40)</td>
<td>3 (60)</td>
<td>2 (67)</td>
</tr>
<tr>
<td>Bulletin board</td>
<td>2 (40)</td>
<td>3 (60)</td>
<td>1 (33)</td>
</tr>
<tr>
<td>Staff meetings</td>
<td>5 (100)</td>
<td>0 (0)</td>
<td>3 (100)</td>
</tr>
<tr>
<td>Email/website</td>
<td>2 (40)</td>
<td>3 (60)</td>
<td>1 (33)</td>
</tr>
<tr>
<td>Director/centre management word of mouth</td>
<td>4 (80)</td>
<td>1 (20)</td>
<td>3 (100)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (40)</td>
<td>3 (60)</td>
<td>1 (33)</td>
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</table>

<table>
<thead>
<tr>
<th>Methods to Monitor Staff Compliance with Policies</th>
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<td>Daily walk-throughs</td>
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<td>Daily log/record</td>
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<tr>
<td>Informal check-in and staff reviews</td>
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<td>Tracked complaints from parents or other staff</td>
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<td>Other</td>
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</table>

<table>
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<tr>
<th>Methods to Inform Parents/Families about Physical Activity Policies</th>
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</thead>
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<td>Centre handbook</td>
</tr>
<tr>
<td>Parent/teacher meetings</td>
</tr>
<tr>
<td>Newsletter/formal letter</td>
</tr>
<tr>
<td>Bulletin board</td>
</tr>
<tr>
<td>Email/website</td>
</tr>
<tr>
<td>Director/centre management word of mouth</td>
</tr>
<tr>
<td>Teacher/staff word of mouth</td>
</tr>
<tr>
<td>Other</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Challenges/Barriers Enforcing Physical Activity Policies</th>
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<tbody>
<tr>
<td>No barriers</td>
</tr>
<tr>
<td>Lack of support from centre’s management</td>
</tr>
<tr>
<td>Lack of support from teachers/staff</td>
</tr>
<tr>
<td>Lack of support from parents/families</td>
</tr>
<tr>
<td>Concern about staff reaction to policy changes</td>
</tr>
</tbody>
</table>
### ENVIROMENTAL CHANGES AFTER POLICY IMPLEMENTATION

| Concern about parents’ reaction to policy changes | 0 (0) | 3 (100) | 0 (0) | 1 (100) | 0 (0) | 2 (100) |
| Limited outdoor play space | 1 (33) | 2 (67) | 0 (0) | 1 (100) | 1 (50) | 1 (50) |
| Limited toys/play equipment | 1 (33) | 2 (67) | 0 (0) | 1 (100) | 1 (50) | 1 (50) |
| Insufficient funds | 0 (0) | 3 (100) | 0 (0) | 1 (100) | 0 (0) | 2 (100) |
| Other | 0 (0) | 3 (100) | 0 (0) | 1 (100) | 0 (0) | 2 (100) |

#### Screen-Time Policy Topics

| Limits on TV | 0 (0) | 1 (100) | - | - | 0 (0) | 1 (100) |
| Limits on computer | 0 (0) | 1 (100) | - | - | 0 (0) | 1 (100) |
| Limits on iPad | 0 (0) | 1 (100) | - | - | 0 (0) | 1 (100) |
| Limits on video games | 0 (0) | 1 (100) | - | - | 0 (0) | 1 (100) |
| Staff supervision of media use | 0 (0) | 1 (100) | - | - | 0 (0) | 1 (100) |
| Not offering media to children | 0 (0) | 1 (100) | - | - | 0 (0) | 1 (100) |

#### Challenges/Barriers Enforcing Screen-Viewing Policies

| No barriers | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) | 0 (0) |
| Lack of support from centre’s management | 0 (0) | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) |
| Lack of support from teachers/staff | 0 (0) | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) |
| Lack of support from parents/families | 0 (0) | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) |
| Concern about staff reaction to policy changes | 0 (0) | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) |
| Concern about parents’ reaction to policy changes | 0 (0) | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) |
| Other | 0 (0) | 2 (100) | 0 (0) | 1 (100) | 0 (0) | 1 (100) |

Note. PA = physical activity; (-) = not applicable. Some values shown may not add up to N = 7 as some questions were not answered.
EPAO-SR Staff Tools: Staff-Today and Staff-General

The scores of 12 best practice items across the two EPAO-SR staff tools (Staff-Today and Staff-General) were analyzed descriptively. Five of the best practice items (PA 1, PA 4, PA 16, OPL 1, and OPL 2) were obtained from the EPAO-SR Staff-Today tool, which had a total of 29 participants. The average response rate from these five best practice items, across the four time points was 74.3%. The remaining seven best practice items (PA 8, PA 11, PA 12, PA 13, PA 15, PA 17, and ST 6) were obtained from the EPAO-SR Staff-General tool, which had a total of 26 participants. The average response rate from these seven best practice items, across the four time points was approximately 87%. The means of five best practice items (i.e., total amount of indoor, outdoor PA time per day [PA 1]; posters and books to promote PA [PA 11]; teacher role during playtime [PA 13]; teachers incorporate PA in classroom routines, transitions [PA 15]; and amount of outdoor playtime [OPL 2]) increased, while the means of two best practice items (i.e., availability of portable play equipment [PA 8] and teachers talk with children about the importance of PA [PA 17]) decreased for both experimental and control groups from pre-intervention to 6-months post-intervention, respectively. The means and standard deviations for the 12 best practice item scores by group (control vs. experimental) across the study’s four time points (pre-, mid-, post-intervention, and 6-month follow-up) are presented in Table 5.
Table 5

Means and Standard Deviations for Best Practice Items at Pre-, Mid-, and Post-Intervention, and at 6-Month Follow-Up

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-Intervention</th>
<th>Mid-Intervention</th>
<th>Post-Intervention</th>
<th>6-Month Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ctrl</td>
<td>Exp</td>
<td>Ctrl</td>
<td>Exp</td>
</tr>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>PA 1</td>
<td>2.54 (0.78)</td>
<td>2.46 (0.88)</td>
<td>2.09 (1.30)</td>
<td>2.54 (0.97)</td>
</tr>
<tr>
<td>PA 4</td>
<td>0.42 (0.67)</td>
<td>0.25 (0.45)</td>
<td>0.30 (0.48)</td>
<td>0.33 (0.49)</td>
</tr>
<tr>
<td>PA 8</td>
<td>2.42 (1.17)</td>
<td>2.79 (0.80)</td>
<td>2.42 (1.17)</td>
<td>2.79 (0.80)</td>
</tr>
<tr>
<td>PA 11</td>
<td>1.58 (1.31)</td>
<td>2.00 (1.24)</td>
<td>1.83 (1.27)</td>
<td>2.21 (1.12)</td>
</tr>
<tr>
<td>PA 12</td>
<td>3.00 (0.00)</td>
<td>2.77 (0.44)</td>
<td>2.80 (0.42)</td>
<td>2.92 (0.28)</td>
</tr>
<tr>
<td>PA 13</td>
<td>1.33 (1.23)</td>
<td>1.14 (0.66)</td>
<td>1.42 (1.00)</td>
<td>1.71 (0.73)</td>
</tr>
<tr>
<td>PA 15</td>
<td>1.40 (0.84)</td>
<td>1.31 (0.48)</td>
<td>1.33 (0.50)</td>
<td>1.46 (0.52)</td>
</tr>
<tr>
<td>PA 16</td>
<td>0.25 (0.87)</td>
<td>1.38 (1.56)</td>
<td>0.55 (1.21)</td>
<td>1.15 (1.52)</td>
</tr>
<tr>
<td>PA 17</td>
<td>1.90 (0.88)</td>
<td>1.54 (0.66)</td>
<td>1.67 (0.87)</td>
<td>1.38 (0.51)</td>
</tr>
<tr>
<td>ST 6</td>
<td>3.00 (0.00)</td>
<td>2.92 (0.29)</td>
<td>2.89 (0.33)</td>
<td>3.00 (0.00)</td>
</tr>
<tr>
<td>OPL 1</td>
<td>3.00 (0.00)</td>
<td>2.25 (1.36)</td>
<td>3.00 (0.00)</td>
<td>2.75 (0.87)</td>
</tr>
<tr>
<td>OPL 2</td>
<td>2.62 (0.77)</td>
<td>2.23 (1.24)</td>
<td>2.00 (1.41)</td>
<td>2.54 (1.13)</td>
</tr>
</tbody>
</table>
Note. Ctrl = control; Exp = experimental; M = mean; SD = standard deviation; PA = physical activity; ST = sedentary time; OPL = outdoor play and learning; # of participants† (from Environment and Policy Assessment and Observation Self-Report [EPAO-SR] Staff-Today) = 29, # of participants‡ (from EPAO-SR Staff-General) = 26.

Best practice items: PA 1 = total amount of indoor, outdoor PA time per day; PA 4 = teacher-led PA time; PA 8 = availability of portable play equipment; PA 11 = posters and books to promote PA; PA 12 = PA withheld for longer than 5 minutes; PA 13 = teacher role during playtime; PA 15 = teachers incorporate PA in classroom routines, transitions; PA 16 = formal child PA education; PA 17 = teachers talk with children about the importance of PA; ST 6 = screen time used as a reward; OPL 1 = occasions of outdoor playtime; OPL 2 = amount of outdoor playtime.
Best Practice Items by Groups

Within the same childcare centre, individual classrooms were first examined to determine whether there were any existing or significant differences in the 12 best practice items. No statistically significant differences were noted between individual classroom data within the same childcare centres; therefore, data were pooled together within each centre ($p > .05$). All logistic regression models reported no evidence of an association between exposure (experimental vs. control) and outcome (best practice items; $p > .004$). The odds ratios, confidence intervals, and $p$-values for the 12 best practice items are presented in Table 6.
### Table 6

**Logistics Regression Results of Best Practice Items by Group**

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-Intervention</th>
<th></th>
<th>Mid-Intervention</th>
<th></th>
<th>Post-Intervention</th>
<th></th>
<th>6-Month Follow-Up</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Ctrl</td>
<td>Exp</td>
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<td>p</td>
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<td>PA 1</td>
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<td>0.91</td>
<td>0.93</td>
<td>0.90</td>
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<td>.04</td>
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<td>.43</td>
<td>.41</td>
<td>.19</td>
<td>.04</td>
<td>.12</td>
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<tr>
<td>PA 8</td>
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<td>1.63</td>
<td>0.94</td>
<td>0.69</td>
<td>2.03</td>
<td>0.94</td>
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<tr>
<td>PA 11</td>
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<td>1.17</td>
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<td>1.97</td>
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<td>PA 12</td>
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<td>0.96</td>
<td>1.03</td>
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Note: OR represents the odds ratio, and 95% CI represents the 95% confidence interval.
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**Note.** Ctrl = control; Exp = experimental; OR = odds ratio; CI = confidence interval; PA = physical activity; ST = sedentary time; OPL = outdoor play and learning.

Best practice items: PA 1 = total amount of indoor, outdoor PA time per day; PA 4 = teacher-led PA time; PA 8 = availability of portable play equipment; PA 11 = posters and books to promote PA; PA 12 = PA withheld for longer than 5 minutes; PA 13 = teacher role during playtime; PA 15 = teachers incorporate PA in classroom routines, transitions; PA 16 = formal child PA education; PA 17 = teachers talk with children about the importance of PA; ST 6 = screen time used as a reward; OPL 1 = occasions of outdoor playtime; OPL 2 = amount of outdoor playtime.

\( p = .004 \) (.05/12).
Chapter 4: Discussion

The purpose of this pilot study was to explore if implementing an 8-week evidence-informed childcare physical activity policy resulted in unintended changes to the childcare environment and in ECEs’ practices. Specifically, this study sought to examine whether there were apparent differences in the physical environment characteristics (e.g., equipment and infrastructure) and in ECEs’ practices surrounding physical activity (i.e., the 12 best practices) between experimental and control centres following the implementation of the Childcare PLAY policy. To date, this study is one of the first few studies to implement and use the EPAO-SR tools to assess the childcare environment. Findings from this work may guide future modifications or adoption of childcare policies that aim to increase physical activity in the childcare environment; important findings are discussed below.

In this study, half (50%) of the directors and the majority (74.5%) of ECEs reported that they could be better role models to children for physical activity. Only 16.7% of directors and 12.2% of ECEs reported meeting the recommended Canadian physical activity guidelines of 150 or more minutes per week. This finding is vital as ECEs’ training and education (Bruijns et al., 2019; Van Cauwenberghe et al., 2013; Vanderloo et al., 2014), perceptions, attitudes, or personal preferences regarding physical activity can greatly influence the physical activity levels of the children in their care (Carson et al., 2020). This finding also emphasizes the role that physical activity competency has on ECEs’ self-efficacy to facilitate MVPA for children, and perhaps suggests that more physical activity training and education is needed for ECEs.
When centres were examined collectively on the EPAO-SR Director General tool, there were six outdoor toys/equipment of 15 that the majority (i.e., ≥71.4%) of directors reported not having (i.e., balancing surfaces, merry-go-round, playhouse, see-saw, swinging equipment, and water play area). A potential explanation for the absence or lack of these outdoor toys and equipment in childcare centres could stem from the importance placed on factors such as ensuring playground safety and the physical well-being of young children. Another possible explanation arises from the fact that the EPAO-SR tools are an American tool, consequently there may be differences in regulations for outdoor playgrounds between Canadian and American childcare centres. Furthermore, perhaps of coincidence, these six items are all categorized as fixed play equipment, which has been determined by some researchers to lead to low intensity physical activity (Dowda et al., 2009; Vanderloo et al., 2014) among young children. For the outdoor play area, the majority of the directors (i.e., ≥71.4%) indicated not having 60% of the infrastructure (total of 10 items) at their centres. The missing outdoor play area characteristics include small and climbable trees; shrubs; ground variation; large, climbable rocks; and hills. Similar to the previous explanation for outdoor toys/equipment, a possible explanation for the absence or lack of some of these features could also pertain to issues regarding safety. According to section 24(4) of the Child Care and Early Years Act (2014), as of August 29, 2016, any constructions or renovations of fixed play equipment made on outdoor play spaces must meet the requirements listed in the Canadian Standards Association standard (CAN/CSA-Z614-14) titled, “Children’s playspaces and equipment”. More specifically, this standard states...
that features such as fences, benches, landscape elements, or plant/natural materials are not conventionally used in outdoor play spaces or designed for play. Although directors have the capability to approve constructions of outdoor playground equipment or infrastructure such as those listed above (as long as they meet the requirements outlined by the standard), regulations as such (i.e., CAN/CSA-Z614-14) may act as a deterrent. In other words, it may be likely that the absence of these outdoor features—as determined in the results of this study—could be a result of several factors including space limitations, budget costs, different priorities, or directors’ compliance with the standard.

Through examining the means of 12 best practice items in this study, it was determined that five best practice items (i.e., PA 1, PA 11, PA 13, PA 15, OPL 2) increased, while two best practice items (i.e., PA 8 and PA 17) decreased for both experimental and control groups from pre-intervention to 6-months post-intervention, respectively. Of the five best practice items that increased, four (i.e., total amount of indoor, outdoor PA time per day [PA 1]; teacher role during playtime [PA 13]; teachers incorporate PA in classroom routines, transitions [PA 15]; and amount of outdoor playtime [OPL 2]) were related to ECEs’ practices and only one (i.e., posters and books to promote PA [PA 11]) pertained to the childcare environment. On the contrary, of the two best practice items that decreased, PA 8 (i.e., availability of portable play equipment) pertained to the childcare environment while PA 17 (i.e., teachers talk with children about the importance of PA) pertained to ECEs’ practices. These same increases and decreases observed across all centres, with or without PLAY policy implementation,
could perhaps be likened to social desirability bias. The remaining five best practice items’ means (i.e., PA 4, PA 12, PA 16, ST 6, OPL 1) had differing or opposing trends between experimental and control groups—in that, each condition’s mean either increased, decreased, or remained constant from pre-intervention to 6-months post-intervention and neither experienced change in the same manner. Among experimental centres, the greatest mean increase was observed for OPL 2 (i.e., amount of outdoor playtime) which increased by .77 points from pre-intervention to 6-months post-intervention. Conversely, among control centres, the greatest mean increase was observed for PA 13 (i.e., teacher role during playtime) which increased by .42 points from pre-intervention to 6-months post-intervention. The mean increase observed in the amount of outdoor playtime (OPL 2) can perhaps be likened to the period in which the 6-month follow-up occurred (i.e., from May to June); therefore, it is possible that weather may have been a factor to more outdoor playtime. This statistical trend supports findings from previous studies which suggest that outdoor playtime is more conducive to greater levels of physical activity among children (Gordon et al., 2013; Mazzucca et al., 2018; Tandon et al., 2018; Vanderloo et al., 2013). On the contrary, the mean increase observed in teacher role during playtime (PA 13) could be an indication of greater encouragement from ECEs or greater facilitations of teacher-led activities, as the literature has shown that teacher-led interventions have an effect on children’s MVPA levels (Gordon et al., 2013). Although these mean score increases may represent changes to ECEs’ practices or the childcare environment, these findings must be interpreted with caution since they are descriptive data and no statistical inferences can
Another major finding from this study was the lack of an association between the two outcome variables (i.e., the childcare environment and ECEs’ practices) and the condition (i.e., experimental vs. control). Although the Childcare PLAY policy study was not primarily designed to target changes to the childcare environment and ECEs’ practices, it did provide recommendations for teacher-led play, therefore this result was somewhat surprising. Results indicated no evidence of an association ($p > .004$) for the 12 best practice items between experimental and control groups. However, it is interesting to note that both PA 4 (i.e., teacher-led PA time) and PA 8 (i.e., availability of portable play equipment) were significant when compared to an alpha of .05, but not significant when compared to the adjusted alpha. For future studies, it may be beneficial to re-examine these relationships with a larger sample size to determine whether the best practice items will differ between experimental and control conditions.

The relationships between ECEs’ practices and the childcare environment on young children’s physical activity levels have been explored in previous studies (Bower et al., 2008; Van Cauwenberghe et al., 2013; Vanderloo et al., 2014); however, not many studies have used the EPAO-SR tools to study these relationships. Moreover, previous studies that have implemented the updated EPAO-SR tools have done so through conducting assessments in family childcare homes (Erinosho, Hales, Vaughn, Gizlice, & Ward, 2019; Vaughn et al., 2017); none of which used these tools to assess the unintended impact of implementing a childcare physical activity policy on ECEs’ practices and the childcare environment. In Vaughn et al.’s (2017) study, the EPAO-SR
tool was modified for use in family childcare homes to assess the relationship between the EPAO-SR subcomponent scores with children’s dietary intake and physical activity levels. Vaughn and colleagues (2017) found that children’s MVPA levels had positive and significant correlations with two subcomponents (i.e., physical activity time provided and outdoor playtime) and negative associations with two other subcomponents (i.e., screen time and screen time practices). In Erinosho et al.’s (2019) study, the EPAO-SR tool was used to examine whether there were differences in the nutrition and physical activity environments between rural and urban family childcare homes in Mississippi. Results from their study indicated that higher scores (indicative of greater compliance with best practices) were observed by the family childcare homes for the physical activity practices and screen time practices domains (also known as subcomponents). In Erinosho et al.’s (2018) study, the EPAO-SR tool was used to assess whether the nutrition and physical activity environments of childcare centres, across three states in the United States, differed by their geographic location, Child and Adult Care Food Program [CACFP] enrolment, and Head Start enrolment. They found that CACFP centres exhibited higher scores in the physical activity training and education domain, while Head Start centres exhibited higher scores in the indoor play environment, physical activity and screen practices, physical activity training and education, and physical activity and screen policies domains than their counterparts (Erinosho et al., 2018). However, due to incomplete data, in this present study, subcomponent scores could not be derived, which make cross-comparisons of this study’s results with those presented in previous studies challenging.
Limitations

A limitation to the current study was the incomplete implementation of the EPAO-SR questionnaires, despite the fact that the tools were the most updated version available at the time of data collection. Since a scoring protocol for the EPAO-SR tools was not available at that time, certain questions from the original EPAO-SR surveys (by the creators) were disregarded or not included due to inapplicability with the present study or question redundancy. These decisions unintentionally resulted in an incomplete implementation of the EPAO-SR tools, which was later determined by the researchers once the scoring protocol was released. As a result of its incomplete implementation, subcomponent scores and an overall physical activity score could not be produced, which also had implications on data analysis. For instance, with previous studies that have implemented the EPAO-SR tools—such as that of Vaughn and colleagues (2017)—their data analyses involved the use of correlation matrices to examine the associations between environmental scores (i.e., subcomponent scores) and nutrition or physical activity. This method of analysis was not performed for this study since an overall physical activity score and subcomponent scores were not produced due to insufficient or missing data.

A second limitation in this study was evident in the responses provided by directors for the EPAO-SR Director General tool. Results indicated that 29% of centre directors reported having a physical activity policy in place, despite one exclusion criterion (for centres involved in the PLAY study) being having established an institutional-level physical activity policy. Of this 29%, none of the control centres
reported having a physical activity policy, while 67% of experimental centres reported having one. A common source used to develop these physical activity policies in centres, as reported by directors, was a provincial policy. A potential explanation for the directors’ indications of a provincial physical activity policy in their centres could arise from a mistaken assumption that the requirement listed in section 47(1) of the *Child Care and Early Years Act* (2014), which states that children in childcare centres should acquire at least two hours of outdoor play each day, is considered a provincial physical activity policy. In terms of the reporting of screen-viewing policies, 57% of centre directors indicated that they did not have one. Of this, 75% of control centers did not have a screen-viewing policy, while 67% of experimental centres had one. This finding, however, is not as surprising since having a screen-viewing policy was not one of the exclusion criteria in the study.

Third, the declining completion rates of the EPAO-SR tools over the course of the multiple data collection time points is another limitation to the study. Additionally, the nature of the EPAO-SR tools, being self-report measures, presents as a limitation since the possibility of social desirability bias may exist among ECEs or directors completing the survey. Lastly, the study had a small sample size, consisting of only nine childcare centres in London, Ontario, which could limit the generalizability of the findings to all childcare centres.

**Conclusion and Future Directions**

This pilot study adds to the literature by providing evidence of the appropriateness of implementing a physical activity policy in childcare centres and
offers insight into the potential changes that can occur in the childcare environment or in ECEs’ practices as a consequence of such policy. Despite a lack of change observed in the present study, it is possible this is a consequence of the small sample size and/or the incomplete use of the EPAO-SR tools. Nonetheless, findings from this present study may guide future modifications or adoption of the Childcare PLAY policy and/or environmental modifications and modifications to ECEs’ practices in childcare centres. Future research is needed to improve our understanding of the impact of implementing a childcare physical activity policy on the childcare environment and in ECEs’ practices.
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doi:10.1016/j.ecresq.2008.08.005


doi:10.1186/s12966-017-0579-7


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Appendix A: Ethics

Date: 9 August 2018

To: Dr. Patricia Tucker

Project ID: 111890

Study Title: Examining a Childcare Policy to Promote Physical Activity among Young Children

Application Type: HSREB Initial Application

Review Type: Full Board

Full Board Reporting Date: 19/Jun/2018

Date Approval Issued: 09/Aug/2018

REB Approval Expiry Date: 09/Aug/2019

Dear Dr. Patricia Tucker,

The Western University Health Sciences Research Ethics Board (HSREB) has reviewed and approved the above mentioned study as described in the WREM application form, as of the HSREB Initial Approval Date noted above. This research study is to be conducted by the investigator noted above. All other required institutional approvals must be obtained prior to the conduct of the study.

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<td>Appendix B - Phone Script to Invite Director</td>
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No deviations from, or changes to, the protocol or WREM application should be initiated without prior written approval of an appropriate amendment from Western HSREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.
REB members involved in the research project do not participate in the review, discussion or decision.

The Western University HSREB operates in compliance with, and is constituted in accordance with, the requirements of the TriCouncil Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2); the International Conference on Harmonisation Good Clinical Practice Consolidated Guideline (ICH GCP); Part C, Division 5 of the Food and Drug Regulations; Part 4 of the Natural Health Products Regulations; Part 3 of the Medical Devices Regulations and the provisions of the Ontario Personal Health Information Protection Act (PHIPA 2004) and its applicable regulations. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

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

Sincerely,

**Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).**
Appendix B: Director Letter of Information and Consent

PLAY (Physical Activity) Policy Study:
Examining a Childcare Policy to Promote Physical Activity among Young Children

Letter of Information for Childcare Centre Directors

Investigators:
Trish Tucker, PhD, Faculty of Health Sciences, University of Western Ontario
Molly Driediger, PhD, Faculty of Health Sciences, University of Western Ontario
Leigh Vanderloo, PhD, Child Health & Evaluative Sciences, The Hospital for Sick Children
Shauna Burke, PhD, Faculty of Health Sciences, University of Western Ontario
Jennifer Irwin, PhD, Faculty of Health Sciences, University of Western Ontario
Andrew Johnson, PhD, Faculty of Health Sciences, University of Western Ontario
Jacob Shelley, PhD, Faculty of Health Sciences & Faculty of Law, University of Western Ontario
Brian Timmons, PhD, Child Health & Exercise Medicine Program, McMaster University

Invitation to participate:
This study aims to implement and evaluate the impact of an evidence-based physical activity policy on children’s physical activity levels during childcare. You are being invited to participate because your centre provides licensed care to young children (age 1 months to 5 years). We plan to recruit approximately 8 childcare centre directors, 64 full-time childcare providers, and 212 children enrolled in the toddler and preschool classrooms of these centres.

Purpose of this letter:
The purpose of this letter is to provide you with the information needed to make an informed decision regarding your centre’s participation in the present study.

Background:
Researchers have found that young children (0-4 years), can benefit from participating in daily physical activity; however, current research supports that young children engage in high levels of sedentary behaviours and low levels of physical activity while in childcare. As such, the need for effective approaches to improve physical activity engagement and participation among this population is evident. Consequently, our research team is conducting a study aimed at creating and evaluating a physical activity
policy for centre-based childcare. The findings from this work will have implications for children enrolled in childcare with regard to physical activity behaviours and health as it may lead to future examinations of policy to support physical activity engagement in early childhood.

**What will happen in this study?**

Your centre will be randomly assigned to either the *intervention* group or the *control* group. Should your centre be assigned to the *control* group, the children will continue their typical daily programming for the duration of the 8-week intervention. If your centre is assigned to the *intervention* group, for 8 weeks you will implement an evidence-based physical activity policy developed with guidance from the childcare community, physical activity researchers, and policy experts. The policy will be a guidance document to specify daily physical activity affordances in childcare. Regardless of the group to which your centre is assigned, if you agree to participate, the children in the toddler and preschool-aged classrooms whose parents have provided consent will wear an accelerometer (a small, motion sensor device) during childcare hours for 5 consecutive days at four different time points (pre-intervention, week 0; mid-intervention, week 4; post-intervention, week 9; and at 6-months follow-up). A pager-like device in size (please see picture below), the accelerometer would be worn on an adjustable elastic belt around the child’s waist (over top of clothing) to collect information about the amount and intensity of his/her movements. While wearing the accelerometer, the children will still be able to participate in all normal activities. Upon arrival at childcare, your staff will be asked to fit the children with the accelerometers, with assistance from a research assistant, and to remove them at end-of-day prior to leaving for home. They will also be asked to record daily device ON/OFF times in a provided log. Prior to accelerometry data collection, two researchers will come to participating classrooms to take the preschool children’s height, weight, and waist circumference measurements. Children will be individually measured by the researchers, and these measurements will be completed in a corner of the centre, to ensure the children’s privacy.

In addition to this letter of information and consent form, you will be asked to complete a short survey at baseline to assess your centre’s physical space, equipment, environment, and existing physical activity policy and practices. The participating staff and children’s parents/guardians will be asked to complete a consent form, and demographic questionnaires at baseline. Staff will also be asked to complete a short survey to assess classroom environment and physical activity practices in general, and as it applies to “today” at four times: baseline, mid-intervention, post-intervention, and at 6-months follow-up. Staff will be asked to also complete a short survey to measure their confidence to engage children in physical activity prior to baseline and after baseline measures. They will be given one week to return completed materials. As centre Director, it would be appreciated if you could provide reminders to your staff and to the children’s parents/guardians (via newsletters and/or email correspondence).
Inclusion and exclusion criteria:
In order for you to participate in this study, you must: a) be a Director of a childcare centre where there are one or more toddler or preschool classrooms, b) understand English (reading and writing), and c) must not have a written physical activity policy at your centre. You will not be able to participate if you: a) are not a Director of a childcare centre where there are no toddler or preschool classrooms, b) do not understand English (reading and writing), and c) if you currently have a written physical activity policy.

Alternatives and your right to withdraw from the study:
Your participation in this study is voluntary. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time. You may withdraw your data at any time up until the point of data analyses. Staff refusal to participate or withdraw from the study (at any time) will not affect their employment status.

Possible benefits and risks to you for participating in the study:
There are no known physical, social, or economic risks due to participation in this study. You do not waive any of the legal rights you would otherwise have as a participant in a research study. There are no personal benefits to you participating in this study.

Confidentiality:
We will keep your identity and survey data, as well as written records, confidential and secure.

All data obtained will be stored in secured computer files (password encrypted) and stored in locked filing cabinets at Western University. Only the research team (including graduate students) and Western University’s Health Sciences Research Ethics Board will have access to these data. The data will be retained for 7 years after the results of the study have been published. After this period, all data will be destroyed (i.e., the computer data will be erased and all written/paper data will be shredded).

Costs and compensation:
There is no cost to you for participating in the study.

Publication of the results:
When the results of the study are published, your name will not be used. If you would like to receive a copy of the overall results of the study, please tick the appropriate box on your consent form.
For further information on this study, you can contact the Principal Investigator, Dr. Trish Tucker.

*If you have any further questions regarding your rights as a study participant, please contact Western University’s Office of Research Ethics.

This letter is for you to keep
PLAY (Physical Activity) Policy Study
Examining a Childcare Policy to Promote Physical Activity among Young Children

I have read the Letter of Information, have had the nature of the study explained to me, and I agree to participate. All questions have been answered to my satisfaction.

Date
Director’s Name
(please print)

Director’s Signature

Date
Name of Researcher Obtaining Informed Consent
(please print)

Signature

Do you wish to obtain a copy of the study results?

☒ Yes
☐ No

If YES, please provide your email address below.

☒ Email: ____________________________
Appendix C: Early Childhood Educator Letter of Information and Consent

PLAY (Physical Activity) Policy Study
Examining a Childcare Policy to Support Physical Activity among Young Children

Letter of Information for Childcare Providers

Investigators:
Trish Tucker, PhD, Faculty of Health Sciences, University of Western Ontario
Molly Driediger, PhD, Faculty of Health Sciences, University of Western Ontario
Leigh Vanderloo, PhD, Child Health & Evaluative Sciences, The Hospital for Sick Children
Shauna Burke, PhD, Faculty of Health Sciences, University of Western Ontario
Jennifer Irwin, PhD, Faculty of Health Sciences, University of Western Ontario
Andrew Johnson, PhD, Faculty of Health Sciences, University of Western Ontario
Jacob Shelley, PhD, Faculty of Health Sciences & Faculty of Law, University of Western Ontario
Brian Timmons, PhD, Child Health & Exercise Medicine Program, McMaster University

Invitation to participate:
This study aims to implement and evaluate the impact of an evidence-based physical activity policy on children’s physical activity levels during childcare. You are being invited to participate because you provide care to children (age 1 months to 5 years) enrolled in a childcare centre where the director has agreed to participate. We plan to recruit approximately 8 childcare centre directors, 64 full-time childcare providers, and 212 children enrolled in the toddler and preschool classrooms of these centres.

Purpose of this letter:
The purpose of this letter is to provide you with the information needed to make an informed decision regarding your participation in the present study.

Background:
Researchers have found that young children (0-4 years), can benefit from participating in daily physical activity; however, current research supports that young children engage in high levels of sedentary behaviours and low levels of physical activity while in childcare. As such, the need for effective approaches to improve physical activity engagement and participation among this population is evident. Consequently, our research team is conducting a study aimed at creating and evaluating a physical activity policy for centre-based childcare. The findings from this work will have implications for the children enrolled in childcare with regard to physical activity behaviours and health
as it may lead to future examinations of policy to support physical activity engagement in early childhood.

What will happen in this study?
Your centre will be randomly assigned to either the *intervention* group or the *control* group. Should your classroom be assigned to the *control* group, the children will continue their typical daily programming for the duration of the 8-week intervention. If your centre is assigned to the *intervention* group, for 8 weeks you will implement an evidence-based physical activity policy developed with guidance from the childcare community, physical activity researchers, and a policy expert. The policy will be a guidance document to specify daily physical activity affordances in childcare. Regardless of the group to which your classroom is assigned, if you agree to participate, the children in your classroom whose parents have provided consent will wear an accelerometer (a small, motion sensor device) during childcare hours for 5 consecutive days at four different time points (pre-intervention, week 0; mid-intervention, week 4; post-intervention, week 9; and at 6-months follow-up). A pager-like device in size (please see picture below), the accelerometer would be worn on an adjustable elastic belt around the child’s waist (over top of clothing) to collect information about the amount and intensity of his/her movements. While wearing the accelerometer, the children will still be able to participate in all normal activities. Upon arrival at childcare, you will be asked to fit the children with the accelerometers, with assistance from a research assistant, and to remove them at end-of-day prior to leaving for home. You will also be asked to record daily device ON/OFF times in a provided log. Prior to accelerometry data collection, two researchers will come to your classroom to take the participating children’s height, weight, and waist circumference measurements. Children will be individually measured by the researchers, and these measurements will be completed in a corner of the centre, to ensure the children’s privacy.

In addition to this letter of information and consent form, you will find a brief demographic questionnaire, and a general and specific (your practices as of today) classroom environment and physical activity practices survey that you will be asked to complete four times (i.e., at baseline, mid-intervention, post-intervention, and at 6-months post-intervention). You will also be asked to complete a survey that assesses your confidence to engage children in physical activity at two times; prior to baseline, and immediately following baseline. You will be asked to complete these forms and return them to the research team as soon as possible. If your centre is assigned to receive the intervention, you will be asked to complete a log to record your adherence for three days per week during the 8-week intervention period. At the conclusion of the intervention period, if you are assigned to the intervention group, you will be given the opportunity to volunteer to participate in focus groups to provide feedback on the feasibility of the policy for use in childcare.
Inclusion and exclusion criteria:
In order for you to participate in this study, you must: a) be a full-time childcare provider for a classroom of a participating childcare centre, and b) understand English (reading and writing). You will not be able to participate if you: a) are not a full-time childcare provider for a classroom of a participating childcare centre and b) do not understand English (reading and writing).

Alternatives and your right to withdraw from the study:
Your participation in this study is voluntary. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time. You may withdraw your data at any time up until the point of data analyses. Refusing to participate or withdrawing from the study (at any time) will not affect your employment status.

Possible benefits and risks to you for participating in the study:
There are no known physical, social, or economic risks due to participation in this study. You do not waive any of the legal rights you would otherwise have as a participant in a research study. There are no personal benefits to you participating in this study. Tokens of appreciation will be distributed to all participants to acknowledge their contributions to the study.

Confidentiality:
We will keep your identity and survey data, as well as written records, confidential and secure.

All data obtained will be stored in secured computer files (password encrypted) and stored in locked filing cabinets at Western University. Only the research team (including graduate students) and Western University’s Health Sciences Research Ethics Board will have access to these data. The data will be retained for 7 years after the results of the study have been published. After this period, all data will be destroyed (i.e., the computer data will be erased and all written/paper data will be shredded).

Costs and compensation:
There is no cost to you for participating in the study. To acknowledge your contribution to the study, you will receive a $5 gift card to a local grocery store at the end of each period of data collection (baseline, mid-intervention, post-intervention, and 6-months follow-up).
Publication of the results:
When the results of the study are published, your name will not be used. If you would like to receive a copy of the results of the study, please tick the appropriate box on your consent form.

For further information on this study, you can contact the Principal Investigator, Dr. Trish Tucker.

*If you have any further questions regarding your rights as a study participant, please contact Western University’s Office of Research Ethics.

This letter is for you to keep
PLAY (Physical Activity) Policy Study
Examining a Childcare Policy to Support Physical Activity among Young Children

I have read the Letter of Information, have had the nature of the study explained to me, and I agree to participate. All questions have been answered to my satisfaction.

Date ___________  Participant’s (Childcare Provider’s) Name ____________ (please print)  Participant Signature ____________

Date ___________  Name of Researcher Obtaining Informed Consent ____________ (please print)  Signature ____________

Do you wish to obtain a copy of the study results?

☐ Yes
☐ No

If YES, please provide your email address below.

☐ Email: ________________________________
Appendix D: Childcare PLAY Policy

PLAY (Physical Activity) Policy

Directed by the Canadian 24-Hour Movement Guidelines for the Early Years*, childcare programs are expected to:

1. Encourage children to engage in higher intensity energetic play (i.e., activities that induce sweating and heavy breathing) often throughout the day with a goal of accumulating a minimum of 40 minutes each day. More is better.

2. Expose children to a variety of indoor and outdoor physical activities, including both child-directed and teacher-facilitated active play daily.

3. Outdoor time is offered for a minimum of 120 minutes each day unless extreme weather (i.e., heat or cold alert) prevents it. When extreme weather occurs, the opportunity exists for children to engage in active play indoors.

4. Short, frequent outdoor sessions are most conducive to higher intensity physical activity among children; therefore, short bouts (e.g., 15-30 minutes) of outdoor time are recommended often (e.g., 3-4 times a day).

5. Unstructured (i.e., child-directed) free play is predominant during outdoor time. When activity levels decline, childcare practitioners encourage continued energetic play through structured activity, participation alongside children, and use of verbal prompts.

6. Encourage children to develop physical literacy by practicing fundamental movement skills often throughout the day (e.g., running, skipping, hopping, or jumping).

7. The appropriate use of screen-based technology is role modeled by childcare practitioners by avoiding it when children are present. Screen-based technology is not offered to children under 2, and is not recommended during childcare hours.

8. Programming is designed to break up sustained sedentary time using indoor movement-based activities.
Dear Childcare Provider:

On behalf of our research team, I would like to thank you for your assistance with and participation in this study. The information collected will assist with the promotion of healthy active behaviours among preschoolers in centre-based childcare. Please accept this token of appreciation as a small gesture of thanks.

Sincerely,

Dr. Trish Tucker
Assistant Professor
School of Occupational Therapy
University of Western Ontario
Appendix F: Early Childhood Educator Demographic Questionnaire

PLAY (Physical Activity) Policy Study
Examining a Childcare Policy to Promote Physical Activity among Young Children

Childcare Provider Demographic Questionnaire

A. ABOUT YOU

What is your sex?
☐ Male
☐ Female

What is your age? _____

What is your racial background/ethnicity?
☐ Caucasian
☐ African Canadian
☐ Native/Aboriginal
☐ Arab
☐ Latin-American
☐ Asian
☐ Other (please specify): ____________________
☐ Prefer not to answer

What is your employment status?
☐ Full-time
☐ Part-time

What age group are you responsible for?
☐ Toddler
☐ Preschool

How many years of experience do you have as a childcare provider?
☐ Less than 5 years
☐ 5-9 years
☐ 10-14 years
15-19 years
20+ years

What is your highest level of education?
- High school
- College
- University
- Graduate School
- Prefer not to answer

On average, how many minutes per week do you spend engaged in moderate-to-vigorous physical activity (e.g., brisk walking, jogging, bike riding, cross-country skiing, etc.)?
- Less than 30 minutes
- 30-59 minutes
- 60-89 minutes
- 90-119 minutes
- 120-149 minutes
- 150 minutes or more

With regard to physical activity, do you feel that you are a strong role model for the children in your care?
- Yes, very much
- Somewhat, I could probably be a better role model
- Not at all
- Do not know

Thank you for completing this questionnaire
## PLAY (Physical Activity) Policy Study

Examining a Childcare Policy to Promote Physical Activity among Young Children

### Director Demographic Questionnaire

#### A. ABOUT YOU

**What is your sex?**
- [ ] Male
- [ ] Female

**What is your age? _____**

**What is your racial background/ethnicity?**
- [ ] Caucasian
- [ ] African Canadian
- [ ] Native/Aboriginal
- [ ] Arab
- [ ] Latin-American
- [ ] Asian
- [ ] Other (please specify): ____________________
- [ ] Prefer not to answer

**What is your employment status?**
- [ ] Full-time
- [ ] Part-time

**What age group are you responsible for?**
- [ ] Toddler
- [ ] Preschool

**How many years of experience do you have as a childcare provider?**
- [ ] Less than 5 years
- [ ] 5-9 years
- [ ] 10-14 years
☐ 15-19 years
☐ 20+ years

**What is your highest level of education?**
☐ High school
☐ College
☐ University
☐ Graduate School
☐ Prefer not to answer

**On average, how many minutes per week do you spend engaged in moderate-to-vigorous physical activity (e.g., brisk walking, jogging, bike riding, cross-country skiing, etc.)?**
☐ Less than 30 minutes
☐ 30-59 minutes
☐ 60-89 minutes
☐ 90-119 minutes
☐ 120-149 minutes
☐ 150 minutes or more

**With regard to physical activity, do you feel that you are a strong role model for the children in your care?**
☐ Yes, very much
☐ Somewhat, I could probably be a better role model
☐ Not at all
☐ Do not know

Thank you for completing this questionnaire
Appendix H: EPAO-SR Director General Questionnaire

PLAY (Physical Activity) Policy Study
Examining a Childcare Policy to Promote Physical Activity among Young Children

Childcare Director Physical Environment and Policy Questionnaire

Childcare Environment

1. Which of the following outdoor toys and equipment do you have available for children to use? *(Mark all that apply)*
   - balancing surfaces (balance beams, boards, etc.)
   - basketball hoop(s)
   - benches
   - climbing structures that cannot be moved (jungle gyms, ladders)
   - garden - fruit/vegetable or container
   - merry-go-round
   - play house
   - sandbox (large enough for child to sit in)
   - see-saw
   - slide that cannot be moved
   - small stage or raised deck
   - swinging equipment (swings, ropes)
   - tricycle track or paved area
   - tunnels (fixed, not movable)
   - water play area (not including a water table)

2. Which of the following devices does your centre have access to?
   - Television
   - iPad
   - Computer
   - Movie projector
3. How many toddler classes are usually allowed on the outdoor playground at a time?
   - 1 class
   - 2 classes
   - 3 classes
   - 4 classes
   - 5 classes or more
   - Toddlers share the playground with preschoolers

4. How many preschool classes are usually allowed on the outdoor playground at a time?
   - 1 class
   - 2 classes
   - 3 classes
   - 4 classes
   - 5 classes or more
   - Preschoolers share the playground with toddlers

5. What is the size of your playground? ______________sq. ft.

6. Which of the following things are part of your outdoor play area? (Mark all that apply)
   - Large trees (8 feet or taller)
   - Small trees (less than 8 feet tall)
   - Tree(s) that children can climb
   - Shrubs
   - Flowering plants
   - Variation in ground (hills, mounds)
   - Grassy area
   - Rocks large enough to climb
   - A hill for rolling down or climbing up
   - Shaded area with room for most children in a class (examples include: porch overhang, shade structures [tent/tarp], trees, umbrellas)

**Physical Activity Policies**

1. Does your centre have a written screen viewing policy?
   - Yes
   - No

2. Does your centre have a written physical activity policy?
   - Yes. Please answer the following questions.
   - No

3. What sources did your centre use when developing its physical activity policies? (Mark all that apply)
   - Provincial policy
4. Which of the following physical activity topics are included in your centre’s written policies? *(Mark all that apply)*
- Amount of time provided for indoor physical activity each day
- Amount of time provided for outdoor physical activity each day
- Amount of teacher-led active play provided
- Limiting long periods of seated time for children
- Appropriate clothing and shoes needed for outdoor play
- Ways to encourage children’s physical activity
- Not taking away physical activity time or removing children from long periods of physically active playtime in order to manage challenging behaviors
- Giving extra active playtime as a reward for good behavior

5. Which of the following topics about screen time are included in your centre’s written policies? *(Mark all that apply)*
- Limits on the amount of time children are allowed to be on a television each day/week
- Limits on the amount of time children are allowed to work/play on the computer each day/week
- Limits on the amount of time children are allowed to work/play on an iPad each day/week
- Limits on the amount of time children are allowed to play video games each day/week
- Staff supervision of children’s media use
- Not offering media (television, videos, computer, video games) as a reward/punishment for children

6. Which of the following topics about physical activity education are included in your centre’s written policies? *(Mark all that apply)*
- Physical activity education (planned or formal lessons) for children
- Physical activity training/professional development for staff
- Physical activity education for parents
7. How do you inform staff and teachers about your centre’s physical activity policies and related provincial and federal policies/regulations? (Mark all that apply)
   □ Centre handbook
   □ Staff orientation handbook
   □ Newsletter/formal letter
   □ Bulletin board
   □ Staff meetings
   □ Email/website
   □ Word of mouth from director or centre management
   □ Other (specify) ____________________

8. How do you monitor whether staff comply with these policies? (Mark all that apply)
   □ Daily walk-throughs
   □ Daily log/record
   □ Informal check-in and reviews with staff
   □ Track complaints about non-compliance voiced by parents or other staff
   □ Other (specify) ____________________

9. How do you inform parents and families about your centre’s physical activity policies and related provincial and federal policies? (Mark all that apply)
   □ Centre handbook
   □ Parent/teacher meetings
   □ Newsletter/Formal letter
   □ Bulletin board
   □ Email/website
   □ Word of mouth from director/centre management
   □ Word of mouth from teachers/staff
   □ Other (specify) ____________________

10. What are challenges or barriers you face when trying to enforce your centre’s physical activity policies? (Mark all that apply)
    □ No barriers
    □ Lack of support from centre’s management
    □ Lack of support from teachers/staff
    □ Lack of support from parents/families
    □ Concern about staff reaction to policy changes
    □ Concern about parents’ reactions to policy changes
☐ Limited outdoor play space
☐ Limited toys/play equipment
☐ Insufficient funds
☐ Other (specify) _______________________

11. What are challenges or barriers you face when trying to enforce your centre’s screen viewing policies? (Mark all that apply)
☐ No barriers
☐ Lack of support from centre’s management
☐ Lack of support from teachers/staff
☐ Lack of support from parents/families
☐ Concern about staff reaction to policy changes
☐ Concern about parents’ reactions to policy changes
☐ Other (specify) _______________________

Thank you for completing this survey!
Appendix I: EPAO-SR Staff-General Questionnaire

Staff General Questionnaire v.2

This survey is designed to help us better understand what happens in your classroom. Please answer each question as accurately as possible.

Today’s Date: 

SECTION 1: Space, Equipment, and Environment

1. When children are inside, where do they participate in physically active play (gross motor activities like running, jumping, hopping, tumbling)? (Mark all that apply)
   - [ ] Our classroom
   - [ ] Gym or large multipurpose room
   - [ ] Another classroom
   - [ ] Hallway
   - [ ] Other (specify)___________________________
   - [ ] No space for this type of activity inside

2. How would you rate your classroom in terms of the space available for physically active play? (Mark only one)
   - [ ] No Room
   - [ ] Limited room – allows for walking, skipping, hopping, jumping
   - [ ] Adequate room – allows for all gross motor activities, including running
   
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

3. Which of the following indoor and outdoor active play equipment does your center have? (Mark all that apply)
   - [ ] Balls
   - [ ] Climbing structures (that can be moved by staff or children)
   - [ ] Floor play equipment (tumbling mats)
   - [ ] Jumping play equipment (jump ropes, hula hoops, mini tramps)
   - [ ] Parachute
   - [ ] Push/pull toys (wagon, scooters, wheelbarrows, big dump trucks)
   - [ ] Riding toys (tricycles, cars, scooters)
   - [ ] Rocking or twisting toys (rocking horse, sit and spin)
   - [ ] Sand/water tables
4. When outside, how often do children have to ask teachers to get out toys and equipment?

- Never
- Rarely
- Sometimes
- Often
- Very Often
- Always

5. When outside, how often is there waiting or competition for toys because the center does not have enough?

- Never
- Rarely
- Sometimes
- Often
- Very Often
- Always

6. Which of the following equipment does your centre have? *(Mark all that apply)*

- TV
- DVD/VCR
- Computer(s)
- Video game system(s) (V-tech, X-box, Playstation, Game boy)
- iPads or tablets
- Smart boards

7. Which of the following equipment does your classroom have? *(Mark all that apply)*

- TV
- DVD/VCR
- Computer(s)
- Video game system(s) (V-tech, X-box, Playstation, Game boy)
- iPads or tablets
- Smart boards

8. Which of the following items are in your classroom? *(Mark only one response per line)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. There are posters and pictures in my classroom that show children being physically active.</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
### ENVIRONMENTAL CHANGES AFTER POLICY IMPLEMENTATION

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. There are posters and pictures in my classroom that show children watching TV or playing video games.</td>
<td>〇 〇</td>
<td></td>
</tr>
<tr>
<td>c. There are books in my classroom that encourage children to be physically active.</td>
<td>〇 〇</td>
<td></td>
</tr>
</tbody>
</table>

### SECTION 2: Practices around Physical Activity

1. Approximately how often do the children go on a planned field trip off child care grounds?
   - o Never
   - o Less than yearly
   - o Yearly
   - o Quarterly
   - o Monthly
   - o Weekly

2. How often do you do the following with children in your classroom? *(Mark only one response per line)*

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I decrease outside time if children misbehave.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>b. I try to encourage children to be active by making positive statements about physical activity.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>c. I increase outside time as a reward for good behaviour.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>d. I join children in running and chasing games while they are playing outside.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>e. I join children in physically active play.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>f. I avoid sitting while supervising outside play.</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>
3. How often do you do the following with children in your classroom? *(Mark only one response per line)*

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I incorporate physical activity into classroom routines and transitions.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>b. I enjoy being physically active at work.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>c. I communicate the importance of physical activity to parents.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>d. I seek professional development opportunities to enhance children’s physical activity.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>e. I talk with children about the importance of physical activity.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>f. I enjoy being physically active in my spare time.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
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</table>

Thank you for completing!
Appendix J: EPAO-SR Staff-Today Questionnaire

PLAY (Physical Activity) Policy Study

Examining a Childcare Policy to Promote Physical Activity among Young Children

Environment and Policy Assessment and Observation Self-Report Survey

Staff Questionnaire about TODAY

This survey will help us better understand what happens in your child care center. In each section, we will ask you to describe the activities that children and staff did TODAY. If possible, try and fill out the survey as you go through your day. We have broken the survey up into morning and afternoon activities. Please be sure to read instructions before completing each section and answer each question to the best of your ability. Thank you for your time!

Today’s Date: __________________________

1. What are the ages of the children in your classroom? (Mark all that apply)
   □ 2 years  □ 3 years  □ 4 years  □ 5 years
SECTION 1: Morning Outdoor Activities
Please answer each question in this section based only on those activities that happened outside this morning (before lunch).

1. Did children play outside this morning?
   - yes
   - no If no, why was there no outdoor time? (Mark all that apply, then continue to Section 2)
     - No outside time was scheduled.
     - It was too hot.
     - It was too cold.
     - It was raining/snowing.
     - The playground/equipment was too wet.
     - Staff-to-child ratios
     - Other

2. How many times did you go outside this morning? _______

3. How long was each individual outdoor period? ________ minutes

4. How many total minutes was your class outside this morning? _______ minutes

5. How would you rate this amount of time outside compared to the usual amount of time your class spends outside in the morning? (Mark only one)
   - Less than usual
   - About the usual
   - More than usual

6. On the scale below, please rate the activity level of most children in your class while they were outside this morning. (Circle only one)

<table>
<thead>
<tr>
<th>Mostly slow/easy activities (walking, marching)</th>
<th>Mostly moderate activities (walking fast, skipping)</th>
<th>Mostly vigorous activities (running)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostly sitting</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
7. While your class was outside this morning, did you or another staff member lead or begin any gross motor physical activities (structured active games, dancing, exercises, gross motor development activities)?
   - [ ] yes
   - [ ] no

   If yes, about how many occasions of teacher-led physical activity were there? *(Occasion = any time a new physical activity was started and led by a teacher with a child or group of children)*
   - [ ] 1 occasion
   - [ ] 2 occasions
   - [ ] 3 occasions
   - [ ] 4 occasions
   - [ ] 5+ occasions

   On average, how many minutes did each occasion last?
   - [ ] 5 minutes
   - [ ] 10 minutes
   - [ ] 15 minutes
   - [ ] 20+ minutes

SECTION 2: Morning Indoor Activities
Please answer each question in this section based only on those activities that happened inside this morning (before lunch).

1. When children in your class were inside this morning, did they participate in physically active play (gross motor activity like running, jumping, hopping, tumbling)?
   - [ ] yes
   - [ ] no

   If yes, where did this take place? *(Mark all that apply)*
   - [ ] our classroom
   - [ ] gym or large multipurpose room
   - [ ] another classroom

   About how many minutes did this last?
   - [ ] 5 minutes
   - [ ] 10 minutes
   - [ ] 15 minutes
   - [ ] 20 minutes
   - [ ] 30 minutes
   - [ ] 45 minutes
   - [ ] 60+ minutes
2. When inside this morning, did children participate in any of the following activities? *(Mark all that apply)*

<table>
<thead>
<tr>
<th>Activity</th>
<th>How long did this last?</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ A planned music and dance activity</td>
<td>_____ minutes</td>
</tr>
<tr>
<td>□ A planned gross motor development activity (not including dancing</td>
<td>_____ minutes</td>
</tr>
<tr>
<td>reported above)</td>
<td></td>
</tr>
<tr>
<td>□ Physical activity as part of another planned lesson (not including</td>
<td>_____ minutes</td>
</tr>
<tr>
<td>those reported above)</td>
<td></td>
</tr>
</tbody>
</table>

3. While your class was inside this morning, did you or another staff member lead or begin any physical activities (structured active games, dancing, exercises, gross motor development activities)?
   - o yes
   - o no

   If yes, about how many occasions of teacher-led physical activity were there? *(Occasion = any time a new physical activity was started and led by a teacher with a child or group of children)*
   - o 1 occasion
   - o 2 occasions
   - o 3 occasions
   - o 4 occasions
   - o 5+ occasions

   On average, how many minutes did each occasion last?
   - o 5 minutes
   - o 10 minutes
   - o 15 minutes
   - o 20+ minutes

4. This morning, did children watch TV or a movie? *(Record “0” if the children did not watch TV or a movie.)*
   - o 0 minutes (no TV or movie)
   - o 10 minutes
   - o 20 minutes
   - o 30 minutes
   - o 45 minutes
   - o 60+ minutes

5. How would you rate this amount of TV/movie time compared to the usual amount of time the children watch during the morning?
   - o Less than usual
   - o About the usual
   - o More than usual
6. Did any staff watch TV in your classroom this morning?
   - yes
   - no
   If yes, how many minutes (total for morning) was the TV on in the classroom for staff use only (news, weather, talk shows)?
   ______ minutes

7. Does your classroom have a computer or iPad available for children to use?
   - yes
   - no
   This morning, about how many minutes was a computer or iPad available?
     - 0 minutes (computer not available)
     - 15 minutes
     - 30 minutes
     - 45 minutes
     - 60 minutes
     - 90 minutes
     - 120 minutes

   About how many minutes did each child spend on the computer or iPad?
     - 0 minutes (no child used the computer)
     - 5 minutes
     - 10 minutes
     - 15 minutes
     - 20 minutes

8. Did children have any other seated play or sitting time, excluding center time, TV/computer/iPad time, and circle time this morning?
   - no
   - yes
   If yes, about how many minutes did the seated play or sitting time last?
     - 10 minutes
     - 15 minutes
     - 20 minutes
     - 30 minutes
     - 45 minutes
     - 60+ minutes

---

**SECTION 3: Nap/Rest Time**

1. How long was nap/rest time today?
   ______ minutes
2. How would you rate the amount of nap/rest time today compared to the usual amount of time the children spend napping/resting?
   - Less than usual
   - About the usual
   - More than usual

3. Did staff watch TV/movies/use iPad in your classroom while children were napping/resting?
   - yes
   - no
   - We do not have a TV/iPad

SECTION 4: Afternoon Outdoor Activities
Please answer each question in this section based only on those activities that happened outside during the afternoon (after nap/rest time).

1. Did the children play outside this afternoon?
   - yes
   - no
   If no, why was there no outdoor time? (Mark all that apply, then continue to Section 5)
   - No outside time was scheduled.
   - It was too hot.
   - It was too cold.
   - It was raining/snowing.
   - The playground/equipment was too wet.
   - Staff-to-child ratios
   - Other __________

2. How many times did your class go outside this afternoon? ____________

3. How long was each individual outdoor period? ____________ minutes

4. How many total minutes was your class outside this afternoon? ________ minutes

5. How would you rate this amount of time outside compared to the usual amount of time your class spends outside in the afternoon? (Mark only one)
   - Less than usual
   - About the usual
   - More than usual
6. On the scale below, please rate the activity level of most children in your class while they were outside this afternoon. *(Circle only one)*

<table>
<thead>
<tr>
<th>Mostly sitting (Mostly slow/easy activities)</th>
<th>Mostly moderate activities (walking fast, skipping)</th>
<th>Mostly vigorous activities (running)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

7. While your class was outside this afternoon, did you or another staff member lead or begin any gross motor physical activities (structured active games, dancing, exercises, gross motor development activities)?

- o yes
- o no

If yes, about how many **occasions** of teacher-led physical activity were there? *(Occasion = any time a new physical activity was started and led by a teacher with a child or group of children)*

- ○ 1 occasion
- ○ 2 occasions
- ○ 3 occasions
- ○ 4 occasions
- ○ 5+ occasions

On average, how many **minutes** did each occasion last?

- ○ 5 minutes
- ○ 10 minutes
- ○ 15 minutes
- ○ 20+ minutes

**SECTION 5: Afternoon Indoor Activities**

Please answer each question in this section based only on those activities that happened **inside this afternoon** (after lunch).

1. When children in your class were inside after nap today, did they participate in physically active play (gross motor activity like running, jumping, hopping, tumbling)?

- o yes
- o no

If yes, where did this take place? *(Mark all that apply)*

- □ our classroom
- □ gym or large multipurpose room
- □ another classroom
2. When inside this afternoon, how many minutes did children participate in each of the following activities? *(Mark all that apply)*

<table>
<thead>
<tr>
<th>Activity</th>
<th>How long did this last?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A planned music and dance activity</td>
<td>_____ minutes</td>
</tr>
<tr>
<td>A planned gross motor development activity (not including dancing reported above)</td>
<td>_____ minutes</td>
</tr>
<tr>
<td>Physical activity as part of another planned lesson (not including those reported above)</td>
<td>_____ minutes</td>
</tr>
</tbody>
</table>

3. While your class was inside this afternoon, did you or another staff member lead or begin any physical activities (structured active games, dancing, exercises, gross motor development activities)?
   - yes
   - no

   If yes, about how many **occasions** of teacher-led physical activity were there? *(Occasion = any time a new physical activity was started and led by a teacher with a child or group of children)*
   - 1 occasion
   - 2 occasions
   - 3 occasions
   - 4 occasions
   - 5+ occasions

   On average, how many **minutes** did each occasion last?
   - 5 minutes
   - 10 minutes
   - 15 minutes
   - 20+ minutes
SECTION 6: Other Activities
Please answer each question thinking about the entire day.

1. Today did the children sit and listen to a planned lesson that taught them about why exercising or being physically active is good for them (strengthen muscles, heart, or minds), but that did not include any gross motor activity?
   - yes
   - no

   About how many minutes did this planned lesson last?
   - 5 minutes
   - 10 minutes
   - 15 minutes
   - 20 minutes
   - 25 minutes
   - 30+ minutes

2. Was a third or more of the outdoor play area or equipment off limits while children were playing outside today?
   - yes
   - no

3. Which of the following toys and equipment were used by children in your class today? (Mark all that apply)
   - Balls
   - Climbing structures (that can be moved by staff or children)
   - Floor play equipment (tumbling mats)
   - Jumping play equipment (jump ropes, hula hoops, mini tramps)
   - Parachute
   - Push/pull toys (wagon, scooters, wheelbarrows, big dump trucks)
   - Riding toys (tricycles, cars, scooters)
   - Rocking or twisting toys (rocking horse, sit and spin)
   - Sand/water tables
   - Sand/water play toys (shovels, scoops, buckets)
   - Slides (that can be moved by staff or children)
   - Twirling play equipment (ribbons, scarves, batons)
   - Small portable pool used for swimming, splashing, or other water play
   - Portable tunnels (can be moved by staff or children)
   - iPad or tablets
   - Smart boards
   - Video games systems (V-tech, X-box, Playstation, Gameboy)

Thank you for your time in completing this survey today!
Curriculum Vitae

PERSONAL INFORMATION

Name: Victoria Tran
Place of Birth: Toronto, Canada

UNIVERSITY EDUCATIONAL BACKGROUND

Master of Science - Health & Rehabilitation Sciences
Field: Health Promotion
Western University, London, ON
Sept 2018-Jun 2020
Thesis: Environmental Changes Following the Implementation of the Childcare Physical Activity (PLAY) Policy

Honours Bachelor of Health Sciences
Specialization in Health Sciences
Western University, London, ON
2014-2018

HONOURS AND AWARDS

Dean’s Honour List
Western University
2017-2018
Dean’s Honour List
Western University
2016-2017

RESEARCH EXPERIENCE

Research Assistant
Child Health and Physical Activity Lab, Western University, London, ON
Sept 2018-Jun 2020
• Supervisor: Dr. Trish Tucker
• Project Title: Physical Activity (PLAY) Policy Study
• Collect data through Actical accelerometers and acquire children’s anthropometric measurements; assist with creating/coding data sets, data cleaning, data entry, and data analysis; assist with manuscript writing

Undergraduate Research Assistant
Western University, London, ON
Nov 2016-Apr 2017
• Supervisor: Dr. Aleksandra Zecevic
• Project Title: Aging Globally: Lessons from Scandinavia Student Survey
Conducted a literature search/review; assisted with piloting the survey and study recruitment; assisted with data analysis (collected via Qualtrics); assisted with writing the survey report

**RELATED WORK EXPERIENCE**

**Graduate Teaching Assistant**  
Faculty of Health Sciences, Western University, London ON  
**Sept 2019-Dec 2019**
- **Course**: HS 3400A (Health Policy)
- **Instructor**: Dr. Maxwell Smith

**Graduate Teaching Assistant**  
Faculty of Health Sciences, Western University, London ON  
**Sept 2018-Dec 2018**
- **Course**: HS 3400A (Health Policy)
- **Instructor**: Dr. Maxwell Smith

**PUBLICATIONS**

**Non-Peer Reviewed**


**PRESENTATIONS**

**Student Conferences**

Guest Lectures


Academic Presentations

A. GRADUATE LEVEL

**Device Addiction**
- **Institution**: University of Western Ontario
- **Course**: HS 9721A (Current Topics in Health Promotion)

B. UNDERGRADUATE LEVEL

**Oral Presentation & Written Synopsis on Naturopathic Doctors**
- **Institution**: University of Western Ontario
- **Course**: HS 3002B (Health Occupations)

**Comprehensive Home Option of Integrated Care for the Elderly (CHOICE)**
- **Institution**: University of Western Ontario
- **Course**: HS 4705B (Aging and Community Health)

**Oral Health Strategies**
- **Institution**: Western University
- **Course**: HS 4740A (Chronic Disease Prevention and Management)

**Smell, Taste & Gastrointestinal System**
- **Institution**: Western University
- **Course**: HS 3701B (Aging Body)

Conferences Attended
### VOLUNTEER EXPERIENCE

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<th>Duration</th>
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<tr>
<td>Intensive Care Unit Waiting Room Volunteer</td>
<td>Apr 2019-May 2020</td>
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<td>London Health Sciences Centre, London, ON</td>
<td></td>
</tr>
<tr>
<td>Go Girls! Mentor</td>
<td>Jan 2016-Apr 2018</td>
</tr>
<tr>
<td>Big Brothers Big Sisters of London and Area, London, ON</td>
<td></td>
</tr>
<tr>
<td>Social Recreation Program Volunteer</td>
<td>Jan 2016-Apr 2017</td>
</tr>
<tr>
<td>Chelsey Park Retirement Community, London, ON</td>
<td></td>
</tr>
</tbody>
</table>

### LANGUAGES

1. English (native)
2. Cantonese (highly proficient, verbal)