THE ONTARIO DAILY PHYSICAL ACTIVITY (DPA) POLICY: A DESCRIPTION OF FACTORS INFLUENCING ITS IMPLEMENTATION AND A REVIEW OF PHYSICAL ACTIVITY INTERVENTIONS IN CHILDREN

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Abstract

The Ontario Ministry of Education (OMOE) implemented the Daily Physical Activity (DPA) policy (OMOE, 2005), which mandates that children receive 20 minutes of sustained moderate to vigorous physical activity (PA) during instructional time daily. The purpose of this thesis was to describe how and to what extent the DPA policy is being implemented, and to generate strategic recommendations to optimize its delivery across Ontario. Two separate studies surveyed teachers (n = 66; Study 1) and parents (n = 172; Study 2) to characterize DPA implementation strategies and fidelity, and to identify associated facilitators, correlates, and barriers. Results indicate that the directives of the DPA policy are not being satisfied by teachers and are not being communicated to parents. Study 3 reviewed the internal and external validity of published PA interventions in children to identify effective strategies for PA behaviour change. Together, findings from the three studies identified modifiable predictors of DPA delivery and family-based support, and informed future research and recommendations.

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Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter 1: Introduction

Regular physical activity (PA) is associated with numerous health benefits in school-age children (Janssen & LeBlanc, 2010; Poitras et al., 2016). The benefits of regular PA to overall health contribute to physical, mental, intellectual, social, and financial outcomes, which together build and strengthen the framework of general well-being (Bailey, Hillman, Arent, & Petitpas, 2013). Research suggests that strengthening these connections, especially in childhood, can foster healthy human development and equip individuals and communities with sustainable health promotion and disease prevention practices (Boreham & Riddoch, 2001; Kelder, Perry, Klepp, & Lytle, 1994).

In January 2011, Canadian Physical Activity Guidelines were released by the Canadian Society for Exercise Physiology (CSEP) and endorsed by the Public Health Agency of Canada (PHAC). These guidelines, which are harmonized with the United States and World Health Organization (WHO) guidelines (Physical Activity Guidelines Advisory Committee, 2008; WHO, 2010), were re-confirmed in June 2016, and recommend that for optimal health, children (age 5 to 11) and youth (age 12 to 17) should get at least 60 minutes of moderate- to vigorous-intensity physical activity (MVPA) daily (Tremblay et al., 2011, 2016). The scientific evidence base informing these guidelines shows a clear dose-response relationship between the volume of MVPA and increased health benefits, with most of the benefits occurring within the initial 60 minutes of MVPA (Janssen & LeBlanc, 2010). However, national survey data indicate that only 9% of Canadians aged 5 to 17 years are meeting the Canadian PA guidelines, with general trends indicating that boys are more active than girls across age groups, and that PA decreases with age (ParticipACTION, 2016; Statistics Canada, 2015). Based on these and supporting health promotion data, the majority

of Canadian youngsters need to make permanent changes to routine PA patterns (Active Healthy Kids Canada [AHKC], 2014).

Schools offer a central location for the implementation of health promotion strategies since they are where youngsters spend a significant amount of their waking time, and where the full socioeconomic spectrum of the population can be reached (Fox, Cooper, & McKenna, 2004; Konu & Rimpelä, 2002; Pate et al., 2006; Speigel & Foulk, 2006). Survey data collected by the Canadian Education Statistics Council (2014) indicate that Canadian youth spend an average of 8, 282 cumulative hours in formal classroom settings between the ages of 6 and 14 years, which provides an extended window of opportunity to promote PA for all children, regardless of their life circumstances (Naylor & McKay, 2008). School-based PA initiatives provide the opportunity for students to obtain the knowledge and skills needed to establish and maintain physically active lifestyles (Cale & Harris, 2006; Lee, Burgeson, Fulton, & Spain, 2007).

Making daily PA a priority in the school setting requires strong leadership from the principal, and ongoing input from teachers, students, parents, and community partners (e.g., public health, parks and recreation) (Ontario Ministry of Education [OMOE], 2006a, 2006b). Together, these multiple levels of influence can affect the success of school-based health promotion strategies (Baranowski & Stables, 2000; Saunders, Evans, & Joshi, 2005). Accordingly, the studies in this dissertation, while distinct in their design, are all closely connected thematically via the socio-ecological (SE) framework, which posits that the most effective approach to promoting positive health behaviours in students is a combination of efforts at individual, interpersonal, and environmental levels of influence (Booth et al., 2001; McLeroy, Bibeau, Steckler, & Glanz, 1988; Spence & Lee, 2003; Welk, 1999; Wetter et al.,

2001). In this dissertation, school-based policy implementation by teachers and parental engagement are surveyed (Studies 1 & 2), and interventions aimed at increasing children's PA behaviour are systematically reviewed (Study 3), thereby incorporating consideration of the proximal and distal levels of influence on children's school-based PA; specifically, those operating at the proximal individual and interpersonal levels, as well as the increasingly distal institutional, community, and policy levels (McLeroy et al., 1988).

Currently, Ontario is one of five Canadian provinces (along with Alberta, British Columbia, Manitoba, and Saskatchewan) with a mandated policy for PA in schools. The OMOE instituted the Daily Physical Activity (DPA) policy in October 2005, and included it in Ontario's Health and Physical Education (HPE) curriculum beginning in 2010 (OMOE, 2005a, 2010, 2015). The DPA policy mandates that during instructional time each school day, all students in Grades 1 through 8 participate in a minimum of 20 minutes of sustained MVPA, which "may include walking, active games, dance, aquatics, sports, and fitness and recreational activities" (OMOE, 2005a, Requirement section, para. 2). Respecting the autonomy of teachers and acknowledging that needs and culture vary across schools, the OMOE has allowed for DPA delivery to be tailored according to different school and classroom contexts across the province (OMOE, 2005a). For example, on days when there are no scheduled HPE classes, or when the HPE classes do not involve PA, the policy and its related resource documents suggest "integrating PA into other curriculum areas" (OMOE, 2005a, Implementation section, para. 1) or "dedicating time for DPA as a separate activity," either via teacher-led or school-wide initiatives (OMOE, 2006, p. 19), and provide corresponding sample resources for its delivery (e.g., timetables, grade-specific activity ideas) (OMOE, 2005b, 2005c, 2005d, 2006).

Similar to the other provincial PA policies, Ontario's DPA policy includes a short section on reporting and accountability, which requires school boards to monitor the implementation of DPA, and states that "school boards and principals should also take appropriate action to ensure that parents are kept informed of their children's participation in activities" (OMOE, 2005a, Reporting and Accountability section, para. 1). However, only British Columbia's policy mandates that report cards include a statement indicating whether or not students are meeting the prescribed learning outcomes of DPA (British Columbia Ministry of Education, 2009, 2011), which adds a measure of accountability. Ontario's DPA policy differs from those of the other four provinces largely with respect to the duration (20 versus 30 minutes) and delivery (requirements must be met during instructional time) of the PA. Further, Ontario's policy is the only one that specifies *sustained* MVPA, although the memorandum allows for initial implementation of DPA to occur in several short sessions (i.e., a minimum of 10 minutes each) (OMOE, 2005a).

While Ontario's HPE directives and DPA mandate are directly associated with health promotion, policies are not necessarily reflected in practice (AHKC, 2014; Sadler, 1985), and although schools may be a key vehicle to improve student health, there are many barriers that can compromise the implementation of school health and PA directives (Agron, Berends, Ellis, & Gonzalez, 2010; Belansky et al., 2009; Curtner-Smith, 1999; Dwyer et al., 2003; Dwyer et al., 2007; Kennedy, Cantell, & Dewey 2010; Langille & Rodgers, 2010; Lounsbery, Bungum, & Smith, 2007; Morgan & Hansen, 2008; Young et al., 2007). More specifically, research on public policy relating to PA in schools identified competing curriculum, facilities, staffing choices, and parent participation as being areas of policy that can impact the amount of PA received by students (Gladwin, Church, & Plotnikoff, 2008).

Compliance with the DPA policy in Ontario elementary schools has been identified as an area requiring evaluation (Ontario Agency for Health Protection and Promotion, and Cancer Care Ontario, 2012; Ramanathan, Allison, Faulkner, & Dwyer, 2008), and unfortunately, recent research conducted by Public Health Ontario (PHO) suggests that DPA is not being implemented uniformly province-wide (PHO, 2015). Further, published research indicates that most studied schools in Southern Ontario are not meeting the DPA requirements (Patton, 2012; Stone, Faulkner, Zeglen-Hunt, & Boone, 2012).

To date, the limited research and evaluations specific to Ontario's DPA policy have focused on teachers (Gilmore & Donahue, 2016; Strampel et al., 2014; Patton, 2012; PHO, 2015), administrators (Hobin, Leatherdale, Manske, & Robertson-Wilson, 2010; PHO, 2015), children (Hobin et al., 2010; Stone et al., 2012), and community partners (PHO, 2013), and when targeted, has concentrated on Southern regions of the province. Based on this limited literature, implementation of the DPA policy in Ontario does not appear to be meeting the mandate in terms of scheduling or intensity. Although Gilmore and Donahue (2016), Patton (2012), and PHO (2015) included evaluations of the reasons for the observed disconnect between policy and practice, consideration of teaching strategies and input from parents have not been explored.

The research presented herein addresses gaps in the relevant evidence base by reporting on perspectives from all regions of Ontario, including a focus on the teaching context in Northern Ontario, thus balancing regional representation, and surveying the perspectives of parents. The available research on DPA implementation either focuses on Southern Ontario specifically, or has formulated recommendations based on provincial averages, making it difficult to identify region-specific support needs. Schools in Northern

regions have the lowest average elementary school sizes (People for Education, 2012) and therefore receive less monetary support from the province, as funding is based on enrolment (People for Education, 2015). This discrepancy creates variability in implementation settings and warrants representation from all regions, as included in Study 1, when examining contextual appropriateness of the DPA policy. Further, parents represent a key stakeholder group in DPA promotion and delivery (OMOE, 2006a, 2006b), and as such, their beliefs and attitudes can inform implementation strategies. At the time of submission, Study 2 is the first research to explore DPA-related input from parents of elementary school children in Ontario. Finally, in light of the underlying purpose and ultimate target of the DPA policy, this research incorporates input from teachers and parents into a broader context by considering the characteristics of interventions that successfully change PA behaviour in children.

The overall goals of the dissertation were to explore the extent to which DPA is being implemented in elementary schools across Ontario, with a focus on Northern regions, and to generate recommendations for strategies to optimize its implementation. To that end, the dissertation research was guided by three main objectives. The first was to assess teachers' self-reported adherence to the DPA policy and their perceptions and practices surrounding its implementation (Study 1). As the implementers of the policy, teachers represent a key stakeholder group in DPA delivery (OMOE, 2006). Therefore, understanding their individual beliefs, behaviours, and perspectives surrounding the DPA policy is critical for establishing the policy's effectiveness, determining which proximal- and distal-level factors influence the degree to which it is implemented, and identifying best practices. The second objective was to explore the perceptions of parents (Study 2), who, as the primary source of children's health-related beliefs, attitudes, and behaviours (Golan, 2006), represent a

significant interpersonal influence on children's school-based PA. Finally, in order to inform future interventions designed to improve DPA implementation, the third objective of this dissertation was to conduct a review of PA interventions in children using the RE-AIM (reach, effectiveness/efficacy, adoption, implementation, maintenance) framework (Glasgow, Vogt, & Boles, 1999) to examine both internal and external validity outcomes that contribute to intervention effectiveness (Study 3). While internal validity measures provide evidence of a cause and effect relationship between intervention strategies and outcomes, external validity is the degree to which study findings are generalizable to groups and environments outside the intervention or experimental setting (Gay, Mills, & Airasian, 2012). Expressly, external validity measures address the distal influences on policy implementation, which include policy-, community-, and institutional-level factors such as funding, coordination of resources, time for training, and the degree to which the policy can be tailored to capture the school-specific context, social norms, and priorities (Rogers, 1983).

A literature review of the multiple ecological levels of influence on children's PA is presented in Chapter 2, with a focus on the school setting and the role of theory in health behaviour change. As a school-based policy, DPA represents an overarching environmental influence that can positively affect PA-related student behaviour. Therefore, the DPA policy is integrated throughout the chapter through discussions of how children's PA and teachers' implementation of PA-based curriculum are influenced by their individual social and physical environments in school and the surrounding community (Baranowski & Stables, 2000; Saunders et al., 2005).

The specific research objectives and methods are organized into three separate studies, which are presented sequentially as Study 1, 2, and 3 in Chapters 3, 4, and 5,

respectively. Study 1 examined elementary school teachers' knowledge and implementation of the DPA policy, and their perspectives surroundings its delivery, as informed by the Theory of Planned Behaviour (TPB). Study 2 examined parents' awareness and perspectives of the DPA policy, and their perceptions of the school's responsibility, their own responsibility, and the relative contribution from each for the promotion and delivery of their children's PA. Studies 1 and 2 employed online surveys with both closed- and open-ended questions. To inform future interventions designed to facilitate context-specific delivery of the DPA policy, Study 3 examined the internal and external validity of published PA interventions in children. Study 3 was a systematic literature review conducted with the RE-AIM framework, which is an established evaluation model for assessing the generalizability of study findings across research settings and populations, and for considering variables that may moderate intervention effectiveness, such as cost and implementation fidelity (Glasgow et al., 1999).

Chapter 6 provides a summative discussion of the three studies, itemizes their collective implications, and identifies future directions for DPA-related research and evaluation in Ontario.

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Chapter 2: Literature Review

The Cost of Physical Inactivity

The importance of regular physical activity (PA) can be framed in terms of the dangers of its absence for both adults and children. The WHO (2013) ranks insufficient PA as the fourth leading risk factor for mortality, together with tobacco use, unhealthy diet, and the harmful use of alcohol, which contributes to four key damaging metabolic/physiological changes; namely, raised blood pressure, overweight/obesity, raised blood glucose, and raised cholesterol (Bangsbo et al., 2016; Poitras et al., 2016; Tremblay & Willms, 2003; WHO, 2013). The crisis of obesity, across age groups, has fueled heightened interest in PA promotion, which in turn has given it a prominent role in public health (Fox, Cooper & McKenna, 2004).

Evidence supporting the intuitive link between physical inactivity and obesity in Canadian youngsters has been documented (Janssen et al., 2005; Kesäniemi, Riddoch, Reeder, Blair, & Sorensen, 2010; Tremblay & Willms, 2003). The prevalence of obese young people in Canada (11.7%) (Roberts, Shields, de Groh, Aziz, & Gilbert, 2012) has tripled over the past twenty-five years (Shields, 2006), and because of the accelerated rate of change, it is generally believed that environmental factors rather than genetic factors explain the increase in childhood obesity (Tremblay & Willms, 2003). Included among these proposed factors are children's increased exposure to calorie-dense foods and beverages, increased barriers to healthy behaviours (e.g., lack of biking trails), and sedentary lifestyle choices (e.g., video gaming) (Castelli & Hillman, 2012; Gortmaker et al., 2011; Mercer, 2010). In Ontario, 27.1% of youth are considered overweight or obese based on self-reported

body mass indices (Public Health Ontario [PHO], 2013), and less than half are meeting the Canadian PA guidelines (AHKC, 2011).

The most widespread short-term consequences of childhood obesity are psychosocial (Dietz, 1998). Obesity can create social and emotional adversity for children, with peer rejection (Zametkin, Zoon, Klein, & Munson, 2004; Zeller, Reiter-Purtill, & Ramey, 2008; Welk & Joens-Matre, 2007) and lower levels of self-esteem (Strauss, 2000; Wang & Veugelers, 2008) among the leading concerns. The long-term impact of child and adolescent obesity affects both mental and physical health. In a systematic review focused on the physical long-term impact of child and adolescent obesity, Reilly and Kelly (2011) found a relatively large and consistent body of evidence, which reported that overweight and obesity in childhood and adolescence were associated with increased risk of both premature mortality and physical morbidity in adulthood. The chronic diseases that are consistently associated with both physical inactivity and obesity include coronary artery disease, stroke, hypertension, colon cancer, and type 2 diabetes (Katzmarzyk, 2011; Kumanyika et al., 2008). Based on the relative risks of these diseases and the prevalence of physical inactivity and obesity in Ontario, the economic burden of physical inactivity was estimated to be $3.4 billion, and the cost associated with obesity was estimated to be $4.5 billion for this province (Katzmarzyk, 2011). Moreover, obesity can lead to significant societal costs by reducing labour market productivity through factors such as increased absenteeism (Park, 2009).

When estimating the importance of a condition or disorder for a society, the burden of suffering is usually described along three dimensions: frequency of the condition, morbidity, and costs, both in fiscal and human terms (Offord, Kraemer, Kazdin, Jensen, & Harrington, 1998). According to these criteria, and as discussed above, physical inactivity and obesity

cause a large burden of suffering for society, which offers further support for interventions and policy initiatives aimed at increasing PA. To that end, the Chronic Disease Prevention Alliance of Canada (CDPAC) includes regular PA among the health promotion priorities for this country, and states that "[i]ncreased physical activity levels can save lives, reduce chronic disease, reduce wait times and save health-care dollars" (CDPAC, 2007, p. 6). Further, Ontario's Ministry of Health Promotion identifies children and youth as a priority population, and states that the "future economic health of this province depends on the academic success and optimal health and well-being" of this population (Ontario Ministry of Health Promotion, 2010, p. 8).

There are systemic differences in health concerns that exist across geographical regions in Ontario (Ontario Ministry of Health and Long-Term Care, 2013). Specific characteristics of Northern Ontario that underlie the importance of sustainable PA habits in this region include the findings that: (a) small town, rural and northern regions (Ontario Ministry of Agriculture, Food and Rural Affairs, 2004; People for Education, 2006; Rural Ontario Institute, 2013) of Canada have increased health risks (Ward et al., 2005), including being overweight, having high blood pressure, and suffering from major depressive episodes (Mitura & Bollman, 2003); (b) schools with lower enrolment (People for Education, 2006) receive less government funding for teachers, which decreases the likelihood that they will employ specialist Health and Physical Education (HPE) teachers (People for Education, 2011, 2013); and, (c) schools that service rural areas can be located a significant distance from students' residences, which increases travel time and decreases the likelihood of active transportation (e.g., walking, cycling) to schools (Davison, Werder, & Lawson, 2008; People for Education, 2006).

Taken together, this information suggests that reducing or preventing obesity through increased PA among youngsters province-wide will contribute to the overall well-being of Ontarians, and lead to multiple sustainable health and economic benefits. This can be optimized by considering regional variances in health behaviour determinants, thus ensuring that PA promotion strategies meet local needs.

Benefits of Regular Physical Activity

Regular PA is considered a major contributor to overall well-being, with its benefits extending well beyond physical health (Bailey, Hillman, Aarent, & Petitpas, 2013; Cavill, Biddle, & Sallis, 2001; Warburton, Nicol, & Bredin, 2006). In addition to greater longevity and reduced risks of coronary heart disease, cardiovascular disease, stroke and colon cancer (Blair, Cheng, & Holder, 2001), physically active individuals have reported a better quality of life, reduced stress, improved sleep, and stronger relationships and social connectedness (e.g., Das & Horton, 2012). Moreover, studies have shown that PA interventions have a positive effect on creativity (Tuckman & Hinkle, 1986), classroom behaviour (Jarrett et al., 1998; Mahar et al., 2006), working memory/executive function (Davis et al., 2011; Kamijo et al., 2011; Tomporowski, Davis, Miller, & Naglieri, 2008), and math achievement (Davis et al., 2007; Davis et al., 2011) in children. There is also evidence that exercise may improve cognition and academic performance (Sattelmair & Ratey, 2009; Trudeau & Shephard, 2008). Correlational studies have shown positive associations between existing fitness levels and academic achievement (Eveland-Sayers, Farley, Fuller, Morgan, & Caputo, 2009; Castelli, Hillman, Buck, & Erwin, 2007), as well as between existing fitness levels and enhanced cognitive function in elementary school children (Hillman, Buck, Themanson, Pontifex, & Castelli, 2009; Buck, Hillman, & Castelli, 2008). A recent expert consensus

statement concluded that regular PA participation does promote improved scholastic performance in children, and that time taken away from academic lessons in favour of PA does not sacrifice scholastic performance (Bangsbo et al., 2016).

While PA can indirectly improve subjective well-being and quality of life via enhanced physical health and cognitive functioning, it can also have a direct role in the prevention and treatment of mental health problems (Fedewa, Candelaria, Erwin, & Clark, 2013; Fox, 1999). Mental health problems, including emotional difficulties (e.g., depression and anxiety) and behavioural difficulties (e.g., aggression, inattentiveness, and hyperactivity), are the leading health problems that Canadian children currently face after infancy (Waddell, McEwan, Shepherd, Offord, & Hua, 2005). Viewing the benefits of PA and the harms of inactivity as two sides of a coin, the effects of obesity on mental health are implicated through their link with physical inactivity. Short-term effects of childhood obesity include decreased self-esteem, which is viewed as an indicator for mental well-being (Fox, 1999). The long-term implications of childhood obesity also include signs of poor mental health. In a childhood-adulthood cohort study, Sanderson, Patton, McKercher, Dwyer, and Venn (2011) found that overweight or obesity in children was associated with an increased risk of diagnosed mood disorder (e.g., major depression, dysthymia) in adulthood. Similarly, findings from a longitudinal study conducted over 20 years suggest that adolescent obesity among females is associated with an increased risk for subsequent development of major depressive disorder or anxiety disorders (Anderson, Cohen, Naumova, Jacques, & Must, 2007).

Stressing the benefits of PA, people who are physically active seem less likely to suffer from mental health problems (Biddle & Asare, 2011). Specifically, regular PA has

been associated with positive self-esteem (Ahn & Fedewa, 2011; DeBate & Thompson, 2005; Ekeland, Heian, Hagen, Abbott, & Nordheim, 2004; Parfitt & Eston, 2005; Strauss, Rodzilsky, Burack, & Colin, 2001) and lower levels of anxiety (Parfitt, Pavey, & Rowlands, 2009) in children and in adolescents (Calfas & Taylor, 1994). Furthermore, although there is currently a paucity of rigorous research in this area, evidence suggests that habitual PA participation may play a role in the prevention and treatment of depression in both children and adolescents (Kirkcaldy, Shephard, & Siefen, 2002; Larun, Nordheim, Ekeland, Hagen, & Heian, 2009). Therefore, the emotional difficulties most commonly afflicting Canadian youth (i.e., anxiety and depression) appear to be influenced, at least in part, by regular involvement in PA. Promoting regular PA at school has been listed amongst the school-based strategies for prevention of depression (Herman et al., 2004).

Together, these health benefits highlight how regular PA can lead to improved physical and mental health and effective functioning throughout an individual's lifespan (Ontario Ministry of Health Promotion, 2010). Ensuring that children participate in regular PA can be considered a strategy for promoting and sustaining overall physical and mental health, and for preventing and treating specific health issues such as obesity, depression, and challenging behaviours.

Theoretical Perspective for Research

The evidence base for sustained health behaviour change indicates a critical role of theory, whereby theory-based initiatives appear to be more successful than atheoretical approaches (Crawford & Ball, 2002; Glanz, Rimer, & Viswanath, 2008; Lai et al., 2014; Sorensen, & Steckler, 2002). When applying a theoretical framework, one must conceptually determine the variables that are pertinent to study. This dissertation focuses on the

implementation of PA-based school policies and interventions, for which the important roles of teacher professional development, adequate funding, administrative support, and community involvement have been consistently highlighted in the literature (Allison et al., 2014; Olstad, Campbell, Raine, & Nykiforuk, 2015; PHO, 2015).

Therefore, the research herein requires a focus on these critical leverage points and on the central role of the school in PA promotion. As such, the use of a theoretical framework that addresses the individual (e.g., student/teacher perspectives towards PA), interpersonal/social (e.g., teacher-parent/student and student-parent interactions that favour increased PA), and environmental (e.g., organizational values and norms, and availability of resources that promote PA within the school system) influences on the PA behaviour of elementary school students is employed (Bauman et al., 2002; Pardo et al., 2013; Rimer, 2008; Stewart-Brown, 2006).

Literature reviews that include a focus on school-based PA promotion and delivery (Brown, Hume, Pearson, & Salmon, 2013; Brown & Summerbell, 2009; Salmon, Brown, & Hume, 2009; McGoey, Root, Bruner, & Law, 2015) consistently identify the Theory of Planned Behaviour (TPB) and social-ecological (SE) models among the applied theoretical frameworks. A brief background of the TPB is provided below, with a focus on its application in predicting teachers' delivery of PA-related lessons. Subsequently, SE models are discussed as comprehensive frameworks that are commonly used for organizing theoretical constructs into individual, interpersonal, and environmental (community, physical, organizational) influences on health behaviour (Bauman et al., 2012).

The Theory of Planned Behaviour (TPB). The TPB is a value expectancy theory that proposes that behavioural intentions and behaviours result from a rational process of

decision making (Rimer, 2008). Overall, the TPB suggests that individuals form intentions based on attitudes (positive or negative evaluation of performing the behaviour), subjective norms (perceived social pressure to perform or not perform the behaviour), and perceptions of behavioural control (the degree to which an individual feels that performance is under his or her control), with intention being conceptualized as a summary of the motivation required to engage in a particular behaviour (Ajzen, 1991). These key constructs of the TPB assume a causal chain linking attitudes, subjective norms, and perceived behavioural control to behaviour through behavioural intentions (Ajzen, 1991). Self-identity emerged in subsequent literature as an additional distinctive predictor of behavioural intentions (Terry, Hogg, & White, 1999), and refers to the extent to which a particular behaviour is an important component of a person's self-concept (Sparks & Shepherd, 1992). Moreover, a refined model of the TPB with self-identity included has been used to predict teachers' intentions to teach physical education (Faulkner et al., 2004).

When researching curricular implementation in schools, teachers play a central role; therefore, the psychological processes that influence teachers' behaviours represent important constructs to study. The TPB focuses on individual-level beliefs and processes, and has been used to effectively explain teachers' intentions, attitudes, and behaviours in the classroom (Lee, Cerreto, & Lee, 2010; MacFarlane & Woolfson, 2013; Sugar, Crawley, & Fine, 2005; Underwood, 2012). More specifically, the TPB has been applied as a framework for predicting elementary school teachers' intentions to teach PE classes (Faulkner et al., 2004; Martin, Kulinna, Eklund, & Reed, 2001). Faulkner et al. (2004) found that intentions to teach a specified duration of PE (2 hours per week) were positively correlated with all the tested TPB variables, which included past behaviour, attitude, subjective norm, perceived

behavioural control, and self-identify. Similarly, Martin et al. (2001) reported that attitude and subjective norm accounted for a significant amount of the variance in intentions to teach physically active PE classes.

Therefore, the TPB and its constructs present a comprehensive guide for studying teachers' perspectives on the delivery of PA-related lessons, which were explored in Study 1.

Social-Ecological (SE) Models. Social-ecological (SE) frameworks are based on Bronfenbrenner's (1979) ecological systems theory, which posits that there are multiple levels of influence on individual behaviour. Bronfenbrenner (1979) conceived the ecological environment as a set of nested structures that incorporate and integrate psychological, social, and organizational levels of influence pertaining to the development of an individual, who is situated in the inner-most level represented by the immediate setting (the microsystem). The second level (the mesosystem) includes "the interrelations among two or more settings in which the [individual] actively participates" (Bronfenbrenner, 1979, p. 25). Events occurring in the third (exosystem) level affect the lower level system(s), and therefore indirectly influence the individual, while the fourth and most distal level (macrosystem) includes societal belief systems, cultural norms, policies, or laws that indirectly influence the person.

In the realm of health promotion, SE models posit that the most effective approach to promoting positive health behaviours is a combination of efforts at individual, interpersonal, and environmental (community, physical, organizational) levels of influence (Booth et al., 2001; McLeroy, Bibeau, Steckler, & Glanz, 1988; Spence & Lee, 2003; Welk, 1999; Wetter et al., 2001). Figure 2.1 is informed by the SE model proposed by McLeroy et al. (1988), which is adapted from Bronfenbrenner's model (1979) and views behaviour as being determined by: characteristics of the individual, such as attitudes and knowledge

(intrapersonal factors); formal and informal social networks and social support systems, such as family and colleagues (interpersonal factors); organizational characteristics, including the rules and regulations for operation (institutional factors); relationships among organizations and institutions (community factors); and, local, provincial, and national laws and policies (policy factors) (McLeroy et al., 1988).

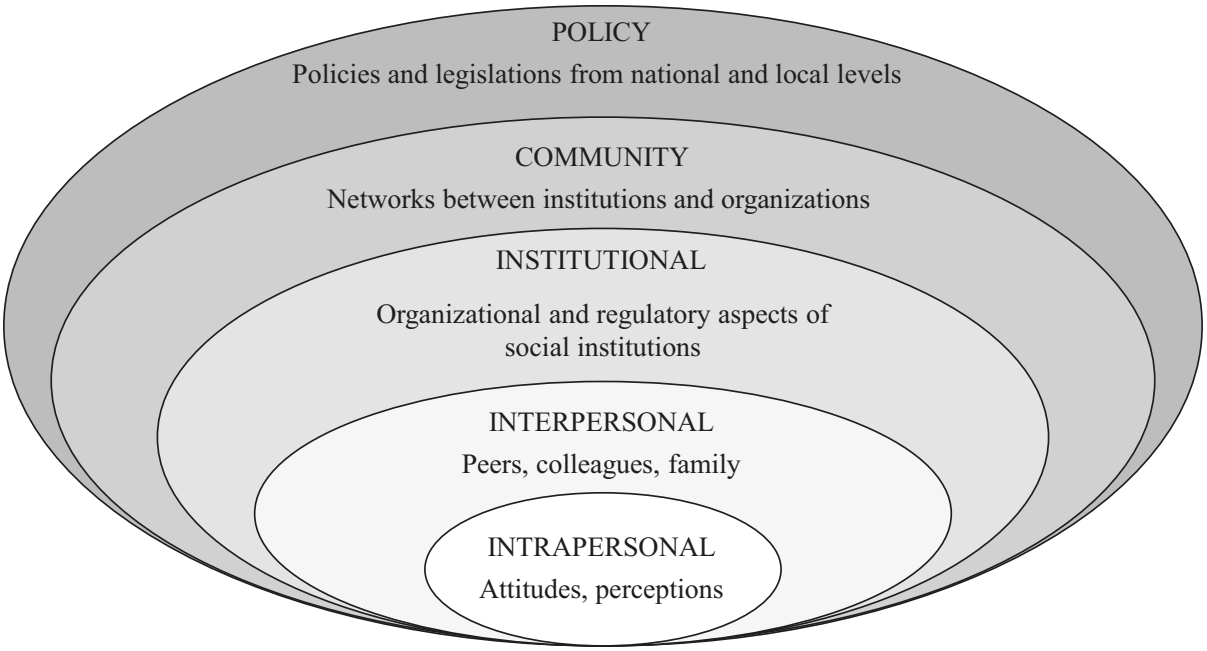

Figure 2.1: Social-Ecological Model Identifying the Multiple Levels of Influence on Health Behaviour (as informed by McLeroy et al., 1988)

In the case of the child, health outcomes are not viewed simply as a result of an individual's chosen behaviours; rather, they are influenced interactively by a range of individual factors (e.g., genetic make-up, personality) as well as outside forces such as parent- and teacher-support (e.g., interpersonal influences), environmental conditions (e.g., school- and community-based influences), and the policies that create them (Atkiss, Moyer, Desai, & Roland, 2011; Davison & Birch, 2001; Stokols, 1992, 1996). As conceptualized in Figure 2.1, a SE framework for school-based PA promotion should consider both proximal

social determinants of behaviour together with additional levels of influence, including the larger school community, family, key community partners (e.g., municipal parks and recreation associations), and province-level government (e.g., ministries of health and education) (King et al., 2002; Langille & Rodgers, 2010; McLeroy et al., 1988).

A SE perspective was used to investigate predictors of elementary school teachers' adoption of PA promotion initiatives within the context of a state-wide policy (Webster et al., 2013). The researchers surveyed teachers' perspectives surrounding intrapersonal- (e.g., attributes of the policy), institutional- (e.g., resource availability), and policy- (e.g., awareness) level influences, and measured the direct (i.e., between intrapersonal and institutional) and indirect (i.e., between policy and intrapersonal) relationships amongst the variables and teachers' self-reported adoption. Results supported the hypothesized relationships, indicating that the theoretical framework was robust, and specified the importance of policy awareness, a supportive school environment, and positive perceived policy attributes for its adoption by teachers (Webster et al., 2013).

In children, PA interventions using a SE approach are frequently associated with positive PA and psychosocial outcomes (Gortmaker et al., 2012; Grydeland et al., 2013; King et al., 2014; Naylor, Macdonald, Warburton, Reed, & McKay, 2008; Kriemler et al., 2010; Erwin, Abel, Beighle, & Beets, 2011; Huberty et al., 2011a; Huberty et al., 2011b; Salmon et al., 2008), suggesting that the broader theoretical framework is conducive to successful health promotion in elementary school students. In addition, cross-sectional (Leatherdale, Manske, Faulkner, Arbour, & Bredin, 2010; Millstein et al., 2011) and case (Naylor, Macdonald, Reed, & McKay, 2006) studies have contributed to the field of PA promotion/participation in youngsters through the application of SE frameworks.

Leatherdale et al. (2010) surveyed elementary school students to identify student- (e.g., weight, height, sedentary behaviour) and school- (e.g., resource availability, social environment) level characteristics associated with school-based PA. Their findings identified participation in team sports and having active friends as student-level characteristics, and using PA as a reward and having established community partnerships as school-level characteristics significantly associated with increased student PA. Millstein et al. (2011) focused on the physical characteristics of home, school, and neighbourhood environments by surveying parents of elementary school children to determine the individual contributions of each environment to children's PA participation. These researchers identified access to sports equipment at home, neighbourhood traffic safety, access to walking/cycling facilities, and street connectivity as factors that explain variance in children's PA levels. Together, these findings support the propositions that the social and organizational environments of the school influence individual student PA behaviour (Leatherdale et al., 2010), and that school-based PA programs considering the characteristics of multiple environments are more likely to be successful (Millstein et al., 2011). Further, Naylor et al. (2006) conducted a case study of a SE model developed to promote PA in elementary school children (*Action Schools! BC*). The case study assessed the provincial, public, and political contexts of the model's implementation using focus groups conducted with representatives from key stakeholder groups (community, school, and government), media content analysis, and government news tracking, respectively. The findings highlighted political will and public interest as positive macro-level influences on the model's implementation (Naylor et al., 2006).

Therefore, the theoretical orientation of this dissertation draws from the SE model described by McLeroy et al. (1988), and reflects the belief that promoting positive health

behaviours in students is a combination of efforts at individual, interpersonal, and environmental levels of influence (Booth et al., 2001; McLeroy et al., 1988; Spence & Lee, 2003; Welk, 1999; Wetter et al., 2001).

Influences on PA Participation in Children and the Delivery of PA-Related Curriculum

There are multiple influences on PA behaviour (Bauman, Sallis, Dzewaltowski, & Owen, 2002). At the individual level, there are demographic and psychosocial factors underlying choice to engage in PA throughout the day, while at the interpersonal and environmental levels, PA-related choice is shaped by the social and physical environments and the policies that impact neighbourhoods and communities (Bauman et al., 2012; King, Stokols, Talen, Brassington, & Killingsworth, 2002). For children, interpersonal influences include the family and the school, which are in turn embedded in larger, distal social contexts including the community and society in general.

Implementing DPA into the curriculum begins with the OMOE, and filters down sequentially to school boards, administration, teachers, and finally students (OMOE, 2006a, 2000b). Therefore, the daily PA levels of elementary school students may be impacted to varying degrees, as a reflection of the individual, interpersonal, and environmental efforts made within schools, and between schools, families, and community partners.

Demographic factors. There are two biological factors that have been consistently predictive of or associated with PA levels in youth. Reviews of global data have indicated that male sex is a positive determinant (Bauman et al., 2012; Sallis, Prochaska, & Taylor, 2000) of PA in elementary school children. In Canada, accelerometer data reveal that boys aged 6 to 19 years accumulate 11 to 14 more minutes a day of MVPA than do girls in the same age range (Colley et al., 2011). Similarly, objectively measured PA levels in American

youngsters identify males as being more active than females (Trost et al., 2002). Further, objectively measured PA levels in Canadian (Colley et al., 2011) and American (Troiano et al., 2008; Trost et al., 2002) youngsters exhibit a significant inverse relationship with age, with the most dramatic decreases occurring between ages 6 to 11 years and ages 15 to 19 years (Nader et al., 2008; Trost et al., 2002).

SES has been inconsistently associated with PA levels of children, with reviews reporting positive (Sallis et al., 1992), inverse (Nader et al., 2008), and no (Sallis et al., 2000) relationships with indicators of SES. In Canada, family income was reported to be inversely related to participation in organized extracurricular activities (Guèvremont, Findlay, & Kohen, 2008), and in a small Midwestern American city, residing in lower SES neighbourhoods was associated with reduced availability and accessibility of PA resources (Estabrooks, Lee, & Gyurcsik, 2003).

Psychosocial factors. According to Bandura (1997) and Dzewaltowski (1994), cognitive factors are strong predictors of PA participation across the lifespan. Published literature reviews and cross-sectional studies have identified increased self-efficacy (Bauman et al., 2012; Mackintosh, Knowles, Ridgers, & Fairclough, 2011; Trost, Pate, Ward, Saunders, & Riner, 1999; van der Horst, Paw, Twisk, & van Mechelen, 2007), positive outcome expectations about participating in PA (Heitzler, Martin, Duke, & Huhman, 2006), intention to be physically active, previous PA participation, and preference for PA (Sallis et al., 2000) as consistent positive correlates of PA behaviour in children. Consistent negative correlates include perceived barriers (Sallis et al., 2000), such as adverse weather and fears about injury (Mackintosh et al., 2011).

Many of these constructs have in turn been targeted in intervention studies designed to increase PA levels in children. Strategies that have resulted in increased PA levels in this population include: (i) teaching students about the health benefits of PA (Spiegel & Foulk, 2006; Stevens et al., 2003); (ii) promoting the development of PA-related autonomy (goal setting, self-monitoring, and decision-making related to PA) (Angelopoulos, Milionis, Grammatikaki, Moschonis, & Manios, 2009; Chen, Weiss, Heyman, & Lustig, 2010; Harrison, Burns, McGuinness, Heslin, & Murphy, 2006; Michaud, Nadeau, Martel, Gagnon, & Godbout, 2012; Salmon, Ball, Hume, Booth, & Crawford, 2008); and, (iii) providing children with a PA-specific implementation intention (i.e., if-then plan) (Armitage & Sprigg, 2010). In addition to increased PA levels, teaching students about the health benefits of PA has had positive effects on PA behavioural outcomes, including self-efficacy (Levy et al., 2012; Stevens et al., 2003), outcome expectancy (Keihner et al., 2011), and intentions (Choudhry et al., 2011; Palmer, Graham, & Elliott, 2005) towards PA. Similarly, promoting the development of PA-related autonomy has resulted in improvements in self-efficacy (Harrison et al., 2006), attitudes (Digelidis, Papaioannou, Laparidis, & Christodoulidis, 2003), and knowledge of PA (Chen et al., 2010).

Together, these findings suggest that education promoting health and fitness can increase knowledge and positively affect psychosocial variables. While these psychosocial adaptations have been associated with positive behaviour change in some studies, they are likely not all that is necessary to maintain PA over the life course (Naylor & McKay, 2008). How demographics and psychosocial factors interact with familial, school, and societal characteristics to influence behaviour is context specific and consequently in continued need of replication (Davison & Birch, 2001). Underscoring the importance of effective DPA

implementation across school settings, a significant quality of school-based policy-level interventions is that they target environmental contexts and provide PA opportunities that reach all students, regardless of their individual characteristics (Kumanyika et al., 2008).

Interpersonal factors. The proximal social environment of a child's life consists of support from and individual relationships with parents, other family members, peers, and teachers (Duncan, Duncan, & Strycker, 2005; Konu & Rimpelä, 2002; Welk, Wood, & Morss, 2003; Wenthe, Janz, & Levy, 2009). The family is a primary source of health-related beliefs, attitudes, and behaviours (Grzywacz & Fuqua, 2000; Kahn et al., 2002), and within a school setting, relationships among and between staff, students, and the community (e.g., beliefs, values, and goals shared by members and affiliates of a school) offer potential for social influences on children (Stewart-Brown, 2006). Together, the family environment, and school setting are believed to have an important influence on children's health behaviours (van Sluijs, Kriemler, & McMinn, 2011).

Family. Adult family members serve as role models, provide opportunities for children to be active, and set the rules that create the family norms that shape children's habits (Peterson & Fox, 2007). With regard to PA patterns in children, familial support (Bauman et al., 2012; van der Horst et al., 2007) and parental perceptions of the importance of children's participation in PA (Heitzler et al., 2006) have been identified as positive correlates. Conversely, children have identified lack of parental support (e.g., restriction on children's play) as a perceived barrier to PA participation (Mackintosh et al., 2011). Familial support may take a variety of forms, including informational, emotional (e.g., encouragement, watching children when they participate in PA), and instrumental (e.g., facilitating with fees and transportation) (Duncan et al., 2005). Qualitative data collected

from parent focus groups identified numerous supportive practices that were perceived to be effective in promoting children's PA, including the provision of motivation, reacting empathetically to children's choices surrounding non-participation, and increasing the intrinsic value of an activity (De Lepeleere, DeSmet, Verloigne, Cardon, & De Bourdeaudhuij, 2013).

In order to exclusively target the natural interactions that occur between parents and their children, researchers have conducted interventions with parent-child dyads to determine the effects of parental role modeling on children's health behaviours when PA opportunities are provided and barriers removed. Results from these studies are mixed, with those targeting mothers reporting an increase (Ransdell et al., 2003) or no change (Olvera et al., 2008) in PA levels of adolescent and child daughters, respectively, and one targeting fathers reporting an increase in PA levels of children (sons and daughters) (Morgan et al., 2011). These findings are inconsistent with a review of the literature, which reported that parental modeling of PA is associated with child but not adolescent PA (van der Horst et al., 2007).

How to best involve parents in childhood PA promotion initiatives such as the DPA policy has been identified as an area requiring further research (O'Connor, Jago, & Baranowski, 2009; Thomas, 2006). Many interventions have targeted parental engagement in school-based PA (e.g., indirectly through school newsletters, directly via organized activities) as part of a comprehensive school-based approach to increase children's participation in PA; however, there has been no consensus on how to yield the most promising outcomes (Kahn et al., 2002; van Sluijs et al., 2011). Regarding the DPA policy specifically, there is a paucity of information surrounding parental awareness, beliefs, and perspectives. Therefore, considering the intended collaborative role of parents in DPA

delivery and promotion (OMOE, 2006a, 2006b), parental input is required for identifying family-influenced support needs.

School. Research shows that the environment of a school can exert a powerful influence on children's health and behaviours (DeWit et al., 2000; Lee, Burgeson, Fulton, & Spain, 2007; Pate et al., 2006; U.S. Department of Health and Human Services, 1996). In 1986, The Ottawa Charter for Health Promotion (WHO, 1986) drew attention to the effect of the social environment on health and health promotion. Subsequent guidelines on health promoting schools (Centers for Disease Control and Prevention, 2003; International Union for Health Promotion and Education, 2010) have emphasized related strategies, such as the development of good relationships within the school, the promotion of staff health and well-being, the promotion of self-esteem among students, and consideration of staff exemplars (i.e., staff who regularly practice healthy behaviours) in health-related issues.

In summary, these guidelines promote a school culture that encourages teachers, administrators, parents, and the affiliated community to become part of the solution and to support a trend towards a healthy and more physically active lifestyle. Collectively, administrators, teachers, students and parents contribute to the school's social environment through their beliefs about the importance of school-based PA (Martin et al., 2001). Focusing on teachers, as the implementers of school-based PA, their behaviour, perspectives, and motivation to comply with the beliefs of their school's administration and broader social culture contribute to the proximal and distal social environments shared with the students, and in turn to the students' exposure to PA opportunities (Martin et al., 2001).

Teacher behaviour and lesson context. Within elementary school classrooms, a teacher's training in PA-related instruction is a positive determinant of classroom PA levels,

with PE-trained teachers delivering curricular PA of increased duration (Erwin, Beighle, Morgan, & Noland, 2011; Matson-Koffman, Brownstein, Neiner, & Greaney, 2005; McKenzie et al., 1995; McKenzie, Sallis, Faucette, Roby, & Kolody, 1993; Verstraete, Cardon, de Clercq, & de Bourdeaudhuij, 2007). More specifically, training in and experience with PA-related instruction influences a teacher's (1) classroom behaviour, and (2) selection of activities (i.e., PA lesson context), both of which are associated with classroom PA levels (McKenzie et al., 1993). For example, teacher behaviour related to the active instruction and promotion of PA (versus general instruction and classroom management) resulted in significantly higher PA levels in observed classrooms (Chow, McKenzie, & Louie, 2008). Regarding lesson context, a focus on fitness activities elicited more energy expenditure in students (McKenzie et al., 1995; McKenzie, Marshall, Sallis, & Conway, 2000) and a greater percentage of lesson time spent in MVPA (van Beurden et al., 2003) than did knowledge-directed lesson contexts. Together, these findings suggest that PE-specific teacher training and experience positively influence teacher behaviour and lesson context, which in turn positively influence students' opportunities to be physically active. This inference is supported by a recent systematic review and meta-analysis of interventions designed to increase MVPA in school PE lessons, which identified teacher professional learning focusing on class organization, management, and instruction as effective intervention strategies (Lonsdale et al., 2013).

Teacher perspectives. Research indicates that individual-level teacher-specific perspectives and characteristics can influence students' engagement in curricular activities (Lee, Contento, & Koch, 2013). For example, teachers' belief in the importance of PA (DeCorby, Halas, Dixon, Wintrup, & Janzen, 2005), confidence in teaching PA-related

lessons (Morgan & Hansen, 2008), experiences of personal exercise behaviour (Faulkner, Reeves, & Chedzoy, 2004), and motivation to teach PA (Magnusson, Sigurgeirsson, Sveinsson, & Johannsson, 2011) have all been shown in a case (DeCorby et al., 2005), cross-sectional (Faulkner et al., 2004; Morgan & Hansen, 2008) or intervention (Magnusson et al., 2011) study to positively influence the allocation of time and resources toward helping elementary school students engage in PA. The relationships amongst teachers' perspectives surrounding PA-related curriculum implementation were investigated in a cross-sectional study conducted by Gilmore and Donahue (2016), who reported a statistically significant relationship between teachers' skills, motivation, and perceived competency to deliver DPA in a Southern Ontario school board. In its evaluation of DPA implementation across Ontario, PHO reported that teachers who are highly confident in planning and implementing DPA are significantly more likely to meet the policy's requirements (PHO, 2015); however, these results are based on responses to only two survey items and therefore have questionable reliability. Further, the PHO study only surveyed teachers from three grade levels (Grades 3, 5, and 7), and only from schools where an administrator had also consented to participate. This recruitment strategy may have introduced bias in the sample, wherein teachers from schools that place a high value on school-based PA are over-represented. These findings underscore the essential contribution of teachers' perspectives to policy and curriculum implementation (McLaughlin, 1990), and highlight a gap in the literature with respect to DPA implementation in Ontario.

School culture. Broadening the scope from the classroom, the social environment of the school can also influence the behavioural functioning of students (DeWit et al., 2000). Although the specific characteristics of successful elementary school-based interventions are

not obviously or consistently different from those reporting no effects (Brown & Summerbell, 2009; Flodmark, Marcus, & Britton, 2006), the incorporation of strategies that include aspects of the school's social environment has proven more effective than focusing strictly on classroom curriculum (Biddle, Braithwaite, & Pearson, 2014; Kriemler et al., 2011; Naylor & McKay, 2008; Salmon, Booth, Phongsavan, Murphy, & Timperio, 2007; Timperio, Salmon, & Ball, 2004). However, the inclusion of a curricular component appears to be a critical component of these whole-school initiatives, perhaps because of the increased likelihood of student participation (Kriemler et al., 2010). Examples include the incorporation of PA breaks in the classroom (Grydeland et al., 2013; Kriemler et al., 2010; Naylor et al., 2006; Williamson et al., 2007), the development of pedagogy strategies that incorporate activity related issues across the curriculum (i.e., in literacy, numeracy, science and geography) (Gorely, Nevill, Morris, Stensel, & Nevill, 2009; Ling, King, Speck, Kim, & Wu, 2014), and the use of a buddy system that pairs PE-trained pre-service teachers with generalist teachers for PE lessons in intervention schools (van Beurden et al., 2003).

Because comprehensive school-based approaches integrate several school environmental factors, it is difficult to identify which aspect(s) contributed directly to the intervention success. Regarding their effectiveness/efficacy, the inclusion of curricular components (Gorely et al., 2009; Grydeland et al., 2013; Kriemler et al., 2010; Ling et al., 2014; Naylor et al., 2006; Williamson et al., 2007), teacher involvement (Grydeland et al., 2013; Naylor et al., 2006; Manios, Moschandreas, Hatzis, & Kafatos, 1999), and consideration of school culture (Naylor et al., 2006; Seo et al., 2013; van Beurden et al., 2003) appear to facilitate success in PA promotion among elementary school students. However, most interventions are not evaluated rigorously beyond their effectiveness/efficacy

and in turn, existing reviews of PA interventions in children focus largely on internal validity, making it difficult to generalize and translate the findings to natural settings.

Student peer groups and affiliations. Embedded within the family- and school-settings are peers, the influence of whom can mediate the effectiveness of strategies, programs and interventions designed to increase children's PA (Barr-Anderson et al., 2012; Horne, Hardman, Lowe, & Rowlands, 2009; Pate et al., 2003; Rosenkranz, Behrens, & Dzewaltowski, 2010). However, while the social influences of peers on children's school-based PA participation should be considered in future research, they are beyond the scope of this dissertation, which focuses on teacher- and family-mediated influences.

Environmental factors. Children and their social relationships share a common context, namely, the communities and neighbourhoods in which they live, and the physical and organizational environments that surround them (e.g., environments of their schools). The physical environment refers to the tangible built and natural spaces and structures found therein, and the organizational environment includes the rules, programming and policies implemented by institutions (e.g., schools) and governments (local, provincial, national) that may influence or inhibit PA participation (Booth et al., 2001; Wetter et al., 2001).

Communities and neighbourhoods.

Community factors refer to networks between institutions and organizations, and as such represent a relevant level of influence on school-based PA promotion (Langille & Rodgers, 2010; McLeroy et al., 1988). Interventions examining social environmental influences on children's PA, such as support from local community members and availability of resources, have indicated positive associations. For example, a school-based intervention that was tailored to access local resources, community-wide funding, and infrastructure

support in a low-income area of Texas was successful in improving aspects of school health, including PA levels of the students (Coleman et al., 2005), and an environmental intervention providing a safe play space (e.g., supervised schoolyard) for inner-city children from New Orleans resulted in an increase in the number of children who were outdoors and physically active in that neighbourhood (Farley et al., 2007). Finally, although compiled data indicated no overall change in Canadian active school travel, a national-level active school travel planning intervention showed evidence of localized success at nearly half of the 53 participating elementary schools (Mammen et al., 2014).

Physical environment. The physical environment of schools refers to such characteristics as physical appearance, structure and size, and student and teacher demographics (DeWit et al., 2000). Cross-sectional studies have shown that more PA is accumulated in schools with greater student enrolment (Hilland, Ridgers, Stratton, & Fairclough, 2011) and larger school buildings and play areas (Cradock, Melly, Allen, Morris, & Gortmaker, 2007), and in classes with smaller sizes (McKenzie et al., 2000). Intervention studies have shown that modifications to the physical school environment, such as providing more opportunities for standing during the school day (Lanningham-Foster et al., 2008), providing greater access to sports and game equipment (Cradock et al., 2014; Huberty, Beets, Beighl, & Welk, 2011a; Huberty et al., 2011b; Lanningham-Foster et al., 2008; Verstraete, Cardon, De Clercq, & De Bourdeaudhui, 2006), and using colourful playground markings to encourage play (Blaes et al., 2013; Loucaides, Jago, & Charalambous, 2009; Ridgers, Stratton, Fairclough, & Twisk, 2007; Stratton & Mullan, 2005) can increase objectively measured PA levels in children. However, providing recreational equipment to elementary school children during recess did not increase PA levels unless staff training and interactive

supervision were also provided in the environmental intervention (Huberty, Beets, Beighle, Stain-Maurice, & Welk, 2014), which further highlights the critical role of teacher training and engagement.

Organizational (political) environment. At the organizational level, political will and stakeholder involvement are influential factors in the successful implementation of policy and program guidelines (Deschesnes, Martin, & Hill, 2003; Dodson et al., 2009; Naylor, Macdonald, Reed, & McKay, 2006). Regarding school-based PA initiatives, relevant stakeholders include school boards and administrators, teachers, and parents for curriculum-based initiatives, such as DPA policy, as well as city planners, transportation departments, community residents and local police departments for community-based initiatives, such as safe routes to school, walking and biking paths.

Emerging evidence suggests that school-based policies and guidelines surrounding PA-related curriculum can positively influence student health and behaviours. For example, guidelines that have been positively associated with improved cardiovascular fitness in students include: not using PE as punishment, not exempting students from PE for reasons other than health or religion, providing student access to a gym or field, having free intramural opportunities for students, and requiring teacher PE certification (Kelly, Phillips, Revels, & Ujamaa, 2010). Similarly, the following policy/guideline-driven initiatives have been shown to be correlated with (Leatherdale et al., 2010; Matson-Koffman et al., 2005; Sallis et al., 2000) and predictive of (Mendoza, Levinger, & Johnston, 2009; Sallis et al., 2003) increased PA behaviour in students: use of PA as a reward and not as discipline, access to facilities and programs and time spent outdoors, provision of an active school travel program, and allowance of students to use activity areas after school.

Regarding the implementation of PE programs (Dowda, Sallis, McKenzie, Rosengard, & Kohl, 2005) and school-based legislation/initiatives for child health (Fagen et al., 2014; Kelder et al., 2009), studies evaluating facilitators identified effective communication among relevant stakeholders, support from local community organizations, administrative support for curriculum implementation, and availability of adequate equipment. In a cross-sectional study examining the implementation of school guidelines in British Columbia, an increase in weekly PE minutes occurred concurrently with an increase in school community (staff and parents) support for healthy eating and PA policies (Watts, Mâsse, & Naylor, 2014). Further, qualitative research conducted with school informants (principals and teachers with and without a specialized background in PE) identified perceptions that guidelines are relatively advantageous, and perceptions that they are compatible with existing school mandates and teaching philosophies as enablers of PA policy implementation (Mâsse, Naiman, & Naylor, 2013).

In Ontario, organizations such as the Ontario Healthy Schools Coalition (OHSC) and the Ontario Physical and Health Education Association (OPHEA) raise awareness of the benefits and need for healthy schools (OHSC, 2009) and provide programs, services and training to schools and communities that enable youngsters to lead healthy, active lives (OPHEA, 2014). Specifically, OPHEA offers comprehensive DPA resources to teachers to support their delivery of the policy. Further, the DPA policy has been linked to the OMOE's 'Foundations for a Healthy School' framework (2014), which encourages Ontario public health personnel to work with schools and school boards to implement health-promotion programming.

Barriers or challenges within school systems may prevent the optimization of the school as a health promoting facility, especially relative to PA (Young et al., 2007). Competing curriculum pressures, not being a school priority, lack of performance measures for PA, fiscal concerns, lack of resources and facilities, and the need to educate and gain the support of community partners have been cited as factors influencing the delivery of DPA school-based policies and practices in Ontario (Allison et al., 2014; Strampel et al., 2014; PHO, 2015), as well as in other Canadian provinces (Dwyer et al., 2003; Dwyer et al., 2007; Kennedy, Cantell, & Dewey, 2010; Langille & Rodgers, 2010; Olstad et al., 2015), America (Agron, Berends, Ellis, & Gonzalez, 2010; Belansky et al., 2009; Lounsbery et al., 2007; Young et al., 2007), Australia (Morgan & Hansen, 2008) and Britain (Curtner-Smith, 1999).

Support from both non-staff and staff stakeholders is critical for effective delivery of school-based policies. Related literature suggests that key factors associated with program (policy) adoption and implementation are (1) the degree to which a school's administration and faculty are united; (2) whether or not there is collaboration amongst staff (peer group) and coordination with community resources; and, (3) the organizational norms regarding change and innovativeness (Durlak & DuPre, 2008; Fullan, 1985; Fullan & Pomfret, 1977; Rogers, 2002). For example, administration that champions an initiative, encourages and devotes time towards its delivery in the school's schedule, and role models its ideals will nurture positive attitudes and cohesion amongst teachers (the implementers), and will contribute positively to the realization of the initiative's goals (Beets et al., 2008). To that end, because each school's social system is unique, PA-based implementation strategies have been shown to be more effective when tailored to schools' individual needs and identities rather than developed at the district level (King et al., 2014).

Together, these findings highlight the important roles of the school's social system (organizational values and norms), adequate funding, administrative support, and community engagement in the implementation of school policies and programs.

Summary of Research Objectives and Theoretical Orientation

The over-arching goal of this research was to generate recommendations for strategies to optimize implementation of the DPA policy in Ontario elementary schools. Study 1 assessed teachers' adherence to the DPA policy and, together with Study 2, explored school- (Study 1) and home- (Study 2) based factors that may influence the degree to which it is implemented. Including representation from all regions of the province, with a focus on Northern Ontario, these studies addressed a gap in the literature, which to date focused largely on Southern Ontario and/or included no consideration of regional variances in implementation contexts. Further, input from parents (Study 2) surrounding awareness and perspectives of the DPA policy was previously missing from the available literature. Study 3 was a systematic review of interventions targeting children's PA behaviour conducted with the established RE-AIM framework (Glasgow et al., 1999). The purpose of this review was to provide a broader context in which to consider the recommendations generated from the teachers' and parents' input, and to address gaps in the literature by assessing the extent to which PA interventions conducted with children report on external validity measures. By focusing on external validity factors, such as cost of implementation and maintenance, this review endeavoured to inform aspects of DPA delivery that extend beyond the school and home environments.

As proposed by Sallis, Owen, and Fisher (2008), SE models should be behaviour-specific, and as such, should identify the most relevant potential influences. Given the focus

of this research, which targets policy implementation by teachers and parental engagement therewith, equal consideration of individual, interpersonal, and environmental influences on DPA delivery is important. To that end, a SE model guided the studies herein, which collectively addressed the school and home settings in which children spend their time. Study 1 focused on teachers as the implementers of the DPA policy, and placed them at the individual level of the SE model. At this proximal level, the influences of teachers' knowledge, as well as their attitudes, confidence, subjective norms, and self-identity (as informed by the TPB) on DPA delivery were examined. In addition, teachers' perceived distal levels of influence, including interpersonal-, institutional-, and community-based facilitators and barriers were explored. Study 2 surveyed parents of elementary school children, the latter of whom were positioned at the individual level of the SE model as the targeted individuals of the DPA policy. Parents were positioned at the interpersonal level, and their perceptions, perspectives and behaviour surrounding the DPA policy and their children's school- and family-based PA were explored. Finally, Study 3 involved a systematic review of children's PA interventions using the RE-AIM framework to provide a direct focus on children as the targeted individuals for PA behaviour change. This review broadened the scope to include all settings in which children's PA behaviour can be targeted, thus giving consideration to additional institutional and community levels of influence not necessarily associated with schools.

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Chapter 3: Teacher- and School-related Factors Influencing Adherence to the Daily Physical Activity (DPA) policy in Ontario Elementary Schools (Study 1)

An important component of a healthy lifestyle is regular participation in physical activity (PA) (Poitras et al., 2016), the promotion of which should begin during childhood since PA habits developed early in life appear to extend into adulthood (Telama, 2009; Telama et al., 2005). Currently, the majority (91%) of Canadians aged 5 to 17 years are not meeting the recommended amount of at least 60 minutes of moderate- to vigorous-intensity physical activity (MVPA) daily (ParticipACTION, 2016; Statistics Canada, 2015; Tremblay et al., 2011, 2016). Global data from World Health Organization (WHO) Member States estimates that four of every five youth do not meet these guidelines (Hallal et al., 2012).

Schools offer a central location for the implementation of sustainable health promotion strategies since this is where youngsters spend a significant amount of their waking time, and where the full socioeconomic spectrum of the population can be reached (Fox, Cooper, & McKenna, 2004; Konu & Rimpelä, 2002; Pate et al., 2006; Speigel & Foulk, 2006). Accordingly, Ontario is among the five Canadian provinces that have mandated policies for daily physical activity (DPA) in schools (Ontario Ministry of Education [OMOE], 2005). Ontario's DPA policy, also included as an expectation of Ontario's Health and Physical Education (HPE) curriculum (OMOE, 2015), requires that all elementary students (Grades 1 to 8) participate in a minimum of 20 minutes (duration) of sustained MVPA (intensity) each school day (frequency) during instructional time (OMOE, 2005). The policy mandates that school boards monitor its implementation and that principals "take appropriate action to ensure that parents are kept informed of their children's participation in activities"; however, there is no requirement that DPA participation be

included in report cards (OMOE, 2005, Reporting and Accountability section, para. 1). Despite this mandate, Ontario's Auditor General reports that neither the OMOE nor the school boards monitor schools to ensure that all students receive DPA (Office of the Auditor General of Ontario, 2015).

Compliance with the DPA policy in Ontario elementary schools has been identified as an area requiring government evaluation (Office of the Auditor General of Ontario, 2015; Ontario Agency for Health Protection and Promotion, and Cancer Care Ontario, 2012; Ramanathan, Allison, Faulkner, & Dwyer, 2008). Accordingly, a recent Ontario-wide evaluation was conducted by Public Health Ontario (PHO), which indicated 50% compliance amongst participating teachers (PHO, 2015). This implementation fidelity score was computed based on teachers' combined ratings of DPA duration, frequency, intensity, continuity, scheduling, and inclusivity, and when interpreted further, indicated that only 3.3% of the teachers categorized as meeting policy requirements were *always* doing it as directed, while the remaining 46.7% were only *often* doing so (PHO, 2015). While the study reported futher analyses on those teachers who were relatively compliant, it is important to highlight that very few teachers were fully compliant. Corresponding perspectives of administrators from the same sampled schools reported a higher implementation fidelity rate, with 61.4% of the schools categorized as meeting policy requirements, 2.4% of which were reflective of full compliance (i.e., *always* meeting policy requirements as opposed to *often* doing so) (PHO, 2015). The discrepancies between administrators' and teachers' perspectives is noteworthy considering that both populations were sampled from the same schools, and may be reflective of inadequate monitoring. The implementation fidelity findings are supported by additional research, which suggests that DPA delivery is not being implemented as prescribed (Gilmore

& Donahue, 2016; Patton, 2012a; Stone et al., 2012), and that there is considerable between-school variation in implementation strategies (Leatherdale et al., 2010; Hobin, Leatherdale, Manske, & Robertson-Wilson, 2010); however, it focuses largely on schools located in Southern Ontario. It is important to balance findings with representation from Northern Ontario, considering the increased prevalence of overweight status, high blood pressure, and diabetes in Northern regions (Booth et al., 2012; Mitura & Bollman, 2003), all of which have been associated with low PA levels (WHO, 2013).

In consideration of the role of school culture in policy implementation, the OMOE allows for DPA delivery to be tailored for different school and classroom contexts across the province (OMOE, 2005); however, there are numerous and disparate factors that can compromise the implementation of school health and PA directives. These include personal and demographic factors related to the teachers (Curtner-Smith, 1999; Morgan & Hansen, 2008a), the quality of professional development offered to teachers (Dwyer et al., 2007; Morgan & Hansen, 2008a), the extent to which administrative and curricular support is available to teachers (Belansky et al., 2009; Dwyer et al., 2003; Langille & Rodgers, 2010; Lounsbery, Bungum, & Smith, 2007; Morgan & Hansen, 2008a; Young et al., 2007), and the availability of PA-related resources (Agron, Berends, Ellis, & Gonzalez, 2010; Belansky et al., 2009; Dwyer et al., 2003; Kennedy, Cantell, & Dewey, 2010; Morgan & Hansen, 2008a; Young et al., 2007). Although Patton (2012a) included an evaluation of the reasons for the observed disconnect between policy and practice, to date, there is a paucity of in-depth exploration of the specific factors that influence DPA delivery in Ontario. For example, teachers' beliefs and perspectives surrounding the DPA policy, as well as their perceived ability to implement it as directed, are variables acting at the individual level (PHO, 2015).

In addition, as informed by the relevant research (Allison et al., 2014; Strampel et al., 2014; Olstad, Campbell, Raine, & Nykiforuk, 2015; PHO, 2015), school-based influences at the interpersonal, institutional, and community levels represent potential barriers and facilitators to the policy's delivery. Identifying how all of these factors influence DPA delivery is important for developing strategies that can help make DPA delivery as rewarding as possible for students and teachers alike.

To that end, as the implementers of the DPA policy, teachers' perceptions of the policy and their perceived individual and collective roles in its implementation need to be taken into account. The causal link between a person's beliefs and their behaviour can be explained by the Theory of Planned Behaviour (TPB), which proposes that behavioural intentions and behaviours result from a rational process of decision making that is influenced by attitudes, subjective norms (degree of personal importance and perceived influence of organizational culture), and Perceptions of Behavioural Control (PBC) (Ajzen, 1991; Rimer, 2008). Bartholomew and Jowlers (2011) emphasized links between elementary school teachers' implementation of PA-based lessons and key variables from the TPB; specifically, they reported increased implementation for teachers with greater perceived self-efficacy, and fewer perceived barriers to implementation. Moreover, in a study designed to establish the utility of the TPB in predicting teachers' intentions to teach a specified duration of PE, all the tested TPB variables were positively correlated with intentions, which included attitudes, subjective norm, PBC, as well as an additional construct measuring self-identify (i.e., experiences of personal exercise behaviour) (Faulkner, Reeves, & Chedzoy, 2004). The construct of PBC overlaps with that of self-efficacy from the Social Cognitive Theory (Bandura, 1993, 1998; Motl, 2007), which, in this context, refers to how confident teachers

feel in their ability to teach and how much control they feel they have over what they teach (Lippke & Ziegelmann, 2008). Confidence in teaching school-based PA has positively influenced teachers' motivation to deliver DPA (Gilmore & Donahue, 2016; PHO, 2015), as well as their allocation of time toward helping elementary school students engage in PA (Morgan & Hansen, 2008b).

Therefore, in consideration of the proposed factors influencing DPA delivery, the similarity of the individual- and interpersonal-level factors with the contructs of the TPB, and the documented use of the TPB in studies measuring teachers' delivery of curriculum (Lee, Cerreto, & Lee, 2010; MacFarlane & Woolfson, 2013; Sugar, Crawley, & Fine, 2005; Underwood, 2012), this study was guided by a SE model within which constructs of the TPB were integrated (see Figure 3.1).

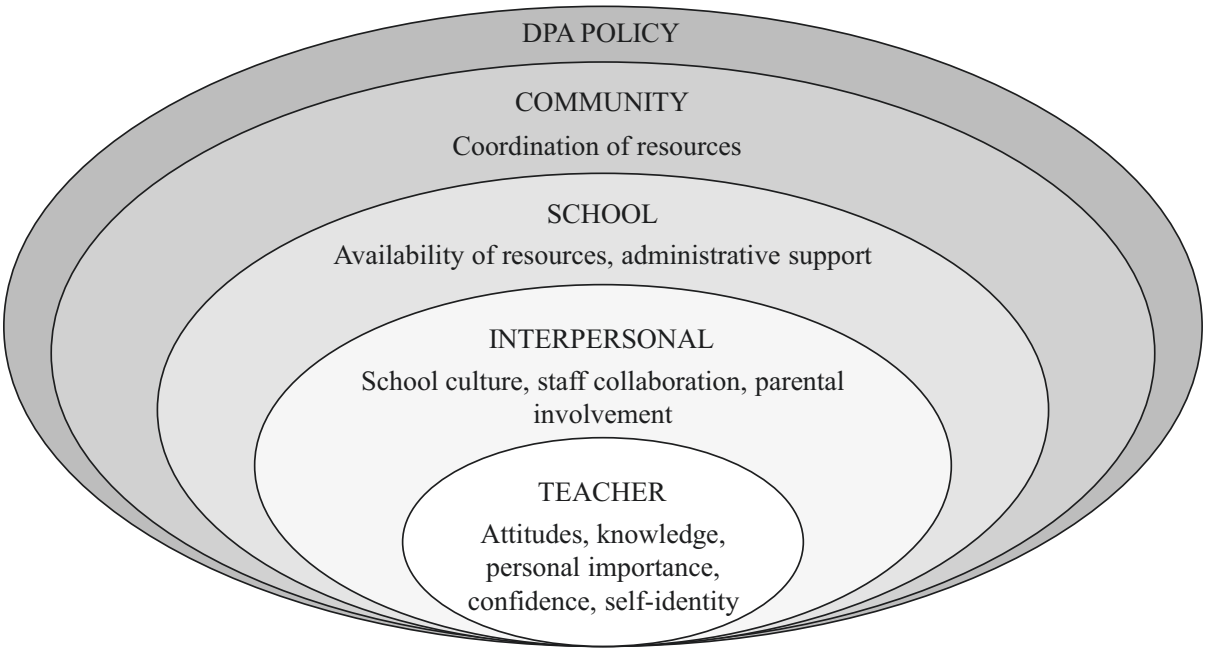

Figure 3.1: Social-Ecological Model with Integrated Theory of Planned Behaviour constructs for studying Teacher- and School-related Factors Influencing Teacher Delivery of the DPA

In light of the critical role of teachers in influencing students' engagement in school-based PA, and data suggesting that DPA delivery is not meeting the mandate, the main goals of this study were to: (1) assess teachers' self-reported adherence to the DPA policy in Ontario elementary schools, with a focus on Northern regions, based on duration, frequency, and intensity outcomes; (2) identify the demographic characteristics of teachers who are (not) implementing DPA; (3) describe how DPA is being implemented; and, (4) explore why it is (not) being delivered as prescribed, based on teachers' perceptions of school-level and TPB-informed teacher-level predictors (see Figure 3.2).

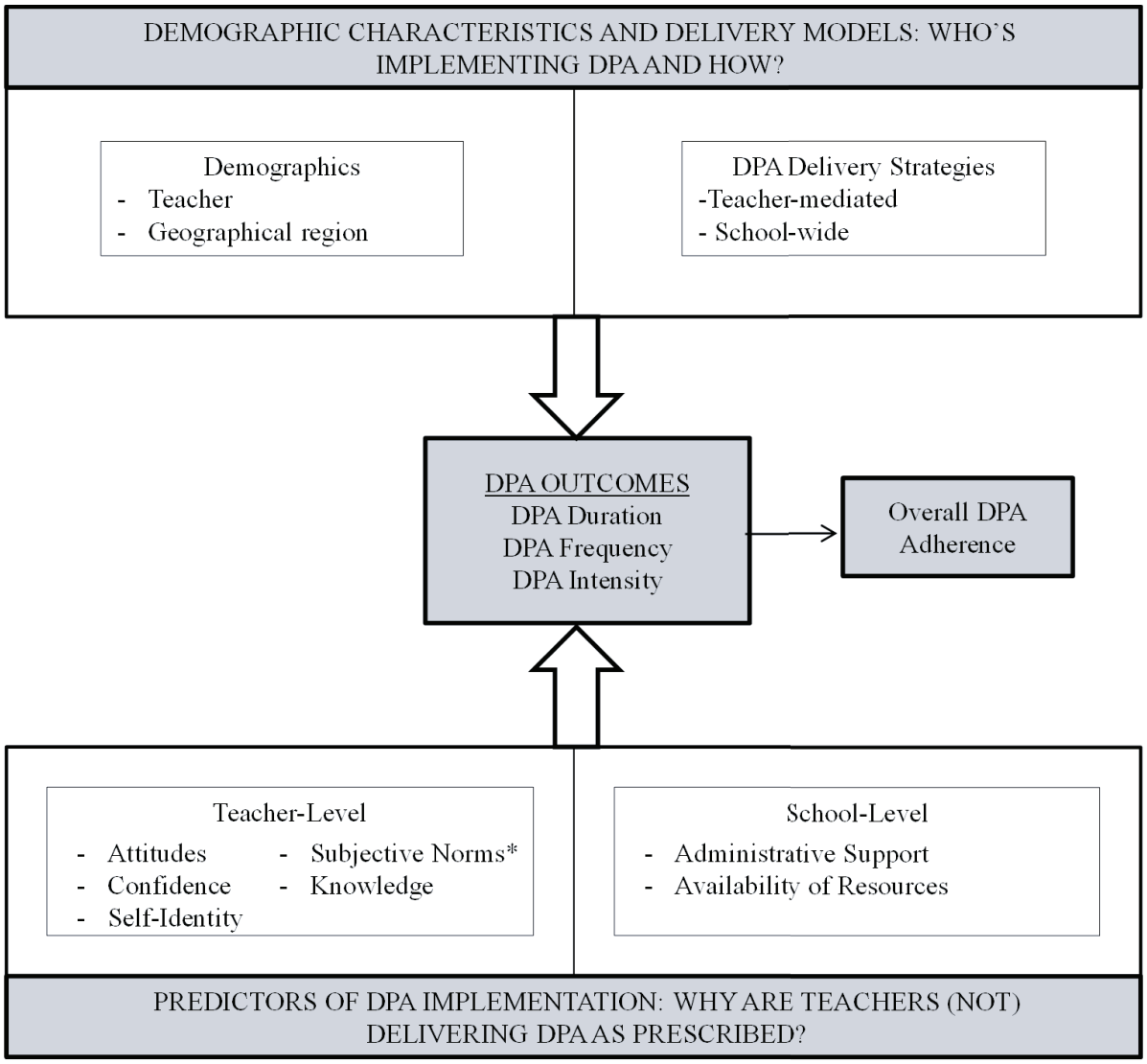

Figure 3.2: Conceptual Model Illustrating the Interactions between Teacher Characteristics, Predictor Variables, and DPA Outcome Variables. *Subjectives norms construct includes degree of personal importance and perceived influence of organizational culture (Rimer, 2008)

Method

Participants

Participants were self-identified teachers from elementary schools in Ontario. Administrators from Ontario elementary schools were also recruited; however, only one respondent completed the survey. In order to maintain anonymity, only data from teacher

respondents were analyzed and discussed herein. Demographic characteristics of the teachers in the study are summarized in Table 3.1. The sample for this study was predominantly female (83.3%) and most of the respondents teach in either the Northern (46.9%) or Central (32.8%) regions of Ontario (see map in Appendix A). The sample was roughly equally divided between those who do and do not have a specific specialization related to HPE, and most respondents taught Grades 1, 2 and/or 3.

Table 3.1

Demographic Variables Describing the Characteristics of the Participants

	n	Frequency	Percent
Gender	66		
Female		55	83.3
Male		11	16.7
Background in Physical Education and/or DPA	63		
University degree in PE, Kinesiology or related field		7	11.1
Additional Qualification course in HPE		4	6.3
Professional Development specific to DPA		17	27.0
No specific specialization related to HPE		35	55.6
PE Delivery	59		
Provided by a PE specialist		18	30.5
Provided by respondent who is PE specialist		2	3.39
Provided by respondent who is not a PE specialist		37	62.7
PE provided via school-wide activities		2	3.39
Ontario Region*	64		
North-East or North-West		30	46.9
Central		21	32.8
South West		4	6.3
East		9	14.1
Years Teaching Experience	63		
Less than 10 years		17	27.0
10 to 19 years		38	60.3
20 or more years		8	12.7
Grade Levels Currently Taught	63		
Grades 1, 2, and/or3		23	36.5
Grades 4, 5, and/or 6		12	19.0
Grades 7 and/or 8		12	19.0
Grades JK-6 or JK-8		13	20.6
Special Needs		3	4.8
Class Size (number of students in class)	63		
Less than 20		11	18.0
20 to 29		29	47.5
30 or more		21	34.4

Notes: *Respondents from Southern regions of Ontario (Central, South West, East) were significantly more likely than those from Northern regions of Ontario (North Eastern and North Western) to have access to a PE specialist (χ^2 (1) = 10.56, $p <$ .01)

Measure

An online survey was developed with closed- and open-ended questions. Closed-ended survey items were adapted or generated and organized into four sections to measure DPA outcomes and implementation strategies and to examine teachers' perceptions of school- and teacher-level predictor variables for delivery of DPA. The fifth section employed open-ended questions to explore facilitators and barriers for DPA delivery. Appendix A includes a copy of the teacher survey, which identifies the sources of those items that were adapted from previously existing research tools. Within each section, additional questions were generated in order to comprehensively address the study questions and to capture retrospective data on DPA patterns and practices within the classrooms.

Demographics. Section I of the survey included nine single-item questions used to assess demographic characteristics of the participants and settings. A multiple choice response format assessed gender, school funding source, teaching qualifications, background in HPE, and school region. For school region, geographical boundaries within Ontario were defined visually using a map generated by the government of Ontario (Appendix A), which was chosen based on its simplicity and clear regional distinctions. Open-ended questions assessed number of years of teaching experience, grade levels currently taught, and number of students in largest class.

DPA outcomes and strategies. Section II of the survey included 13 single-item questions, four of which target the main DPA outcomes by asking teachers to: (1) estimate the weekly frequency (0 to 5 days/week) of their students' participation in DPA sessions and HPE classes (combined to give DPA frequency); (2) categorize the incidence of DPA sessions that last for the full 20 minutes (5-point scale ranging from *never* to *always*; DPA

duration); and, (3) estimate the proportion (in minutes) of a typical DPA session that is spent in MVPA (DPA intensity). An overall adherence score was calculated, which involved recoding DPA intensity so that responses were on a scale of 1 to 5, and then adding each response (duration + frequency + intensity) for a combined score within the range of 3 to 15. For example, participants who indicated a DPA delivery frequency of zero days per week (score = 1), never conducted sessions for the full 20 minutes (score = 1), and spent zero minutes in MVPA (score = 1) received the minimal overall score of 3. Because scores on the categorical scales were highly skewed, the sample was divided into two groups to create a binary variable: implementers and non-implementers. Employing the same scoring strategy as PHO (2015), the implementer group included participants who indicated that DPA met policy requirements most of the time (i.e., scores of at least 4 for each of the three outcomes), and the non-implementer group included participants who indicated that DPA met the policy requirements some or none of the time (i.e., scores of less than 4 for at least one of the three outcomes).

The remaining nine questions addressed the strategies (e.g., guidelines, implementation models, policies) employed for the delivery of DPA, and were answered using one of two response scales: a) the 5-point scale ranging from 1 (*never*) to 5 (*always*); and b) a dichotomous scale of *yes* or *no*. Multiple choice and/or open-ended question formats were added to assess location (classroom, gymnasium, hallways, sports fields, outdoors, specify other), timing (first thing in the morning, just before lunch, just after lunch, last period of the day), frequency (number of days per week), and intensity (number of minutes spent in MVPA) of DPA sessions. Questions that were not specific to DPA (i.e., asked about school-based PA) were obtained from a previously validated survey (The School

Health Environment Survey, SHES) (Manske, 2008). All DPA-specific questions were either obtained from dissertation studies (Pascall, 2010; Patton, 2012b) or generated based on published facilitators and barriers surrounding DPA implementation (Mâsse, Naimen, & Naylor, 2013).

School-level predictor variables based on teacher perceptions. Section III of the survey included 11 items, comprising two scales: teachers' perceptions of administrative support (7 items for scheduling accommodations, monitoring of implementation, and provision of training; e.g., *My school's administration supports faculty participation in professional development opportunities that inform my delivery of DPA*), and the availability of resources (4 items for educational, space, equipment, and specialized staff; e.g., *I have sufficient space to conduct DPA*) for delivery of DPA. Survey items were answered using a 5-point scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). The majority of the questions in this Section were obtained from dissertation studies (Pascall, 2010; Patton, 2012b), one was obtained from the SHES (regarding the promotion of PA during, or as part of, special events), and one was generated based on published barriers (adequate guidance from school community) surrounding DPA implementation (Mâsse et al., 2013). Slight adaptations were made to the questions obtained from Patton (2012b) to accommodate the 5-point Likert scale, and one question from each of Patton (2012b) and Pascall (2010) was modified to be more specific (e.g., specified *professional development* as a form of support, and *PE specialist* as an educational resource).

Teacher-level predictor variables based on teacher perspectives. Section IV of the survey included 30 items distributed amongst five subscales: knowledge (6 items), attitudes (6 items), confidence (5 items), subjective norms (7 items) and self-identity (4

items). All survey items were answered using a 5-point scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*).

For the knowledge subscale, questions were generated to address the extent to which teachers think they know the DPA policy (3 items; e.g., *I am familiar with the frequency of physical activity that is prescribed by the DPA mandate*) and the HPE curriculum (1 item: *I have read Ontario's Health and Physical Education curriculum for Grades 1-8*), as well as their familiarity with and use of available resources, such as the DPA handbook and timetables supplied by the OMOE (1 item: *I have used the teacher resources that were developed by Ontario's Ministry of Education to support the implementation of DPA*) and the teacher resources created by OPHEA designed to aid in the delivery of daily PA (1 item: *I have used the teacher resources that were developed by the Ontario Physical and Health Education Association*).

TPB research (Ajzen, 2002; Faulkner et al., 2004; Francis et al., 2004; Martin, Kulinna, Eklund, & Reed, 2001; Morgan and Hansen, 2008a; Mummery et al., 2000) was consulted for questions in each of the remaining subscales. The attitudes subscale targeted teachers' beliefs about the importance of regular PA and DPA policy (3 items modified from Pascall, 2010, to accommodate the 5-point Likert scale; e.g., *DPA is a beneficial initiative within the school system*), teacher enjoyment of DPA sessions (1 item adapted from a TPB-informed survey developed by Morgan & Hansen, 2008, by changing PE to DPA: *I enjoy conducting DPA sessions*), whether or not teachers feel that the implementation of DPA is positive for their students (1 item generated using a Ajzen's TPB guidance document, 2002: *When I implement DPA, I feel that I am doing something positive for the students*), and

regarding their use of PA as a reward in the classroom (1 item obtained from the SHES: *I use physical activity as a reward in my classroom*).

The confidence subscale included items that target self-efficacy (3 items; e.g., *I am confident in my ability to teach physical activity-related lessons*) and PBC (2 items; e.g., *Whether I deliver DPA is not entirely up to me*) surrounding the scheduling and delivery of DPA and PA-related lessons. One of the self-efficacy items was adapted from Mummery et al. (2000) by replacing *regular participation in PA* to *teaching PA-related lessons*. The remaining items for confidence were created using identified barriers to DPA implementation (e.g., scheduling constraints, lack of guidance) (Mâsse et al., 2013) and Ajzen's TPB guidance document (2002).

The self-identity subscale contained three items addressing experiences of personal exercise behaviour (e.g., *I think of myself as a health conscience person*) and one item targeting experiences with teaching HPE (e.g., *I think of myself as a sort of person who teaches physical education*). These items were obtained ($n = 2$) or generated ($n = 2$) from a TPB-informed study that predicted primary-school teachers' intentions to teach PE and included a measure for self-identity (Faulkner et al., 2004).

Answers to the questions in the subjective norms subscale addressed the culture of the school surrounding the importance of regular PA and DPA implementation (4 items; e.g., *My teaching colleagues at my school believe that delivery of DPA is important*), and whether or not compliance with DPA and/or the beliefs of the school is of personal importance for teachers (3 items; e.g., *I am motivated to comply with the beliefs of my school's administration*). The questions targeting the culture of the schools and the one regarding motivation to comply with the beliefs of administration were adapted from a TPB-informed

study by replacing PA with DPA (Martin et al., 2001). The remaining questions asking about the personal importance of compliance with DPA and the influence of peer groups were generated to gain insight into the schools' social climate.

Facilitators and barriers for DPA delivery. Section V of the survey included five open-ended items asking participants to comment on what they like and dislike about the DPA policy, what they would like to see changed about the policy, and what existing facilitators and barriers exist surrounding its implementation.

Procedure

Following approval from the Research Ethics Board at Nipissing University (Appendix B), a snowball recruitment process was used to sample Ontario elementary public school teachers. The purpose of the recruitment process was to obtain a final sample size of 150 teachers, based on *a priori* power analysis. Elementary school teachers who were known personally to either the principal investigator or to personal associates of the principal investigator were contacted using personal e-mail addresses with basic study information (Appendix C). Teachers who chose to participate in the study accessed the link to the anonymous online survey powered by SurveyMonkey®, which contained the Participant Information Letter and the survey questions (Appendix A). The Participant Contact Letter sent to teachers contained a sentence encouraging them to forward the letter to other teachers who may be interested in participating in the study, who in turn, also had the option of sharing the online study information. To help improve the distribution of the study information, the chairs of teaching associations (e.g., the Elementary Teachers Federation of Ontario and the Ontario English Catholic Teachers Association) and listservs that are likely to reach teachers (e.g., People for Education) were also contacted via e-mail (Appendix D)

through publicly available contact information posted on their websites. The e-mail asked the associations to endorse the study by forwarding the study information to its members. All data were collected between February 2015 and January 2016.

Data Analysis

All quantitative data were entered into SPSS for Windows (version 20). Central tendencies were calculated using the *Mean* for normally distributed data, and the *Median* for ordinal data and data that deviated from normal distribution. Cross-tabulations (χ^2) and group comparisons (independent-samples *t*-test, Mann-Whitney *U* Test, one-way analysis of variance, or Kruskal-Wallis *H* Test) were used to examine relationships between the categorical variables and the DPA outcomes. Prior to conducting regression analyses, continuous variables were tested for normality, and correlations between individual measures of DPA delivery and continuous predictor variables were conducted to determine which variables to include in the models. For the binary DPA adherence score, multinomial logistic regression and discriminant function analysis (DFA) were performed to identify the categorical and continuous predictor variables, respectively, that best discriminate the two DPA delivery groups. For each statistical test, all assumptions were tested and passed. Specifically, for the ordinal regression test, the assumptions of proportional odds (test of parallel lines was non-significant, $p > .05$) and no multicollinearity among independent variables (based on collinearity diagnostics) were met. For the linear regression models, assumptions of normal distribution of the residuals ($p > .05$ for Kolmogorov-Smirnov test for studentized residual), absence of significant outliers (Mahalanobis values for independent variables compared to their cumulative distribution function have p values > .001), no multicollinearity, homoscedasticity ($p > .05$ for Breusch-Pagan test for heteroscedasticity),

and presence of linear relationships between dependent and independent variables (loess fit lines fell within the 99% confidence interval around the linear fit line between the dependent variable and each of the independent variables) were met. For the DFA, assumptions of independence of observations (regressing each variable onto the case identification number was not significant), homogeneity of variance (Levene's test is non-significant for all of the variables), absence of significant outliers, and no multicollinearity were met. Three of the variables failed the test for multivariate normality; however, violations of the normality assumption are not of particular concern as long as non-normality is not caused by outliers (Tabachnick & Fidell, 2007). Cases with missing data were deleted as indicated by *n* values < 54, which is appropriate when data appear to be missing in a random pattern (Tabachnick & Fidell, 2007). The alpha level was set at 0.05 for all analyses.

Teachers' responses to open-ended survey items were compiled and content analyzed by categorizing the statements. For each of the five questions, meaning units (MUs) were identified and grouped into themes. Based on the themes, analytical categories were generated, and each MU was re-coded with the appropriate response categories for descriptive analysis (Boyatzis, 1998; Braun & Clarke, 2006). MUs that fit into more than one category and/or pertained to a category associated with a different question were coded and analyzed as such. A reliability check of the coding system was completed whereby a second researcher independently read a random selection of 20% of the responses and independently coded them using the same categories. Adequate inter-rater reliability (71% to 100%) was calculated for each question, and members of the research team (principal investigator and research supervisor) met to achieve consensus prior to final coding.

Results

Data Screening

The data for DPA frequency, DPA intensity, knowledge, attitudes, and self-identity all significantly deviated from a normal distribution ($p < 0.05$ for Shapiro-Wilk Test), whereas data for resources, support, confidence, and knowledge were all normally distributed ($p \geq 0.05$ for Shapiro-Wilk Test). The data for DPA duration are ordinal and were therefore not tested for normality. For each continuous predictor variable scale (support, resources, knowledge, attitudes, confidence, self-identity, and subjective norms), item content was assessed for relevance and utility. This resulted in one item (number 60) being removed from the attitudes scale, responses to which were more reflective of context-mediated behaviour rather than of individual attitudes.

A total of 78 teachers consented to participate, 54 of whom completed the survey (see Figure 3.3).

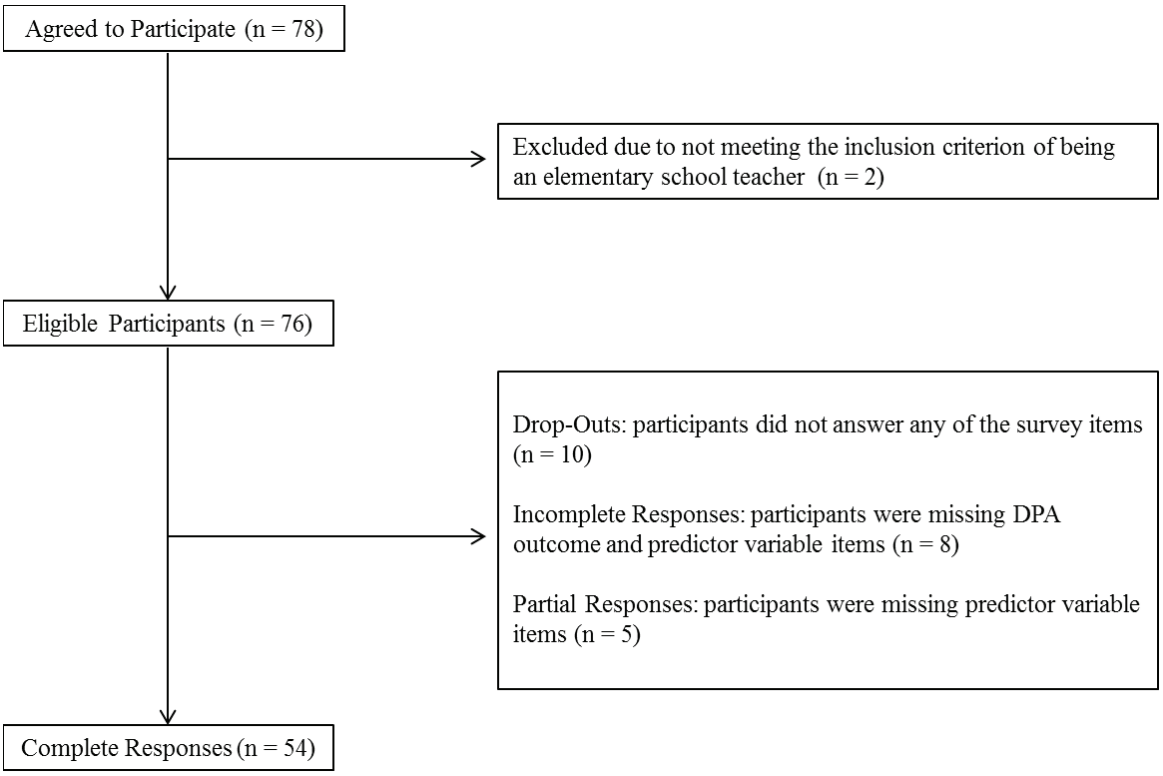

Figure 3.3: Participant Response Frequencies Organized by Categories

Comparing the demographic data between incomplete and complete/partial responses revealed no statistically significant differences, with the exception of teachers with class sizes of 30 plus students who were less likely to complete the survey compared with those with smaller class sizes (less than 29 students) ($\chi^2 = 8.15$, $p < .05$). Comparing the DPA outcome data between partial and complete responses revealed no statistically significant differences. Therefore, partial responses were retained in the analyses of DPA delivery models.

DPA Outcomes, Overall Adherence, and Delivery Strategies

The three main DPA outcomes (frequency, duration, and intensity) and computed overall adherence scores are presented in Table 3.2. To enable exploration of the factors that

might be predictive of teachers' delivery of DPA, adherence scores were used to categorize participants according to their implementation status (see Table 3.2).

Table 3.2

DPA Implementation Based on Frequency, Duration, Intensity, and Overall Adherence

DPA Implementation	*n*	Frequency	Percent	*Mdn*
Frequency: Number of days per week that class participates in DPA (including HPE class*)	59			
1		1	1.7	5
2		5	8.5	
3		7	11.9	
4		9	15.2	
≥ 5		37	62.7	
Duration: Incidence of DPA sessions that last for full 20 minutes	57			
Never[b]		11	19.3	
Rarely[b,c]		14	24.6	
Sometimes		12	21.1	
Often[c]		12	21.1	
Always[a]		8	14.0	
Intensity: Proportion (minutes) of DPA session spent in MVPA	54			
0 minutes		5	9.1	15
≤ 5 minutes		2	3.6	
6 to 10 minutes		15	27.3	
11 to 19 minutes		13	23.6	
≥ 20 minutes		19	34.5	
DPA Adherence Categories	59**			
Non-Implementers		34	57.6	
Implementers		25	42.4	

Notes: DPA duration categories with different superscript letters have significant differences in DPA frequency (*a* versus *b:* $\chi^2(4) = 19.76$, $p = 0.001$) and DPA intensity (*c* versus *b:* $\chi^2(4) = 11.086$, $p < 0.05$). *Many teachers indicated having DPA and HPE on the same day, which gave a combined frequency of > 5 days/week. **When calculating DPA adherence, missing data from individual DPA implementation variables were replaced with the respondent's own mean for the implementation items completed (Tabachnick & Fidell, 2007).

The calculated overall DPA adherence scores indicated that the majority of teachers included in this sample (57.6%) are not delivering DPA sessions that satisfy all three measured components (i.e., 20 minutes of MVPA every day). Among the teachers categorized as meeting policy requirements, the majority reported 85% implementation (i.e., partial implementers). Five participants were 100% compliant (i.e., full implementers). Among the teachers categorized as not meeting the policy requirements, the majority reported 69% adherence, which was the median score for the entire sample.

Individual policy components were descriptively analysed based on frequencies and percentages. The majority of teachers reported good frequency, with DPA and/or HPE classes occurring five or more days per week, indicating that many teachers (n = 26) have both DPA and HPE on the same day, as mandated by the policy when HPE does not involve sufficient PA (OMOE, 2005). Further, many teachers (34.5%) reported that the intensity of PA during DPA sessions is moderate-to-vigorous for at least 20 minutes (range from 0 to 35 minutes). However, only 14% of teachers reported *always* delivering DPA sessions for the full 20 minutes. No relationships were found between DPA intensity and frequency; however, results of a Kruskal-Wallis H test with pos-hoc analyses indicated that DPA sessions that were *always* conducted for the full duration were significantly more likely to: (1) occur daily ($\chi^2(4) = 19.76$, $p = 0.001$) compared to those that *never*, *rarely*, or *sometimes* fulfilled duration requirements; and, (2) provide opportunities for MVPA ($\chi^2(4) = 11.086$, $p < 0.05$) compared to those that *never* fulfilled duration requirements.

Delivery models for DPA. School-based strategies for PA delivery and classroom DPA delivery models were assessed via teachers' perspectives of their school's position on, and their own practices surrounding PA during instructional time. Responses (see Table 3.3) indicated that the majority of teachers (54.2%) taught at schools that had their position on PA in curricular education outlined, either through practices (23.7%) or written policies (30.5%). Of the teachers who reported delivering DPA, the majority did so either just before (24.4%) or just after (31.1%) lunch, and did not include DPA on their posted classroom schedule (41.1%). DPA was most commonly delivered in the classroom and outdoors, and the types of activities most frequently used were games and dance, with teachers (28.1%) including a

variety of activities across DPA sessions only *sometimes*. Based on these data, the teachers included in this sample employed a range of DPA delivery models and scheduling practices.

Table 3.3

Descriptive Results for DPA Delivery Strategies

	n	Frequency	Percent
School's Position on PA in curricular education (HPE and DPA)	59		
Outlined through practices[e]		14	23.7
Outlined through existing written policies		16	27.1
Outlined through written policies still under development		2	3.4
No position[f]		9	15.3
Position unknown		18	30.5
Time of day when DPA occurs in the classroom	56		
First thing in the morning		7	12.5
Just before lunch		11	19.6
Just after lunch		14	25.1
Last period of the day		7	12.5
More than once		6	10.7
It doesn't		11	19.6
Inclusion of DPA on daily schedule posted in the classroom	56		
Yes[a]		18	32.1
No[b]		23	41.1
N/A (no schedule)		15	26.8
How often a variety of activities are used across DPA sessions	57		
Never[d]		11	19.3
Rarely		11	19.3
Sometimes		16	28.1
Often		13	22.8
Always[c]		6	10.5
How often a warm-up and cool down are included in DPA sessions	57		
Never[b]		20	35.1
Rarely		8	14.0
Sometimes		17	29.8
Often[a]		11	19.3
Always		1	1.8
Type of activities*	50		
Games		33	66
Walks		24	48
Running		25	50
Dance		30	60
Sports		18	36
Yoga		19	38
Location of activities*	51		
Classroom		39	76.5
Gymnasium		14	27.5
Hallways		7	13.7
Sports Fields		10	19.6
Outdoors		37	72.5

Notes: Categories with superscript *a* have significantly higher DPA duration than categories with superscript *b* ($\chi^2(2) = 6.68$, $p < .05$ for scheduling variable, and $\chi^2(4) = 13.47$, $p < 0.01$ for inclusion of warm-up/cool down variable). Categories with superscript *c* have significantly higher DPA duration ($\chi^2(4) = 20.47$, $p < 0.001$) and DPA frequency ($\chi^2(4) = 10.11$, $p < .05$) than categories with superscript *d*. Categories with superscript *e* have significantly higher DPA frequency than categories with superscript *f* ($\chi^2(4) = 14.34$, $p < .01$). For variables marked with an (*), participants had the option of choosing more than one response.

DPA outcomes: Categorical predictors. DPA duration was not influenced by any of the demographic variables; however, DPA frequency scores were significantly higher for teachers of Grades 1, 2, and/or 3 compared to those of higher grade ranges ($\chi^2(2) = 7.086$, $p < .05$), and DPA intensity scores were significantly higher for male compared to female teachers ($U = 118.5$, $p < .05$) and for teachers in South Western Ontario compared to those in Central or Northern regions ($\chi^2(3) = 8.81$, $p < .05$). Regarding delivery strategies (see Table 3 footnote), DPA duration was significantly longer for teachers who reported: (i) including DPA on the posted schedule; (ii) using a wide variety of activities across DPA sessions; and, (iii) including a warm-up/cool-down in individual DPA sessions. DPA frequency was also significantly increased for teachers who used a wide variety of activities, as well as for those who reported teaching at a school with a school-wide position on PA curricular education. DPA intensity was not significantly influenced by any of the delivery strategies.

Overall DPA adherence: Categorical predictors. A direct multinomial regression analysis was performed with overall DPA adherence as the outcome and the seven statistically significant variables identified based on Mann-Whitney *U* or Kruskal-Wallis *H* analyses: gender, geographical location, grade level, presence of school-wide policies, inclusion of DPA on daily schedule, delivery of a variety of activities across sessions, and use of warm-up/cool-down within sessions. A test of the full model with all seven predictors against a constant-only model was statistically significant ($\chi^2(8, n = 53) = 20.60$, $p < .01$), with a classification accuracy rate of 83.0%, which was greater than the proportional by chance accuracy criteria of 63.8%. According to the Wald criterion, only delivery of a variety of activities across sessions significantly predicted adherence to the DPA policy

($\chi^2(1) = 5.47$, $SE = .45$, $p < .05$), with survey respondents implementing a variety of activities being more likely to be in the group of teachers who adhered to the DPA policy.

Teacher- and School-Level Predictors of DPA Implementation

Mean composite scores and internal consistencies were calculated for the teacher- (knowledge, attitudes, confidence, self-identity, subjective norms) and school- (support, resources) level predictor variables (see Table 3.4).

Table 3.4

Descriptive Results for School- and Teacher-Level Predictor Variables

	Number of Items	Cronbach's α	*M* (*SD*) / *Mdn* (range)	*n*
Support	7	0.83	2.88 (.78)	55
Resources	4	0.72	2.97 (.93)	55
Knowledge	6	0.90	3.59 (1.00- 5.00)[a]	54
Attitudes	5	0.89	4.20 (1.40-5.00)[a]	54
Confidence	5	0.77	3.53 (.83)	54
Self-Identity	4	0.79	4.00 (1.75-5.00)[a]	54
Subjective Norms	7	0.68	3.33 (.49)	54

Notes: Rating scales for individual responses ranged from 1.00 to 5.00 for all constructs. Data marked with a superscript *a* significantly deviate from normal distribution and have central tendencies reported with *Mdn* rather than *M*.

DPA outcomes: Continuous predictors. Bivariate correlations among the continuous predictor variables and individual DPA outcomes are presented in Table 3.5.

Table 3.5

Bivariate Results for School- and Teacher-Level Variables Related to DPA Outcomes (Duration, Frequency, Intensity): Spearman's rho (and Pearson Product Moment) Correlation Coefficient Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Knowledge	1.00	.120	.308*	.406**	.529**	.561**	.399**	.379**	.116	.039
2. Support		1.00	.602**	.096	(.367**)	.243	(.565**)	.436**	.378**	.191
3. Resources			1.00	.298*	.541**	.320*	.403**	.509**	.189	.334*
4. Attitudes				1.00	.618**	.434**	.485**	.497**	.148	.164
5. Confidence					1.00	.598**	(.544**)	.678**	.326*	.224
6. Self-ID						1.00	.492**	.348*	.013	-.022
7. Norms							1.00	.436**	.325*	.092
8. Duration								1.00	.563**	.405**
9. Frequency									1.00	-.021
10. Intensity										1.00

Notes: ID = self-identity. *$p < .05$ (two-tailed). **$p < .01$ (two-tailed).

Only variables that were significantly correlated were retained for further analyses. Based on results of the bivariate correlations, multivariate regression analyses were completed to examine which variables best predicted DPA duration and DPA frequency, both of which were significantly correlated with multiple independent variables. For DPA intensity, which had only one significant correlation, a simple linear regression analysis with heteroscedasticity-consistent standard error estimators was performed to determine the predictive value of the availability of resources on the intensity of delivered DPA sessions. For each outcome, Table 3.6 identifies the type of regression used and the resulting individual influences of each predictor variable. As depicted by the significant F and χ^2 values, each model was a good fit for predicting the outcome.

Table 3.6

Summary of Regression Analyses Predicting DPA Components

Outcome Predictors	DPA Intensity				DPA Frequency				DPA Duration		
	B	*SE (HC)*	*β*	*t*	B	SE	*β*	*T*	Log-odds regression coefficient	Wald χ^2	*SE*
Confidence	-	-	-	-	.38	.43	.13	.874	1.78	8.55**	.61
Support	-	-	-	-	.84	.46	.28	1.81	1.50	7.31**	.56
Subjective Norms	-	-	-	-	.58	.83	.12	.700	-1.25	1.80	.93
Resources	2.81	1.01	.33	2.79*	-	-	-	-	.15	.14	.40
Attitudes	-	-	-	-	-	-	-	-	.81	1.92	.58
Knowledge	-	-	-	-	-	-	-	-	.72	3.04	.42
Self ID	-	-	-	-	-	-	-	-	-1.00	2.85	.59
R^2		.093				.19				.56	
F-value		7.79**				3.99*				-	
χ^2-value		-				-				44.14**	

Notes: Dash (-) indicates that data were not obtained. Type of regression analysis = simple linear for DPA Intensity (n = 51), standard multiple linear for DPA Frequency (n = 54), and ordinal for DPA Duration (n = 53). β = standardized beta. B = unstandardized beta. SE = Standard Error. HC = heteroscedasticity-consistent. *p < .05. **p < .01.

The results suggest that there is a positive predictive relationship between the availability of resources and the intensity of DPA sessions. For DPA duration, ordinal regression identified support and confidence as the largest contributors, with none of the other variables significantly impacting the odds of DPA duration. For DPA frequency, a

standard multiple linear regression analysis indicated that none of the variables accounted for a statistically significant amount of the variance.

Overall DPA adherence: Continuous predictors. A direct discriminant function analysis (DFA) was used to conduct a multivariate analysis of variance test of the hypothesis that teachers who do and do not adhere to the DPA policy would differ significantly on a linear combination of seven variables: knowledge, support, resources, attitudes, confidence, self-identity, and subjective norms (see Table 3.7).

Table 3.7

Univariate and Multivariate Results for Overall DPA Adherence

	ANOVA		η^2	Direct DFA Structure Coefficients
	DPA Implementers *M* (SD)	DPA Non-Implementers *M* (SD)		
Support	3.37 (.59)[a]	2.54 (.72)[b]	.28	.71
Confidence	3.95 (.61)[a]	3.23 (.83)[b]	.19	.56
Resources	3.40 (.95)[a]	2.76 (.65)[b]	.17	.50
Subjective Norms	3.52 (.45)[a]	3.21 (.48)[b]	.10	.39
Attitudes	4.38 (.43)[a]	3.93 (.80)[b]	.10	.38
Self-Identity	4.06 (.61)	3.91 (.67)	.015	.14
Knowledge	3.67 (.75)	3.54 (.95)	.0056	.087

Notes: $n = 54$. Means in the same row with different superscripts are significantly different at $p < .05$. DFA = discriminant function analysis.

Results from the DFA revealed that the variables significantly differentiated between DPA adherence groups (Wilk's $\Lambda = .57$, χ^2 (7) = 27.27, $p < .001$). The canonical correlation was .66, indicating that the seven variables accounted for 45% of the variance. As shown in Table 3.7, the measures with the strongest correlations with the discriminant function (i.e., structure coefficients of ≥ .30) (Brown & Wicker, 2000) included, in descending order: support, confidence, resources, subjective norms, and attitudes. Overall, a total of 75.9% of the teachers were correctly classified, compared with 51.2% who would be correctly classified by chance alone. In sum, these findings suggest that self-reported DPA groups can be significantly distinguished on the basis of their confidence, support, subjective norms,

resources, self-identity, and attitudes scores, with adherers having significantly higher scores for each.

Facilitators and Barriers to DPA Implementation: Descriptive Analysis

Content analysis was completed on written responses to the open-ended questions regarding facilitators and barriers to DPA implementation. When asked what they like about the DPA policy (see Figure 3.4), the majority of the respondents indicated an appreciation for the 'Policy's Message/Concept' (41% of MUs), which was specified as the promotion of student PA (n = 10) and overall health (n = 6). For example, respondents expressed beliefs that the DPA policy "focus[es] on physical and mental health" (Kindergarten-Grade 6 teacher) and that it "shows that there is value place[d] on ensuring students get some exercise within their daily routine" (Grade not specified). A total of 13 MUs (33.3%) referenced the policy's beneficial outcomes, which included: the provision of PA opportunities (n = 7) and and provision of "mental breaks [that] helps them to refocus" (Grade 4-5 teacher) (n = 2); student enjoyment (n = 3); and, prompting teachers to incorporate PA into lessons (n = 1). Five MUs indicated a like for the policy's design, specifying that the requirements are clear (n = 1) and "based on valuable research" (Grade 4-5 teacher) (n = 1), that it addresses the need for safety (n = 1), and that its delivery is flexible (n = 2). The remaining five MUs were reflective of either indifference (n = 3) or unfamiliarity (n = 2).

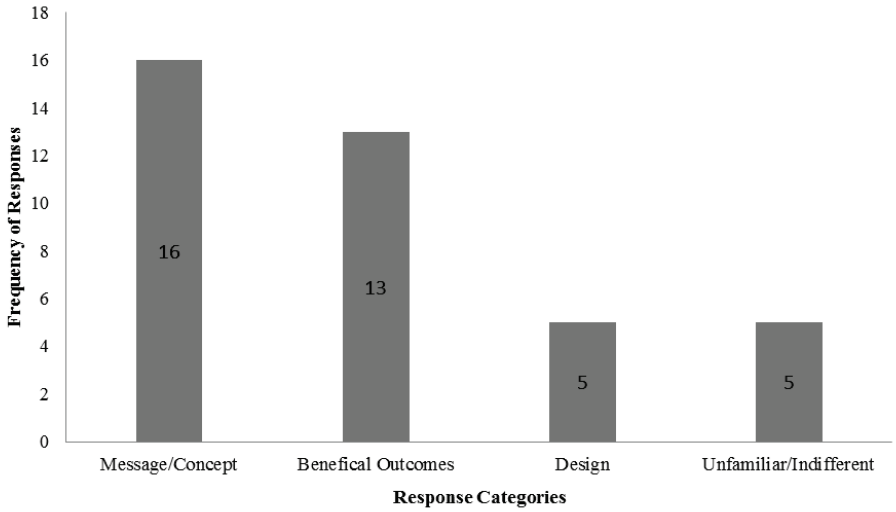

Figure 3.4: Theme Categorizations for Teachers' Responses to Question 110: "What do you like about the DPA policy?". Responses from 29 respondents generated 39 meaning units, which were categorized into four response categories.

The remaining four open-ended questions asked about the actual implementation of the DPA policy, responses to which pertained mainly to barriers (question 114) and associated dislikes (question 111) (see Figure 3.5). Proposed facilitators to DPA implementation (question 112) either directly addressed the barriers and dislikes, or aligned with the limited number of existing facilitators (question 113) (see Figure 3.6). For example, 68.7%, 78.9%, and 72.4% of the MUs for dislikes, barriers and proposed facilitators, respectively, were distributed into three related response categories: (lack of) scheduling accommodations, (lack of) support from key stakeholders, and (limited) resource availability. For example, one teacher (Grade 7) proposed that there be "more concrete examples of how to implement DPA into other [curricula]", while another (Grade 7) indicated difficulty in "finding activities that are suited to [the students]". Although the majority (36.4%) of the MUs for existing facilitators were indicative of their absence, many provided evidence of existing support measures and available resources.

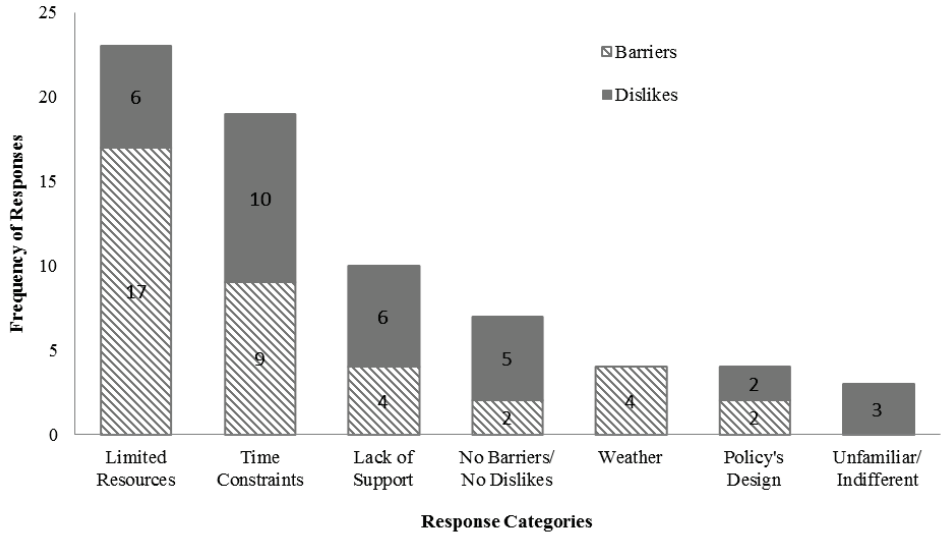

Figure 3.5: Theme Categorizations for Teachers' Responses to Question 111: "What do you dislike about the DPA policy?" and Question 114: "Are there any specific institutional and/or individual barriers that hinder your delivery of DPA". Responses from 26 and 27 respondents generated 32 and 38 meaning units for dislikes and barriers, respectively.

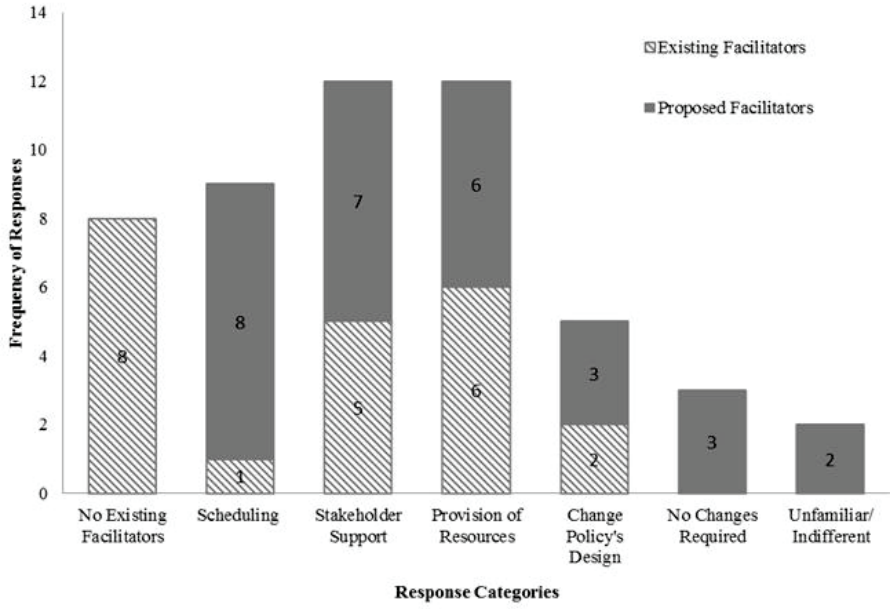

Figure 3.6: Theme Categorizations for Teachers' Responses to Question 112: "If you could change the DPA policy, what would you do to make it more effective?" and Question 113: "Are there any specific institutional and/or individual facilitators that support your delivery of DPA". Responses from 22 respondents generated 29 and 22 meaning units for proposed and exiting facilitators, respectively.

Regarding scheduling, time constraints was a consistently reported dislike and barrier. Competing curriculum demands, “especially when teaching an EQAO [Education Quality and Accountability Office] grade” (Grade 6 teacher) means that “DPA is one of the first things to go by the wayside” (Grade 4-5 teacher). To that end, existing and/or proposed scheduling accommodations included having a dedicated time on the teaching schedule for DPA (*n* = 1 and 4 MUs for existing and proposed, respectively) and increasing the amount of time available for HPE (*n* = 2 MUs for proposed).

The beliefs that the policy lacks funding and “is mandated without any proper training” (Grade 3 teacher), is “boring for students” (Grade 2-3 teacher), and that it “doesn't hold parents accountable” (Grade 8 teacher) indicated a lack of support from key stakeholder groups (i.e., administration, students, and parents, respectively). Stakeholder groups from whom increased support was requested included parents (*n* = 2; e.g., “there needs to be … partnerships between home and school [rather than] simply relying only on school[s]”, Grade 8 teacher) and administration, the latter via increased accountability (*n* = 2), implementation of school-wide delivery systems for DPA (*n* = 2), and establishment of partnerships with local facilities (*n* = 1). Finally, the stakeholder group from whom existing support was reported included colleagues and other staff members (*n* = 4; e.g., “there are a couple of teachers here [who] share ideas [for] games, etc”, Grade not specified).

Lack of resources included both space limitations (e.g., “lack of classroom space and no gym availability”, Grade 8 teacher) and unavailable or non-functioning equipment (e.g., “…the policy doesn't come with supplies like skipping ropes or balls”, Grade 1 teacher). Weather was also cited as a barrier (10.5% of MUs), usually in relation to space limitations in the cold winter months (e.g., “on a day that is -35[°C], there is no space in the school to

conduct DPA", Grade 8 teacher). When specified, examples of proposed resources included provision of "concrete examples [for incorporating DPA] into other curriculum areas" (Grade not specified), increased funds for use of local facilities, and access to a dedicated DPA teacher. To that end, examples of resources that were cited as existing facilitators included: having a dedicated staff member for DPA delivery; websites such as gonoodle.com, which has interactive games and videos; and, "fitness apps on classroom iPad" (Grade 1-2 teacher), which were cited as the easiest resources to access, "as long as the Wi-Fi is working" (Grade 1-2 teacher). OPHEA (Ontario Physical and Health Education Association) was also mentioned as a provider of resources and teaching tools for DPA implementation.

Collectively, these qualitative findings substantiate the quantitative data reported for teachers' perceptions of support and resources surrounding the DPA policy. The remaining MUs either indicated endorsement of the policy (15.6%, 10.3%, and 5.3% indicated no dislikes, no changes, and no barriers, respectively), or suggested changes to its design, including the use of non-instructional time (n = 2 MUs for each of proposed and existing facilitators) and an increased focus on safety (n = 1 and 2 MUs for proposed facilitator and barrier, respectively). Additional aspects of the policy that were disliked included its perceived redundancy to the HPE curriculum, and that it is "not really verified" (Grade 2 teacher).

Discussion

Assessing adherence to a policy is necessary for determining factors that may influence the degree to which it is implemented, and whether variability in its delivery affects outcomes (Kazdin, 1986; Yeaton & Sechrest, 1981). Whereas past research has measured DPA delivery based on its overall implementation (Gilmore & Donahue, 2014; Patton,

2012a), this study adds to the findings that consider the policy's individual components (PHO, 2015; Stone et al., 2012); specifically, DPA duration, frequency, and intensity. An additional strength of the current study was the consideration of teacher- and school-mediated delivery strategies and their influence on DPA delivery outcomes, which provides contextual information not previously reported on in relation to implementation fidelity.

The majority of the participants in Study 1 were classified as not adhering to the DPA policy guidelines, with a median implementation score of 69%, which corroborates the extant literature for DPA implementation nationally (Olstad, Campbell, Raine, & Nykiforuk, 2015) and provincially (Gilmore & Donahue, 2016; PHO, 2015; Patton, 2012a; Stone et al., 2012). Considering only those teachers who reported full implementation (i.e., 100% compliant with the policy's directives), this percentage decreases to 8.5%, which is slightly higher than the corresponding proportion of teachers (3.3%) meeting full implementation requirements in the PHO study (2015). Examining the individual policy components indicated that many teachers met the frequency and intensity requirements, but less than half met the duration requirements.

The gender demographic for the study's sample is representative of a national sample of elementary school teachers, which is 84% female (Statistics Canada, 2011); however, the regional distribution of respondents is disproportionately high for Northern Ontario, which has only 11% of Ontario's publicly funded schools, compared to 51% for Central Ontario (People for Education, 2015). This regional imbalance was expected due to the snowball sampling technique, which originated in Northern Ontario, and addresses a gap in the literature by characterizing support needs for DPA delivery in in this region. For example, PE specialists, who, depending on the school, may or may not have a specialized background

in HPE and/or DPA (People for Education, 2011), are considered important resources and have been shown to provide the necessary leadership to build a health-promoting environment throughout the entire school community (Allison et al., 2014; People for Education, 2015); however, data from this study revealed that schools in Northern (Eastern and Western) regions of Ontario have significantly less access to PE specialists than those in Southern (Central, South Western, and Eastern) regions.

Demographic Characteristics and Delivery Models: Who's Implementing DPA and How?

The literature suggests that smaller class sizes are associated with increased student PA (McKenzie, Marshall, Sallis, & Conway, 2000). This finding was not replicated herein; however, grade level, gender, and geographical location each influenced delivery of DPA. Teachers of lower grades (e.g., Grades 1-3) were significantly more likely than teachers of higher grades (e.g., Grades 4-8) to deliver DPA daily, which may have been confounded by their associated smaller class sizes, whereas male teachers and teachers in the South-Western region of Ontario were significantly more likely than others to engage students in MVPA during DPA sessions. Although the small sample size prevents further exploration of these differences, the grade level discrepancy could be due to increasing academic pressures that begin in Grade 3 when Ontario's EQAO delivers the first of four provincial tests to "assess students' literacy (reading and writing) and math skills" (Education Quality and Accountability Office, 2015, The Assessments section, para. 1). The literature supports this postulate, citing the prioritization of academic subjects with government-mandated tests as a barrier to implementation of school-based PA initiatives in Canada (Dwyer et al., 2003;

Langille & Rodgers, 2010), Australia (Morgan & Hansen, 2008a) and the United States (Belanskey et al., 2009; Lounsbery et al., 2007).

The DPA delivery strategy most consistently associated with DPA implementation was planning for a variety of activities across DPA sessions. Posting DPA on a daily schedule, including warm-up and cool-down components, and the presence of a school-wide position on PA curricular education were also significantly associated with increased DPA delivery. The latter finding is consistent with data from an investigation conducted in Toronto that reported increased student PA in schools that had written policies for PA (Faulkner, Zeglen, Leatherdale, Manske, & Stone, 2014), and is reflective of school-level influences on teacher and student behaviour. Regarding scheduling, the evaluation conducted by PHO (2015) also reported a positive significant relationship between posting DPA in teachers' timetables and its delivery; however, compared with the sample studied herein, of which only 32.1% reported having DPA on a schedule, a much larger proportion of the province-wide sample (67.0%) reported having DPA on their schedules. Although none of the delivery strategies influenced DPA intensity directly, there is a positive correlation between DPA duration and intensity, suggesting that increasing the duration of a DPA session may also influence its intensity.

In this study, written responses identified distal SE levels of influence, including school-wide delivery systems for DPA and coordination of community resources (liaisons with a local health unit) as proposed and existing facilitators for DPA delivery, respectively. Utilizing a whole-school approach for DPA delivery was also mentioned by surveyed elementary school teachers in a cross-sectional study conducted by Strampel et al. (2014), which was designed to identify proposed facilitators. Additional delivery models that

reportedly facilitate DPA implementation include collaborating with, and utilizing the PE expertise of other staff members, which is a strategy that was highlighted during the initial development of Ontario's DPA policy (Allison et al., 2014) and in a study evaluating British Columbia's DPA policy (Mâsse et al., 2013). Some teachers described alternate delivery models, which included the use of non-instructional time; however, although supportive of student PA, these delivery strategies are not reflective of DPA adherence.

Together, these data suggest priority sub-populations to whom recommendations should be targeted, as well as straightforward delivery strategies that may positively affect DPA outcomes/adherence. For example, one option may be encouraging teachers to include DPA on their daily schedule; however, the possibility of reciprocal influences was not investigated, and it may be that teachers who are invested in compliant DPA delivery are more likely to have it posted on a daily schedule.

Facilitators and Barriers: Why are Teachers (not) Implementing DPA?

Teacher-level variables. The TPB-informed teacher-level variables measured indicators of past behaviour with the long-term goal of informing future intervention strategies designed to strengthen the intention-behaviour gap. The TPB conceptualizes intention as a summary of the motivation required to engage in a particular future behaviour, and suggests that PA-related intentions are formed based on attitudes, subjective norms, confidence, and self-identity (Ajzen, 1991; Faulkner et al., 2004). Results from Study 1 highlight positive associations between the TPB constsructs and teachers' implementation of the DPA policy, suggesting that aspects of the theory are relevant in this context; however, the mediating effects of the theory's constructs were not tested. Therefore, future

interventions conducted with teachers should target these constructs, with a particular focus on PBC, which is reflective of teacher confidence (Lippke & Ziegelmann, 2008).

The association between increased teacher confidence and DPA delivery is consistent with the evidence base linking teacher readiness and self-efficacy to DPA implementation fidelity (Gilmore & Donahue, 2016; Patton, 2012a; PHO, 2015). Considering that PE-related professional development is among the key influences on teachers' confidence in teaching PA-related lessons (Morgan & Bourke, 2008; Morgan & Hansen, 2008b; Rolfe, 2001), the current research highlights a need for innovative professional development opportunities that focus less on knowledge, which did not influence this sample of teachers' DPA delivery, the majority of whom were familiar with the DPA policy and HPE curriculum, and more on strategies that increase teachers' confidence related to planning, implementing and assessing PA.

When DPA was introduced, there was a strong and consistent international body of evidence linking childhood health problems to insufficient PA, and regular PA to improved health outcomes (Gladwin, Church, & Plotnikoff, 2008). It is therefore not surprising that qualities of the DPA policy consistently liked by teachers included its overall message of health promotion, the opportunities it provides to students to be physically active, and its clear directives. These findings, together with those showing that subjective norms and attitudes were each significantly associated with DPA adherence, support the promotion of a school climate wherein the integration of DPA is encouraged and modeled by teachers who think of themselves as health conscious and physically active.

School-level variables. The role of school administration in DPA policy implementation was measured via teachers' perceptions of administrative support, which was

positively associated with DPA duration. These outcomes concur with literature on the implementation of school-based programs, which showed that an administration that encourages an initiative and devotes time towards its delivery in the school's schedule contributes positively to the realization of the initiative's goals (Beets et al., 2008). However, administrators' influence on how and to what extent DPA is implemented in the school may in turn be constrained by more distal levels of influence that, through board-wide monitoring and accountability measures, focus on academic achievement (Langille & Rodgers, 2010). Although one of the goals of this research was to identify influences on DPA implementation from the perspectives of administrators, the sample size for this population prohibited analyses of responses; therefore, future research that targets administrators is needed.

Based on teachers' written responses, administrative support was identified as lacking, and viewed as a barrier to DPA implementation. The policy states that DPA must be scheduled during instructional time, and the DPA Resource Guides specify that principals are responsible for checking teachers' timetables to ensure that DPA is scheduled for all students in each school day (OMOE, 2006a, 2006b); however, the data reported herein suggest that this is not happening. While some respondents liked having the opportunity to schedule DPA into their teaching day, others viewed the allocation of time as a school-level support issue and believed that DPA should have a dedicated and mandated time on the teaching schedule, as it gets lost amongst competing academic demands. These findings are in line with those reported in a cross-sectional study surveying teachers' perceived barriers to DPA implementation in Ontario (Strampel et al., 2014), a systematic review of Canadian DPA policies (Olstad et al., 2015) and global school-based PA initiatives (Naylor et al., 2015), all

of which identify time constraints as a barrier to implementation of school-based PA-related goals. Brownson et al. (2010) purported that the motivation to overcome constraints for policy implementation in school environments may be related to the strength of accountability mechanisms in place to monitor implementation.

Accordingly, the introduction of an accountability mechanism (i.e., performance measure) to ensure that DPA is being correctly and consistently scheduled and implemented was identified herein and by Strampel et al. (2014) as a proposed implementation facilitator. This strategy, while directly addressing the suggestion that DPA be included on the teaching schedule, may also increase teachers' confidence in DPA delivery, as it would help to alleviate the identified time constraint barriers and facilitate performance mastery.

The perceived availability of resources was also positively associated with DPA delivery. Although PHO evaluations suggest that there is an under-utilization of resources in Ontario elementary schools (PHO, 2013, 2015), written responses identified a lack of resource availability as a barrier to DPA implementation in terms of appropriate activities, space, equipment, and weather to keep activities interesting and safe. When asked *where* DPA sessions are conducted, most teachers identified the classroom or outdoors; however, when expanded upon, respondents identified problems with these spaces, including safety and noise concerns due to large class sizes (for classrooms), and inclement weather (for outside). Many respondents identified the gym as a preferred space for DPA, but indicated that its availability is a problem. Intervention studies have shown that modifications to the physical school environment, such as providing greater access to sports and game equipment (Cradock et al., 2014; Huberty, Beets, Beighl, & Welk, 2011a; Huberty et al., 2011b; Lanningham-Foster et al., 2008; Verstraete, Cardon, De Clercq, & De Bourdeaudhui, 2006),

and using colourful playground markings to encourage play (Blaes et al., 2013; Loucaides, Jago, & Charalambous, 2009; Ridgers, Stratton, Fairclough, & Twisk, 2007; Stratton & Mullan, 2005) can increase objectively measured PA levels in children. However, in light of fiscal concerns and a lack of facilities, future research is required that explores alternative resources for communities susceptible to inclement weather. For example, computer-based implementation tools (e.g., gonoodle.com, YouTube videos) were mentioned as being facilitators to DPA implementation, and internet/video exercise interventions have been predictive of increased PA in children (Frenn et al., 2005; Hamel, Robbins, & Wilbur, 2011). Tailoring computer-based interventions for use in small/confined spaces as delivery agents for DPA (e.g., 20 minutes of sustained MVPA) represents a strategy that merits further investigation.

External resources (i.e., stakeholders) are also important for effective and sustainable implementation of school-based health initiatives (Agron et al., 2010; Fagen et al., 2014; Dowda, Sallis, McKenzie, Rosengard, & Kohl, 2005; Kelder et al., 2009). To that end, the DPA Resource Guides (OMOE, 2006a, 2006b) include community partners and parents as key contributors to the DPA implementation context. Specific to community partners, Ontario public health personnel are encouraged to work with schools and school boards to implement health-promotion programming, including DPA (OMOE, 2014); however, based on implementation data herein and evidence from PHO, this does not appear to be happening (PHO, 2013, 2015). In this study, partnerships between the home and school were identified as lacking, and specific parental roles, such as ensuring that children have the proper dress attire for PA and providing healthy food for lunches, were highlighted. How to best involve parents in childhood PA promotion initiatives has been identified as an area requiring further

research (Kipping, Jago, & Lawlor, 2011; O'Connor, Jago, & Baranowski, 2009; Thomas, 2006). Many interventions have included parental involvement (e.g., indirectly through school newsletters, directly via organized activities) as part of a comprehensive school-based approach to increase children's participation in PA; however, there has been no consensus on how to yield the most promising outcomes (Kahn et al., 2002; van Sluijs, Kriemler, & McMinn, 2011). Additional research exploring parents' perceptions of their children's experiences in school-based PA is required to inform future comprehensive school-based interventions.

Considering the school-level variables collectively, findings from this research are consistent with the relevant literature (Agron et al., 2010; Belansky et al., 2009; Curtner-Smith, 1999; Dwyer et al., 2003; Dwyer et al., 2007; Kennedy et al., 2010; Langille & Rodgers, 2010; Lounsbery et al., 2007; Strampel et al., 2014; Morgan & Hansen, 2008a; Young et al., 2007) in identifying the following factors as influencers of DPA delivery in Ontario elementary schools: competing curriculum pressures, lack of performance measures, and not being a school priority. These barriers highlight the importance of having a school administration that supports DPA implementation through scheduling accommodations, accountability measures, and allocation/coordination of resources. For example, the provision of resources and promotion of relationships between the school and community environments were mentioned as proposed implementation facilitators in this and related (Allison et al., 2014; Strampel et al., 2014) research, and may contribute to a more favourable environment, both socially and physically, for consistent delivery of PA.

It is important to evaluate these findings in the context of the study limitations. The sample size was relatively small considering the time frame during which the survey

remained active. This may have been due to concurrent labour disputes that were on-going with elementary school teachers. Regarding the data collection tool, it lacked a measure for continuity (sustained activity), which is a component of the policy that is reportedly not well delivered (PHO, 2015), and the measure of DPA frequency may be over-reported since there was no way to differentiate between active and non-active HPE classes due to a limitation in the survey design. The basis on which respondents were classifying teachers as PE specialists cannot be surmised due to the ambiguous requirements for this position across schools (People for Education, 2011), which do not necessarily require PE specialists to have a related degree or professional development course. Finally, translatability and generalizability of the findings may be limited due to the anonymity of the data collection tool and snowball sampling technique, which prevented identification of school-specific influences on DPA delivery strategies, and generated a sample that is predominantly from Northeastern Ontario; however, the findings reinforce and extend those in the relevant literature, thus adding the evidence base of influences on DPA implementation. Although the reported DPA outcomes relied solely on teacher self-report data, measuring the quantity (duration, frequency) of lessons via self-report survey data has been shown to provide an accurate representation of instructional practice (Mayer, 1999).

Conclusion

Study 1 surveyed Ontario elementary school teachers to assess adherence to, identify support needs for, and document the implementation predictors of the DPA policy. Considering the reported sub-optimal adherence to the policy, and recognizing that schools face constrained resources, implementation strategies that minimize time and financial burdens are required. Teachers in this study reported a perceived lack of resource

availability as an implementation barrier; however, in light of the available grade-appropriate resources generated by the OMOE (e.g., OMOE, 2006c), school boards (e.g., Active Tools for Schools), and related associations (e.g., OPHEA), this may be more reflective of a lack of teacher awareness. In addition, the findings from this study identified low-cost teacher-mediated strateiges that are associated with DPA delivery, including posting DPA on a daily schedule, and delivering a variety of different activities across DPA sessions with warm-up and cool-down components. Disseminating these research findings and increasing awareness of available resources at the teacher-, school-, and community-levels is required to address the current implementation status of the DPA policy in Ontario. For example, distribution of an infographic that highlights key research findings and directs stakeholder groups to the available implementation resources is recommended for elementary school teachers and administrators, as well as for teacher education program providers.

Future research recommendations generated from the findings herein include developing strategies that: (1) increase perceived administrative support via the reliable tracking and reporting of DPA delivery, thereby prioritizing school-based PA and involving additional stakeholder groups (i.e., parents) in its delivery; and (2) target teacher confidence for DPA delivery, thereby contributing to a school climate wherein PA is valued. To further investigate school climate and how it influences DPA delivery, future studies informed by the organizational culture literature (e.g., Schein, 1992) are recommended. For example, research testing the use of Schein's model identifies organizational artifacts that embed institutional values and norms as powerful mechanisms for communicating and endorsing values that support innovation (Hogan & Coote, 2013), thus identifying a potential intervention strategy for improved DPA implementation (e.g., 'champion' teachers and/or

schools that are progressive and innovate regarding DPA implementation, school mission statements surrounding DPA). Finally, longitudinal studies are required to (1) understand the nature and relative importance of the variables identified herein; (2) investigate alternative factors that may be associated with DPA implementation (e.g., teacher enthusiasm for teaching and for DPA, behavioural intentions); (3) verify the usefulness of the highlighted delivery strategies; and, (4) target the administrative population, thereby including representation from the organization (school) level of influence as informed by the SE model.

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Chapter 4: Parents' Perceptions of Elementary School-Based Physical Activity: A Descriptive Study of Ontario's Daily Physical Activity (DPA) Policy (Study 2)

In 2005, the Ontario Ministry of Education (OMOE) implemented the Daily Physical Activity (DPA) policy in all elementary schools (OMOE, 2005) to address the current suboptimal physical activity (PA) levels of Canadian youngsters (Colley et al., 2011; OMOE, 2005; ParticipACTION, 2016; Statistics Canada, 2015). The policy mandates that all elementary school students participate in a minimum of 20 minutes of sustained moderate to vigorous physical activity (MVPA) during instructional time on each school day of the school year (OMOE, 2005).

To date, published studies of the DPA policy in Ontario have focused on its implementation in terms of scheduling and intensity (Stone, Faulkner, Zeglen-Hunt, & Bonne, 2012; Patton, 2012a) and on students' and teachers' perspectives surrounding its delivery (Gilmore & Donahue, 2016; Patton, 2012a, b). Findings from these and an evaluation conducted by Public Health Ontario (PHO) (PHO, 2015) suggest that DPA is not being implemented uniformly in Ontario elementary schools. Challenges to DPA policy implementation in Ontario have been cited to include an apparent lack of long-term funding (Robertson-Wilson & Lévesque, 2009) and lack of evaluation strategies or province-wide testing of student outcomes related to DPA (PHO, 2015; Robertson-Wilson & Lévesque, 2009). For example, the OMOE has not formalized learning outcomes for DPA (OMOE, 2005), which creates ambiguity in reporting mechanisms related to students' attainment of the policy's requirements. This current absence of Ministry-mandated resource provision and compliance highlights a significant role for school-related stakeholders that have a vested interest in these issues.

As the strongest advocates for children, parents represent a critical group of stakeholders. Recognizing the influential role played by parents in their children's PA (Janssen, 2015; Vander Ploeg et al., 2013; Voss & Sandercock, 2013; Wofford, 2008), the DPA resource guides (OMOE, 2006a, 2006b) include parents among the important partners in the promotion and implementation of effective and sustainable DPA activities, stating that "parents can model and encourage healthy behaviours at home by being positive role models, leading an active lifestyle themselves, and making physical activity an enjoyable part of the family's daily routine" (OMOE, 2006b, p. 10). Futher, the OMOE's current conceptual model for school wide health promotion ('Foundations for a Healthy School'), to which the DPA policy has been linked, highlights the involvement of parents as central to the development of a comprehensive approach to healthy schools policies, programs and initiatives (OMOE, 2014). Many effective interventions have included parental involvement (e.g., indirectly through school newsletters, directly via organized activities) as part of a comprehensive school-based approach to increase children's participation in school-based and overall PA (Cradock et al., 2014; Gorely, Neville, Morris, Stensel, & Neville, 2009; Jurg, Kremers, Candel, Van der Wal, & de Meij, 2006); however, there has been no consensus on how to yield the most promising outcomes (Kahn et al., 2002; van Sluijs et al., 2011), and little is known about parents' perceptions of their children's experiences in school-based PA. Consideration of parental perspectives on childhood PA (Lopez-Dicastillo, Grande, & Caller, 2010), and how to best involve parents in childhood PA promotion initiatives have been identified as areas requiring further research (Kipping, Jago, & Lawlor, 2011; O'Connor, Jago, & Baranowski, 2009; Thomas, 2006). Although Gilmore and Donahue (2016), Patton

(2012a), and PHO (2015) examined the reasons for the observed disconnect between policy and practice, there was no representation from parents in either study.

As with most learning, school-based programming should be viewed within a broad framework that considers the involvement of non-staff stakeholders, including families (Hickson, Robinson, Berg, & Hall, 2012). Therefore, the theoretical orientation of Study 2 is informed by McLeroy, Bibeau, Steckler, and Glanz's (1988) socio-ecological (SE) model, which posits that the most effective approach to promoting positive health behaviours in students is a combination of efforts at individual, interpersonal, and environmental (community, physical, organizational) levels of influence (Booth et al., 2001; McLeroy et al., 1988; Spence & Lee, 2003; Welk, 1999; Wetter et al., 2001). Study 2 positions parents at the interpersonal level of influence on their children's PA participation (see Figure 4.1). To that end, identifying and incorporating parental viewpoints and suggestions will contribute to a coordinated, comprehensive approach to improving PA in schools.

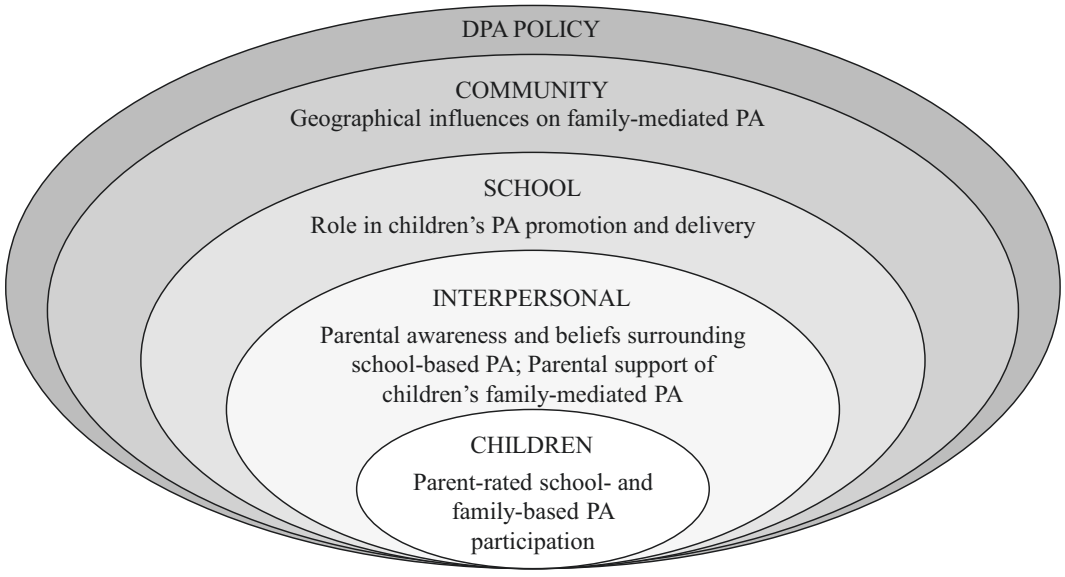

Figure 4.1: Social-Ecological Model Informing the Study of Parental Input on Ontario's DPA Policy and their Influences on Children's School-and Family-Based PA

The DPA resource guides (OMOE, 2006a, 2006b) and the HPE curriculum (2015) highlight the need for schools and parents to work together to ensure that school and home provide a mutually supportive framework for children's healthy growth and development. Familial support (Bauman et al., 2012; Gustafson & Rhodes, 2006; Pugliese & Tinsley, 2007; Rhodes et al., 2016; Trost et al., 2003; van der Horst, Paw, Twisk & Van Mechelen, 2007; Vander Ploeg et al., 2013; Verloigne, van Lippevelde, Maes, Brug, & De Bourdeaudhuij, 2012), parental attitudes about PA (Heitzler, Martin, Duke, & Huhman, 2006; Vander Ploeg et al., 2013), and parenting styles (Patrick, Hennessy, McSpadden, & Oh, 2013) have been identified as correlates of PA patterns in children, with parental support being more predictive of child PA than parenting styles (Sebire, Jago, Wood, Thompson, Zahra, & Lawlor, 2016).

Together, the impact of their support, and their role as key school stakeholders, emphasize the significance of parents' input. The primary purpose of Study 2 is to describe parents' awareness of and beliefs about the DPA policy. Additional goals include measuring parents' perceptions of the roles and relative contribution of both school and family to children's PA, and to determine whether or not their attitudes and level of support related to PA influence the outcomes measuring perceived responsibilities and relative contributions of family and school for children's PA promotion and delivery. By addressing these gaps in the literature, this study will strive to identify family-influenced support needs for implementation of the DPA policy in Ontario.

An appraisal of the literature identified few existing survey instruments that addressed the above constructs, highlighting an important knowledge gap in the promotion of school-based PA in children. Related surveys include those developed to assess parental

perceptions of school-based policies (Kandra, Goldstein, Gizlice, Woldman, & Proescholdbell, 2007; Southward et al., 2012), school climate (Schueler, Capotosto, Bahena, McIntyre, & Gehlbach, 2014), the school's role in addressing childhood obesity (Murnan, Price, Telljohann, & Boardley, 2006; Murphy & Polivka, 2007; Stalter, Steinke, & Barker, 2011), children's experiences in curricular PA (Cardon, Haerens, Verstraete, & de Bourdeaudhuij, 2009; Na, 2015), and parenting practices concerning their children's PA (e.g., attitudes, role modeling, social support) (Berry et al., 2014; Bryant et al., 2008; Davison, Cutting, & Birch, 2003; Edwardson & Gorely, 2010; Gattshall, Shoup, Marshall, Crane, & Estabrooks, 2008; Henry, Smith, & Ahmad, 2013; Hoover-Dempsey, Bassler, & Brissie, 1992; Jaballas, Clark-Ott, Clasen, Stolfi, & Urban, 2011; Larios, Ayala, Arredondo, Baquero, & Elder, 2009; Price, Huhman, & Potter, 2008; Vander Ploeg et al., 2013). None of the available instruments focused on parental beliefs pertaining to Ontario's DPA policy; therefore, a survey was developed with selected items extracted from the relevant existing surveys.

As this study is descriptive and exploratory in nature, no specific hypotheses are forwarded regarding parental awareness or perceptions of the DPA policy. It is anticipated however that parents vary in their provision of PA support and personal beliefs surrounding the importance of PA, thus influencing their perceptions of the family's and the school's roles in promoting and delivering PA opportunities for children.

Method

Participants

Participants were self-identified parents/guardians of elementary school-aged children residing in Ontario (n = 172). Demographic variables describing the characteristics of the

participants are presented in Table 4.1. Parents completing the survey generally were female (78%), Caucasian (Non-Hispanic) (86.2%), from North Eastern Ontario (57.9%), had children in grades 1 through 3 (32.4%), and were university graduates (40.6%). Of the 59 parents who specified, 37 self-identified as teachers (12 of whom specified as elementary school teachers) and 32 indicated that they worked in a profession related to health promotion.

Table 4.1

Demographic Variables Describing the Characteristics of the Participants

	n	Frequency	Percent of *n*
Gender	159		
Female		124	78
Male		35	22
Racial/Ethnic Group	159		
Caucasian (Non-Hispanic)		137	86.2
Caucasian (Non-Hispanic) and/or First Nations		12	7.5
Other		10	6.3
Highest Level of Education	160		
No Schooling		1	.62
Secondary		9	5.62
Community/Technical College		49	30.6
University		65	40.6
Graduate University		36	22.5
Ontario Region	159		
North-East		92	57.9
North-West		6	3.8
Central		30	18.9
South West		11	6.9
East		20	12.6
Total Household Income	159		
Don't know/Prefer not to answer		8	5.0
Less than $25,000		5	3.1
$25,000 - $50,000		7	4.4
$50,001 - $75,000		23	14.6
$75,001 - $100,000		35	22.0
More than $100,000		81	50.9
Children's Fitness Tax Credit Claimed	160		
Yes		131	81.9
No		16	10
Unsure		9	5.6
Unaware of Tax Credit		4	2.5
Number of Parents with Child(ren) in Following Grade Categories	151		
Grades 1, 2, and/or 3		49	32.4
Grades 4, 5, and/or 6		33	21.8
Grade range from 1 to 6		31	20.6
Grade range including 7 and/or 8		38	25.2

Table 4.1

Demographic Variables Describing the Characteristics of the Participants

	n	Frequency	Percent of *n*
Number of Respondents with Related Profession	156		
Unrelated		97	62.2
Teacher (not Elementary School)		15	9.6
Teacher (Elementary School)		12	7.7
Health Promotion		32	20.5

Measure

An online survey was developed with closed- and open-ended questions. Survey items were adapted or generated and organized into five sections. The first four sections comprise of closed-ended questions that address parental awareness and perceptions of the DPA policy, and their perspectives surrounding regular PA and the school's role in its promotion and delivery. The fifth section comprises of open-ended response items prompting participants to expand on items from the first four sections.

Pilot testing. An expert panel of four researchers in PA were invited to rate each survey item based on (1) clarity and (2) content validity. For each survey item, feedback on each of the two parameters being assessed was obtained via a 3-point scale (agree, somewhat agree, and disagree) and an open-ended comments section. Following this review, seven items were deleted because they were deemed extraneous, too broad, or irrelevant based on the research questions (e.g., focused on HPE classes rather than school-based PA), and two items were added to better represent research constructs surrounding the family's role in PA participation. Of the 57 retained survey items, 18 were modified and five were completely reworded based on expert feedback. The main reasons for the modifications and re-wording were to decrease comprehension problems resulting from the use of technical terms and complex sentence structure, and to better reflect the constructs under study.

Appendix E includes a copy of the final survey, which identifies the sources of those items that were adapted from previously existing research tools. Within each section, additional questions were generated in order to comprehensively address the goals of the research.

Demographics. Section I of the survey included 11 single-item questions used to assess demographic characteristics of the participants. A multiple choice response format assessed gender, race/ethnicity, highest level of education, household income, awareness and use of the children's fitness tax credit, number of children in elementary school (specified by grade), geographical location of residence, and school system attended by their child(ren). A dichotomous scale of *yes* or *no* was used to identify parents who are also teachers (elementary versus secondary) or who work in a field related to health promotion.

Parent awareness and perceptions of DPA policy. Section II of the survey included 17 items divided into four subscales, which addressed parents' awareness of the DPA policy (6 items; e.g., *Prior to completing this survey, I was already familiar with the DPA policy*), their perceptions of its suitability (4 items; e.g., *The DPA guidelines are realistic in terms of the duration of recommended physical activity*) and importance (4 items; e.g., *It is important for elementary schools to have a policy that requires daily physical activity for students during the school day*), and their beliefs surrounding its scheduling and reporting (3 items; e.g., *Report cards should include a section specific to DPA so that parents know if their children are meeting the DPA requirements*). Questions in the first two subscales were generated based on information obtained from the DPA policy itself (OMOE, 2005) as well as its accompanying resource guides (OMOE, 2006a, 2006b). Questions measuring parental perceptions of the importance of the policy were adapted from Kandra et

al. (2007) by recontextualizing North Carolina's tobacco-free policy to Ontario's DPA policy. The scheduling and reporting questions were informed by DPA implementation literature (Mâsse, Naimen, & Naylor, 2013; Watts, Mâsse, & Naylor, 2014) and previous related research conducted with teachers (Study 1). A 5-point response scale ranging from 1 (*strongly disagree)* to 5 (*strongly agree*), based on previously developed surveys (Murphy & Polivka, 2007; Price et al., 2008; Stalter et al., 2011), was used to measure level of agreement, and allowed for respondents to choose neutrality on the items.

Parental perspectives. Section III of the survey included 27 items, five of which are stand-alone and ask parents about the source of their child(ren)'s PA. The remaining 22 items collectively address parental perspectives related to regular PA and the family's and school's roles in its promotion and delivery. The questions are divided into the following four subscales: attitudes towards regular participation in PA (5 items; e.g., *Regular physical activity is associated with numerous health benefits in school-age children*), perspectives of the family's (5 items; e.g., *it is important for parents to attend school-based events related to healthy, active living at their children's school*) and school's (7 items; e.g., *Schools should be responsible for providing students with opportunities to be physically active while at school*) roles in PA participation, and perceived home-based barriers to PA participation (5 items; e.g., *Time contraints influence the amount of physical activity in which my children engages outside of school*). Of the five questions measuring attitudes towards regular participation in PA, one was adapted from Price et al. (2008) by changing PA to DPA, and one was adapted from Larios et al. (2009) by revising *getting enough exercise* to *current daily amount of PA*. Of the questions measuring parental perspectives the school's role in PA promotion/delivery, three were informed from Murnan et al. (2006), and one was adapted from Murphy and

Polivka (2007) by changing *alleviate childhood obesity* to *increase PA levels of students*. One of the questions measuring parental perceptions of the family's role in PA promotion/delivery was adapted from Alberta Health (2014). The original item used a multiple choice format for assessing who has the main responsibility (*parent*, *child*, *school*, or *other*), which was revised to ask specifically about the *family*'s role using the 5-point Likert scale. The remaining questions were generated based on the reviewed relevant published literature. The same 5-point response scale from Section II was used for all survey items in Section III.

To explore the factors that might influence whether or not children receive most of the PA at school, an overall 'Main PA Source' score was computed using the five stand-alone questions from Section III. The rationale for this survey-specific computation was to compare the relative contributions of family-mediated to school-based PA. This was accomplished by adding each response specific to family-based PA (active play + organized sports + active commute) and subtracting from this value the cumulative score calculated for school-based PA (recess + HPE + DPA). Each sum was within the range of 0 to 15, and their difference produced a positive value (when family-based PA was a larger contributor: family > school), a negative value (when school-based PA was a larger contributor: school > family), or a null value (when family- and school-based PA were equal contributors: family = school). For example, participants who had cumulative scores of 7 and 10 for family- and school-based PA, respectively, had a negative outcome (-3) and were therefore assigned to the 'school > family' category.

Parental support. Section IV of the survey included nine items measuring parental support of regular PA, five of which measure parental role modeling of PA (validation

support; e.g., *In a typical week in the past month, how often did your children hear you talk about physical activity?*) and 4 of which measure social support (e.g., *In a typical week in the past month, how often did you transport your children for physical activity related events?*). Seven of the nine questions were original items from Gattshall et al. (2008) and one was an original item from Davison et al. (2003). The scale for each of these items was changed to a 6-point response scale ranging from 1 (*never*) to 6 (*daily*) based on the Godin Leisure-Time Exercise Questionnaire (Godin, Jobin, & Bouillon, 1986; Godin & Shephard, 1985). The ninth item in this Section was informed by Lox et al. (2014) (e.g., *In a typical week in the past month, how often did you educate your children about the benefits of regular physical activity?*), and was assessed using the same scale.

Descriptive Comments. Section V of the survey included three open-ended questions prompting participants to expand on what they like and dislike about the DPA policy, and to provide comments on how they would change the DPA policy to optimize its implementation.

Procedure

Following approval from the Research Ethics Board at Nipissing University (Appendix F), a snowball recruitment process was used to sample parents/guardians of children attending an elementary school in Ontario. The purpose of this recruitment process was to obtain a final sample size targeted at 170 parents. Eligible parents/guardians who were known personally to either the principal investigator or to personal associates of the principal investigator were contacted using personal e-mail addresses with basic study information (see Appendix G for Participant Contact Letter). Parents/guardians who chose to participate in the study accessed the link provided within the letter to go directly to the

anonymous online survey powered by FluidSurveys™, which contained the Participant Information Letter and the survey questions (see Appendix E). The Participant Contact Letter sent to parents/guardians contained a sentence encouraging them to forward the letter to other parents/guardians who may have been interested in participating in the study, who in turn, also had the option of sharing the online study information/survey. To help improve the distribution of the study information/survey, the chairs/presidents of associations likely to reach parents of elementary school-aged children in Ontario (e.g., Nipissing District Developmental Screen, North Bay Y Titans Swim Team, People for Education) were also contacted via e-mail (see Appendix H for Association Permission Letter) through publicly available contact information posted on their websites. The e-mail asked the associations to endorse the study by forwarding the study information to its members.

Completion of the survey entitled participants to enter into a draw to win one of eight Chapters gift cards, valued at $25 each, as compensation for their time. Following submission of responses, participants who chose to enter the draw were re-directed to a page not linked to their survey information (see Appendix I for the survey completion/exit options). All data were collected between December, 2015, and March, 2016.

Data Analysis

All quantitative data were entered into SPSS for Windows (version 20). Descriptive characteristics were used to describe the sample. Mean composite scores were calculated for the constructs measuring DPA-specific outcomes (parental awareness of and perceptions of its suitability, importance, and scheduling/reporting), parental perspectives related to regular PA (attitudes), the family's and school's roles in its promotion and delivery (family

responsibility and school responsibility), the barriers surrounding home-based PA (home barriers), and parental support of PA (support).

Central tendencies were calculated using the *Mean* for normally distributed data, and the *Median* for data that deviated from normal distribution. Cross-tabulations (χ^2), group comparisons (independent-samples *t*-test, Mann-Whitney *U* Test, one-way analysis of variance, or Kruskal-Wallis *H* Test), and correlation coefficients were used to examine relationships between the variables. The influences of parental perspectives and behaviours (support) on their perceived roles of family and school in PA promotion/delivery were examined with multiple regression analyses. A discriminant function analysis (DFA) was performed with the Main PA Source score (family > school, school > family, family = school) to identify the variables that best discriminate parents who do and do not rely on schools for provision of the majority of their child's PA. All assumptions were tested and passed (unless otherwise indicated) for each statistical test, which resulted in the removal of five outliers based on their critical values of Mahalanobis distance at $\alpha = .001$ (Tabachnick & Fidell, 2007). For the linear regression models, assumptions of normal distribution of the residuals ($p > .05$ for Kolmogorov-Smirnov test for studentized residual), absence of significant outliers (Mahalanobis values for independent variables compared to their cumulative distribution function have p values > .001), no multicollinearity, homoscedasticity ($p > .05$ for Breusch-Pagan test for heteroscedasticity), and presence of linear relationships between dependent and independent variables (loess fit lines fell within the 99% confidence interval around the linear fit line between the dependent variable and each of the independent variables) were met. For the DFA, assumptions of independence of observations (regressing each variable onto the case identification number was not

significant), homogeneity of variance (Levene's test is non-significant for all of the variables), absence of significant outliers, and no multicollinearity were met. Six of the variables failed the test for multivariate normality; however, violations for the normality assumption are not considered 'fatal' if non-normality is not caused by outliers (Tabachnick & Fidell, 2007). The alpha level was set at 0.05 for all analyses.

Parents' responses to open-ended survey items were compiled and content analyzed by categorizing the statements. For each question, meaning units (MUs) were identified and grouped into themes. Based on themes, analytical categories were generated, and each MU was re-coded into the appropriate response category(ies) for descriptive analysis (Boyatzis, 1998; Braun & Clarke, 2006). MUs that fit into more than one category and/or pertained to a category associated with a different question were coded and analyzed as such. A reliability check of the coding system was completed whereby a second researcher independently read a random selection consisting of 20% of the responses and independently coded them using the same categories. Adequate inter-rater reliability (77% to 89%) was calculated for each question, and members of the research team (principal investigator and research supervisor) met to achieve consensus prior to final coding.

Results

Data Screening

The data for DPA suitability, DPA importance, attitudes, support, family responsibility, and school responsibility all significantly deviated from a normal distribution ($p < 0.05$ for Shapiro-Wilk Test), whereas data for resources, support, confidence, and knowledge were all normally distributed ($p \geq 0.05$ for Shapiro-Wilk Test). For each construct, internal consistency was investigated through Conbach's alpha coefficient (see

Table 4.2), and item content was assessed for relevance and utility. The DPA reporting and scheduling construct had poor internal consistency (α = .33); therefore, the individual items (n = 3) were interpreted as stand-alone questions. For the DPA importance construct, one item measured actual source of PA rather than perceived importance of the policy, and was therefore removed from the construct and used in the calculation of the Main PA Source score. Similarly, one of the items from the school responsibility construct was removed and analyzed separately, as it measured parents' beliefs about what schools are actually doing, rather than their perceptions of the school's general role in PA delivery.

Table 4.2

Psychometric Data for Measured Variables

	Survey Items [a]	Initial Cronbach's α	Items removed	Final Cronbach's α
DPA Awareness	17, 19, 21, 24, 26, 28	.751		.751
DPA Suitability	13-15, 22*	.729		.729
DPA Importance	16, 18, 23, 27*	.645	18	.733
DPA Reporting and Scheduling	20, 25, 29	.331		-
Family Responsibility	40, 43a, b, c, 46	.614		.614
School Responsibility	32-35, 37, 38, 45	.703	45	.858
Attitudes	30, 31, 36, 39, 42	.787		.787
Support	47-54	.760		.760
Home Barriers	41a, b, c, d, e	.690		.690

Notes: [a] Survey items are identified by question number (see Appendix D). *Responses were reverse-scored.

A total of 172 parents/guardians consented to participate in the survey, 134 of whom completed the survey (see Figure 4.2).

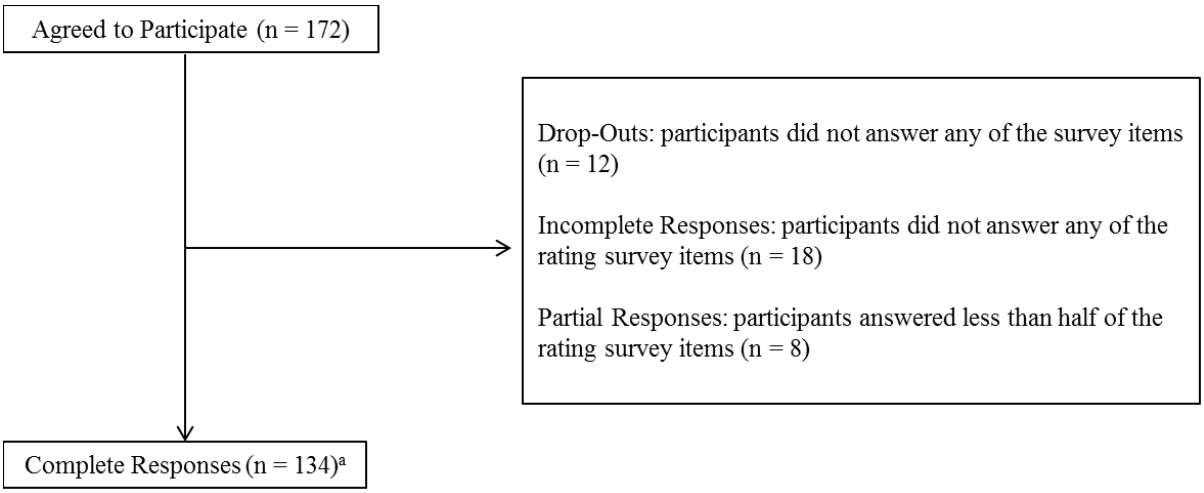

Figure 4.2: Participant Response Frequencies Organized by Categories. [a]Five of the complete responses were identified as outliers and removed from all but the demographic data.

Participants who were significantly less likely to complete the survey (i.e., those who provided incomplete/partial responses) had the following demographic characteristics: they self-identified as belonging to the *other* category of racial/ethnic group ($\chi^2 = 8.76$, $p < .05$), their highest level of education reached the secondary school level ($\chi^2 = 11.80$, $p < .05$), and they had an annual household income less than $25,000 ($\chi^2 = 16.17$, $p < .01$).

Parents' Awareness and Perceptions of DPA

Descriptive statistics for the DPA-specific constructs and stand-alone responses are presented in Tables 4.3 and 4.4, respectively.

Table 4.3

Descriptive Results for DPA Awareness, Suitability, and Importance Constructs Based on Parents' Perceptions

	n	*M* (*SD*) / *Mdn* (range)
DPA Awareness	129	2.58 (±.73)
DPA Suitability	129	3.75 (1.25 – 5.00)[a]
DPA Importance	129	4.33 (2.00 – 5.00)[a]

Notes: Rating scale for individual responses ranged from 1.00 to 5.00. Data marked with a superscript *a* significantly deviate from normal distribution and have central tendencies reported with *Mdn* rather than *M*.

The data suggest that awareness of the DPA policy amongst the sampled population is poor, with the mean score indicating that most respondents disagreed with being familiar with, or having received information about, the policy. Comparing subpopulations indicated that teachers (elementary and secondary) had a significantly higher awareness of the DPA policy (2.90 ± .53) compared to non-teachers (2.51 ± .07), $t(127) = 2.37$, $p < 0.05$. There was no significant difference in the levels of awareness between elementary and secondary school teachers, or amongst the other measured demographic variables, with the exception of the children's grade level, with parents of children in grades 1, 2 and/or 3 having statistically significantly lower awareness of the policy compared to parents with children in grades 4, 5 and/6 ($F(4, 117) = 4.12$, $p < .01$), and geographical region, with parents from North Western Ontario having significantly higher awareness than parents in Eastern Ontario ($F(4, 124) = 2.95$, $p < .05$).

The majority of the parents agreed that the DPA policy is an important initiative in schools; however, parents who are elementary school teachers were significantly less likely to agree than parents who are not elementary school teachers ($U = 306.5$, $p < .05$). The majority of parents also agreed that the DPA policy is suitable in terms of duration, frequency and intensity of prescribed PA; however, respondents who identified as First Nations were significantly less likely to do so compared with respondents who identified as Caucasian (non-Hispanic) (χ^2 (2) = 37.45, $p < .01$).

Regarding DPA reporting (see Table 4.4), most parents agreed that report cards should include a section specific to DPA so that they will know whether or not their children are meeting the DPA requirements. Parents who self-identified as teachers were significantly less likely to agree compared to non-teaching parents ($U = 782$, $p < .01$), and amongst

teachers, elementary school teachers were significantly less likely to agree compared to secondary school teachers ($U = 16.5$, $p < .01$). For scheduling, parents neither agreed nor disagreed with it having to be delivered during instructional time, and when asked if it should be separate from HPE classes, most parents disagreed. There were no significant differences amongst the measured demographic variables for either of these delivery-based DPA variables.

Table 4.4

Descriptive Results for DPA Reporting and Scheduling Stand-Alone Questions Based on Parents' Perceptions

	n	*Mdn* (Range = 1.00 – 5.00)[a]
DPA should be included in report cards	127	4.00
Teachers should be able to deliver DPA during non-instructional time	128	3.00
Teachers should not be able to use HPE classes to meet the DPA requirement	128	2.00

Notes: [a]Data significantly deviate from normal distribution. Respondents used the full range of response options for each item.

Parental Perspectives and Support

Descriptive statistics for parental perspectives and support related to regular PA and the relative responsibilities of families and schools in its promotion and delivery are presented in Table 4.5.

Table 4.5

Descriptive Results for Parental Perspectives Related to Regular PA and the Family's and School's Responsibilities in its Promotion and Delivery

	n	*M* (SD) / *Mdn* (range)
Attitudes	129	4.60 (3.00 – 5.00)[a]
Support	129	3.56 (1.00 – 4.89)[a]
Home Barriers	129	2.80 (.74)
Family Responsibility	129	4.40 (3.20 – 5.00)[a]
School Responsibility	129	4.50 (3.17 – 5.00)[a]

Notes: Rating scale for individual responses ranged from 1.00 to 5.00 for all constructs except Support, which had a rating scale that ranged from 1.00 to 6.00. Data marked with a superscript *a* significantly deviate from normal distribution and have central tendencies reported with *Mdn* rather than *M*.

According to the data for the attitudes construct, most parents agreed strongly, with equal distribution across demographic categories, that participation in regular PA is

associated with numerous health and psychosocial benefits in school-aged children. The median score for PA-related support indicated that the majority of parents exhibit behaviours that are reflective of this belief, with parents who work in a field related to health promotion having statistically significantly higher scores ($U = 932.0$, $p = .01$) compared to parents who do not, and parents with children in Grades 4, 5 and/or 6 having statistically significantly lower scores (χ^2 (4) = 11.05, $p < .05$) than those with children in other grades. The overall mean score for the perceived influence of home-based barriers on children's PA was neutral, with parents from the South Western region of Ontario reporting significantly higher scores than those form the North East and Central regions ($F(4, 124) = 3.254$, $\eta^2 = .095$, $p < .05$).

A Wilcoxon signed-rank test showed a statistically significant difference between the scores for perceived family and school responsibilities ($Z = -2.662$, $p < .01$), indicating that this sample of parents believe that schools have a greater responsibility than family in the promotion and delivery of PA for children. When asked specifically whether or not schools are doing enough to increase the PA levels of the students (stand-alone question), 47.7% of parents disagreed, 37.5% neither agreed nor disagreed, and only 14.8% agreed ($n = 128$). There were no demographic differences amongst responses for either the family or school responsibility constructs, or for the question asking whether or not schools are doing enough.

Main PA source. An overall 'Main PA Source' score was computed to explore the extent to which schools contribute to children's PA, as indicated by parents' ratings of family- and school-based activities (see Table 4.6). Based on these computed scores, family-mediated activities were identified as the main source of children's PA by the majority (50.4%) of the respondents, with 37% of the parents ascribing school-delivered activities as the main source, and the remaining 12.6% assigning equal contributions for the two sources.

The distribution of respondents in these categories did not significantly vary across on any of the assessed demographic characteristics.

Table 4.6

Relative Contributions from School and Family to Overall PA in Children: Frequencies of Calculated Scores based on Parents' Recall

Relative Contribution	Frequency (Percentage)
Family > School	64 (50.4%)
School > Family	47 (37%)
Family = School	16 (12.6%)

Note: $n = 127$.

Multivariate Analyses

Bivariate correlations among the constructs measuring parents' perspectives of the DPA policy, their attitudes and provision of support surrounding PA, their perceived barriers for home-based PA, and their perceptions of the roles of family and schools in PA promotion/delivery are presented in Table 4.7.

Table 4.7

Bivariate Results for Parent Perspectives and Support Related to PA and/or DPA: Spearman's rho (and Pearson Product Moment) Correlation Coefficient Matrix

	1.	2.	3.	4.	5.	6.	7.	8.
1. Awareness[a]	1.00	-.042	.039	.114	.071	.089	.107	(-.085)
2. Suitability[a]		1.00	.188*	.131	.176*	.037	.039	-.092
3. Importance[a]			1.00	.370**	.478**	.478**	.141	-.125
4. Family[b]				1.00	.539**	.517**	.396**	-.052
5. School[b]					1.00	.788**	.385**	-.073
6. Attitudes						1.00	.338**	-.074
7. Support							1.00	-.033
8. Barriers								1.00

Notes: [a] of DPA. [b] responsibility. *$p < .05$. **$p < .01$ (two-tailed).

Only variables that were significantly correlated were retained for further analyses. Based on the results of the bivariate correlations, standard multiple linear regression analyses were completed to examine which constructs influence parents' perceptions of the family's and school's role in promoting/delivering PA, both of which were correlated with multiple independent variables. For each outcome (family responsibility and school responsibility),

Table 4.8 identifies the individual influences. As depicted by the *F* values, each model was a good fit for predicting the outcome.

Table 4.8

Summary of Regression Analyses Predicting Parents' Perspectives of the Family's and School's Responsibilities for PA Promotion and Delivery

Outcome Predictors	Family Responsibility				School Responsibility			
	B	*SE*	*β*	*t*	*B*	*SE*	*β*	*t*
DPA Importance	.061	.058	.090	1.06	.047	.045	.066	1.057
Attitudes	.219	.121	.223	1.80	.708	.071	.683	9.907**
Support	.153	.045	.261	3.39*	.050	.036	.081	1.401
DPA Suitability	-	-	-	-	.055	.031	.091	1.756
School Responsibility	.201	.115	.213	1.75	-	-	-	-
Family Responsibility	-	-	-	-	.114	.068	.108	1.678
R^2			.377				.663	
F-value			18.79**				51.30**	

Notes: n = 129. Dash (-) indicates that data were not obtained. β = standardized beta. *B* = unstandardized beta. *SE* = Standard Error. HC = heteroscedasticity-consistent.*p = .001 **p < .001.

The results indicate a positive predictive relationship between parents' belief in the importance of PA (i.e., attitudes) and their perception of the school's role in PA delivery/promotion for children, and between parents' PA-related support and their perception of the family's role in PA delivery/promotion for children.

Main PA Source. A direct DFA was used to conduct a multivariate analysis of variance test of the hypothesis that parents whose children do and do not receive most of their PA during school hours will differ significantly based on eight variables: awareness, importance and suitability of the DPA policy, attitudes and support surrounding regular PA, school and family responsibilities for promotion/delivery of PA, and barriers for the latter (see Table 4.9).

Table 4.9

Relative Contributions from School and Family to Overall PA in Children: Univariate and Multivariate Results

	Main PA Source for Children				Direct DFA Structure Coefficients	
	Family > School *M* (SD)	School > Family *M* (SD)	Family = School *M* (SD)	η^2	Function1	Function 2
Support	3.74 (.65)[a]	3.26 (.80)[b]	3.44 (.52)	.095	.603*	.189
Home-Based Barriers	2.62 (.75)[a]	3.02 (.73)[b]	2.82 (.55)	.062	.467*	.205
DPA Importance	4.46 (.55)	4.29 (.66)	4.06 (.73)	.047	.361*	.285
Attitudes	4.58 (.42)	4.45 (.46)	4.71 (.33)	.041	.151	.467*
Family Responsibility	4.43 (.39)	4.30 (.46)	4.27 (.44)	.027	.316*	.048
DPA Awareness	2.59 (.76)	2.48 (.69)	2.75 (.73)	.012	.043	.268
DPA Suitability	3.50 (.78)	3.64 (.70)	3.50 (.77)	.0084	.139	.139
School Responsibility	4.47 (.44)	4.30 (.46)	4.27 (.44)	.0024	.010	.118

Notes: $n = 127$. DFA = discriminant function analysis. Means in the same row with different subscripts are significantly different at $p < .05$. Function 1 discriminates between family > school and school > family. Function 2 discriminates between family = school and school > family. *Identifies variables that have a strong correlation (i.e., structure coefficients of ≥ .30) (Brown & Wicker, 2000) with one of the functions.

Univariate tests demonstrated a significant effect of main PA source on support, $F(2, 127) = 6.50$, $p < .01$, and home-based barriers, $F(2, 127) = 4.12$, $p < .05$, which accounted for 9.5% and 6.2% of the variability in parents' support and home-based barriers, respectively. The multivariate combination of all eight variables was found to significantly discriminate between groups of parents whose children do (school > family) and do not (family ≥ school) receive most of their PA at school with moderate accuracy. Specifically, 56.7% of the parents were correctly classified by the resulting functions, compared with 40.5% who would be correctly classified by chance alone. The predictive capacity of the model was better for classifying parents in the family = school (62.5% compared with 13% for chance alone) and school > family (51.1% compared with 37% for chance alone) groups, but less successful at classifying them in the family > school group (59.4% compared with 50% for chance alone).

The Wilk's Lambda for both the first ($\Lambda = .67$, $\chi^2 (16) = 47.84$, $p < .001$), and the second ($\Lambda = .85$, $\chi^2 (7) = 18.84$, $p < .01$) function of the direct DFA was significant. For

each function, the canonical correlation was .46, indicating that the eight variables accounted for 21% of the variance. The variables that have the strongest correlations with each function (see Table 9) suggest that parents who report more barriers to home-based PA can be significantly distinguished into the group of parents whose children receive most of their PA at school (school > family). Conversely, those parents who believe in the importance of regular PA (attitudes) and the DPA policy (DPA importance), who exhibit behaviours reflective of this belief (support), and who perceive the family to have a responsibility in the promotion/delivery of their child's PA (family responsibility), can be significantly distinguished into the group of parents whose children receive most or a balanced amount of their PA through family-mediated activities (family > school or family = school). Specifically, attitudes distinguished between parents whose children received most of their PA at school and those whose children received an equal contribution from school and family (family = school), and the remaining variables distinguished between parents whose children received most of their PA at school and those whose children received most of their PA through family-mediated activities (family > school).

Descriptive Analysis of Short-Answer Questions

When asked what they liked about the DPA policy, the majority of MUs generated by respondents indicated endorsement of the policy's overall message (24.6%), and specifically, its mandate to have dedicated PA time in the school day (30.6%) (see Figure 4.3). For example, respondents liked that the DPA provides "students with the opportunity to [be] physically active every day" (parent-teacher with children in Grades 2 and 4) (dedicated PA time), and that it teaches them "how to have work/exercise balance" (parent of children in Grades 5 and 7) (overall message). The facilitation of student learning and promotion of

student health were also specified as commendations of the DPA policy, representing 14.1% and 8.2% of the MUs, respectively. The examples provided for how DPA can improve learning included via increased student focus (*n* = 8) and its provision of an academic break (*n* = 3). Among the specific physical and mental health benefits, respondents highlighted that it helps children burn energy (*n* = 4), manage stress levels (*n* = 2), build relationships (*n* = 2), and increase self-confidence (*n* = 1). For example, "I like that the 20 minute break helps children burn energy, clear their heads, manage stress levels, build relationships, etc." (parent of child in Grade 8).

A total of 10 MUs (11.8%) referenced the policy's reach, with respondents expressing beliefs that the policy "is great for students who don't have activities at home" (parent of child in Grade 6) and that they "like [how] it standardizes daily physical activity for all children" (parent of children in Grades 3 and 7). The policy was also viewed as a means to reinforce/supplement home-based PA messages and initiatives (7.1% of the MUs): "During the school year, the school sees more of my children [than] I do during the timeframe [when] physical activity can be encouraged…school needs to play a role in providing opportunities [for] and reinforcing the importance of physical activity and health. The DPA policy gives me assurance that my children are receiving consistent physical activity in my absence" (parent of children in Grades 2 and 5). The remaining MUs were either reflective of unfamiliarity (*n* = 2) or a general dislike for the policy (*n* = 1).

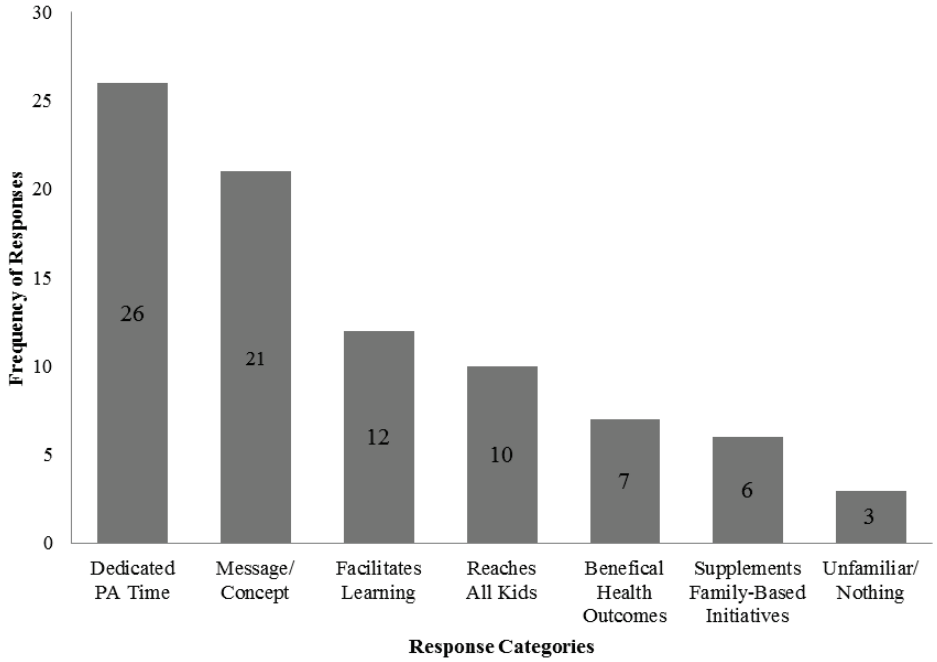

Figure 4.3: Theme Categorizations for Parents' Responses to: "What do you like about the DPA policy?" Responses from 72 respondents generated 85 meaning units, which were categorized into seven response categories.

In response to the question that asked parents what they dislike about the DPA policy, the majority of the MUs pertained to inconsistencies in its implementation, which included lack of compliant delivery in some schools/classes/grades (27.6%) as well as complications with its delivery (14.9%) (see Figure 4.4). Factors perceived to interfere with successful implementation included disengaged teachers (n = 4), scheduling constraints (n = 4), lack of student engagement (n = 3), and lack of useable space (n = 2). One parent with a child in Grade 4 specified, "gym time and space is limited so I'm not sure how teachers are meant to implement the DPA policy without the tools to do so". A total of 28 MUs addressed the policy itself. Of these, 16 specified the directives, indicating that they don't mandate enough PA in terms of duration (n = 14), frequency (n = 2) and/or intensity (n = 1). The remaining 12 referenced the lack of support and accountability measures. Because "there is no Ministry oversight or reporting on [its] implementation" (parent of child in Grade 6), it makes it "hard

to measure if all children are participating in DPA" (parent of children in Grades 2 and 5) and "difficult to enforce" (parent of child in Grade 4).

The next most frequent response (11.5% of MUs) indicated that information about the DPA policy is not shared with parents, which was evidenced by respondents' unfamiliarity with the policy (e.g., "I was not familiar with it prior to this survey", parent of child in Grade 2) and the belief that it is "not well communicated" (parent of children in Grades 3 and 7); "that's what I like least" (parent of children in Grades 1 and 3). While 9.2% of the MUs were indicative of endorsement for the DPA policy (No Dislikes), another 4.6% indicated that children's PA is "primarily the parent's responsibility" (teacher-parent of children in Grades 3 and 7) and the policy "puts too much emphasis on the teachers and school to ensure each child is active every day" (parent of child in Grade 1).

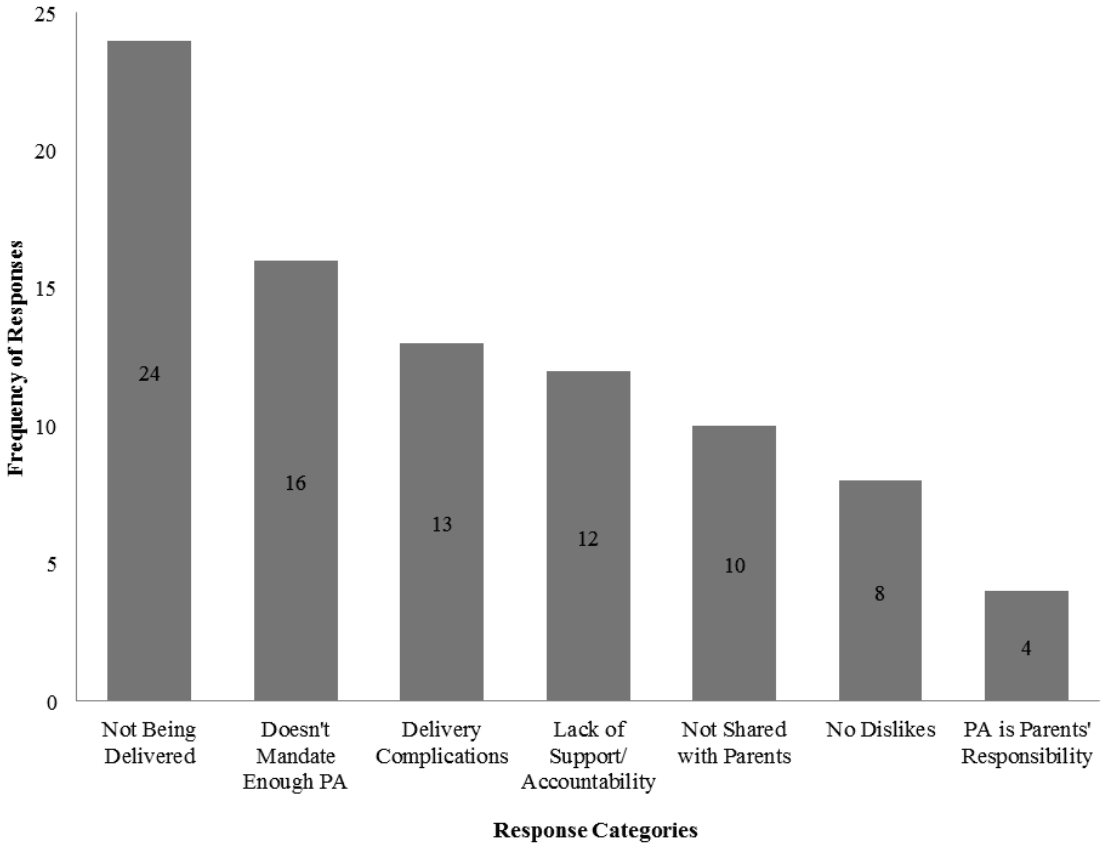

Figure 4.4: Theme Categorizations for Parents' Responses to: "What do you dislike about the DPA policy?". Responses from 69 respondents generated 87 meaning units, which were categorized into seven response categories.

The follow-up and final question asked respondents to propose changes that would make the DPA policy more effective. The most frequently cited proposed changes directly addressed the policy-specific dislikes, and included increasing accountability measures (20.2% of MUs) and changing or modifying the directives (15.5% of MUs) (see Figure 4.5). When specified, suggested accountability measures included the institution of a Ministry audit, and including DPA in report cards and homework. Examples of suggested modifications to the directives included increasing the duration (n = 4), intensity (n = 3) and/or frequency (n = 2), and changes included the addition of a nutrition component (n = 1) and mandating that teachers participate in the activities with students (n = 1).

Response categories that collectively addressed the implementation issues included increasing support for teachers (14.3% of MUs; e.g., including DPA in pre-service teaching, providing space and equipment), having allotted time on the school-day schedule for DPA (14.3% of MUs; e.g., school-wide implementation), and integrating the directives into existing curricula (13.1% of MUs; e.g., having HPE daily but not DPA, incorporating PA into all courses). For example, one parent suggested including "curriculum in teachers' college about the benefits of physical activity throughout the school day" (parent of child in Grade 6), and another "would find ways of using it with other subjects so that while being physical kids can also learn other subjects at the same time" (parent of children in Grades 3, 6, and 8). Some respondents (n = 3) indicated that DPA should be part of HPE, which reflects an unfamiliarity with the policy (10.7% of MUs) and supports the proposal that there be increased parental awareness (9.5% of MUs; e.g., more communication). One parent indicated that she "would like comments from the teacher about [her] children's participation and what is being done to meet the DPA policy requirements" (parent of children in Grades 3, 7, and 8). The remaining two MUs indicated that no changes to the policy should be made.

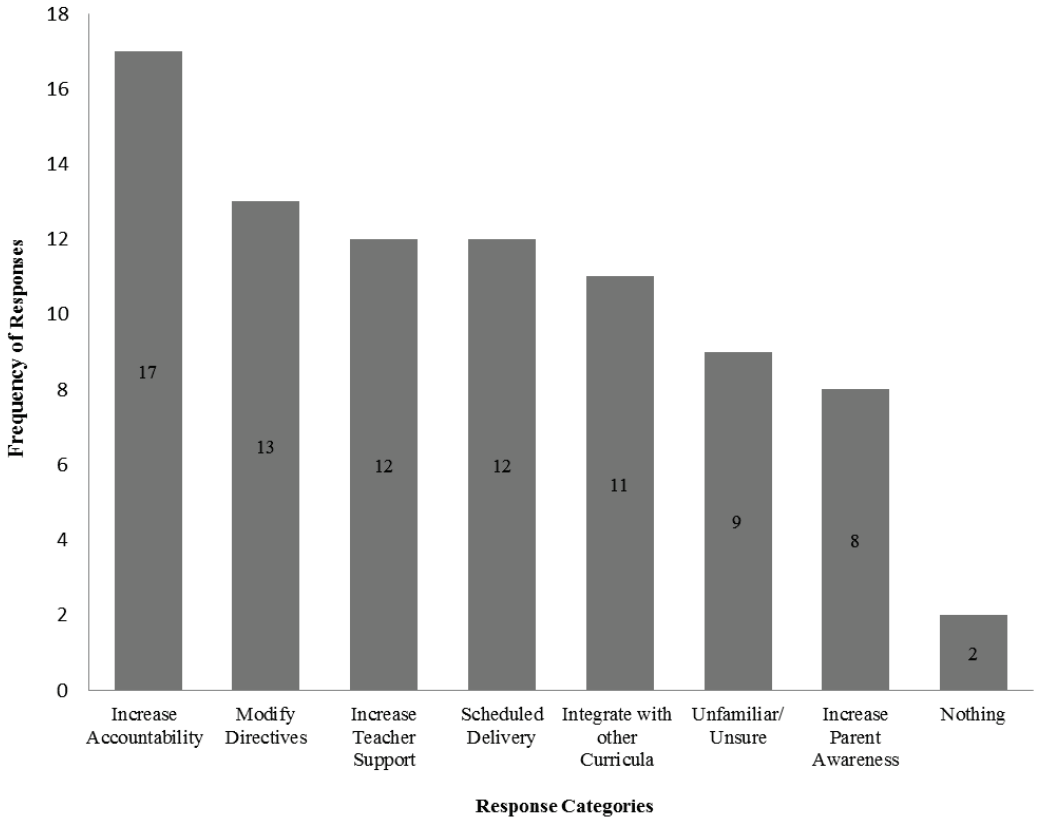

Figure 4.5: Theme Categorizations for Parents' Responses to: "If you could change the DPA policy, what would you do to make it more effective?". Responses from 70 respondents generated 84 meaning units, which were categorized into eight response categories.

Discussion

Study 2 addressed a gap in the relevant literature by surveying parents' awareness and perspectives of Ontario's DPA policy with the overall goal of identifying parent-influenced support needs for the policy's implementation in elementary schools. As informed by the SE model described by McLeroy et al. (1988), Study 2 targeted the interpersonal level of influence on children's school-based PA by surveying parents' perceptions of the home and school settings.

Parents' Awareness and Perceptions of the DPA Policy

The findings from this study show that partnerships between home and school are lacking with respect to DPA promotion and implementation. The majority of parents were

not aware of the DPA policy prior to participating in this study, which may be why teachers have cited a lack of parental engagement as a barrier to its implementation (Study 1). Qualitative responses expanded on the reported lack of awareness, with many parents citing that the DPA policy is not well communicated. Coupled with the belief that there is inadequate accountability surrounding its implementation, having DPA included on students' report cards and in their homework were among the proposed initiatives. Based on their children's grade level, parents with the lowest awareness of the policy were those of children in Grades 1, 2 and/or 3, which is the grade range that receives significantly more DPA, as reported by teachers from the same regions (Study 1). This discrepancy further highlights a lack of communication between schools and families with respect to PA-related goals. For parents who were learning about the DPA policy as they were completing the survey, responses to subsequent questions may have been biased due to a reflexive guardedness surrounding their personal roles as parent stakeholders in DPA delivery (OMOE, 2006a).

Despite being previously unaware of it, most parents did agree that DPA is an important and feasible initiative in elementary schools. The perceived importance of the policy was expanded upon via written responses, which collectively highlighted an endorsement for the incorporation of PA in the school day. These findings are consistent with those indicating that surveyed parents strongly agree with school-based health promotion initiatives in Alberta, including the province's DPA policy (Spitters, Schwartz, & Veugelers, 2009). Although the quantitative measure of suitability indicated that most parents think of the policy's PA directives as adequate in terms of duration, frequency and intensity, many of the written responses advocated for an increased amount of daily PA, and when specified, indicated that it be via increased duration of DPA sessions.

When asked specifically about having DPA on report cards, most parents agreed that it should happen; however, those who self-identified as elementary school teachers were less likely to do so. Pairing this finding with the data that identify elementary school teachers as both more aware of the policy, and less likely to believe in its importance, suggests that these perceptions are reflective of teachers' knowledge surrounding its actual implementation, which previous research suggests is not happening as prescribed (Study 1). Comparing Ontario's DPA policy with DPA policies in other provinces, only British Columbia's mandates that DPA participation is included in report cards; however, considering that none of the Canadian DPA polices are increasing the PA levels of students (Olstad, Campbell, Raine, & Nykiforuk, 2015), the impact of an accountability measure on implementation fidelity is unknown and warrants further research.

Inconsistent and/or suboptimal implementation of the DPA policy was cited as its most disliked characteristic. These negative outcomes have been linked with the flexible delivery model for DPA (Olstad et al., 2015), which gives teachers autonomy in determining how PA is delivered (Allison et al., 2014). However, among the suggestions from parents in this study were the standardization of delivery models and the mandated inclusion of DPA on daily timetables. Data from surveyed Ontario elementary school teachers supports the latter suggestion and indicates that posting DPA on a daily schedule is significantly associated with improved DPA delivery (Study 1). Quantitative responses to specific questions targeting DPA scheduling gave equivocal results regarding the use of instructional time, and suggested that the use of HPE time was supported by parents. In their short answer responses, some parents suggested that the directives of the policy be integrated with academic curricula throughout the day, and others suggested that they be integrated into a modified HPE

curriculum that has increased time dedicated to PA (as opposed to being mandated separately as a policy). A search of OMOE policies and programs, and a review of the curricula, did not reveal any other provincial policies that were also a required component of a specific curriculum, as the DPA policy is with the HPE curriculum. Rather, a resource document has been prepared to assist teachers in bringing environmental education into the classroom in each subject area in Grades 1 to 8 and kindergarten (OMOE, 2011), which identifies a precedent for the integration of DPA into all subjects, as proposed by some parents. Further research exploring existing cross-curricular opportunities for HPE is suggested in order to identify schools /teachers that/who model this delivery, thereby facilitating the identification of effective practices for DPA integration into the curricula.

Together, these findings highlight a need for increased communication between schools and families regarding the DPA policy. While parents appear to be supportive of its specific directives, there is a belief that it is not happening due to its absence from report cards and ambiguity in delivery strategies.

Parental Attitudes, Support, and Perceptions Surrounding PA Promotion and Delivery

Considering the importance of the home environment in shaping children's PA behaviours (Golan, 2006), an understanding of parents' attitudes, behaviours (i.e., support) and perceived responsibilities surrounding PA promotion and delivery is necessary for developing strategies that increase parents' awareness and foster their support of the DPA policy.

Parental attitudes and support. Findings from the quantitative and qualitative data consistently indicated that parents' values and beliefs in the importance of PA align with the available health-based evidence (e.g., Bailey, Hillman, Arent, & Petitpas, 2013; Janssen &

LeBlanc, 2010), and with the tenets of the DPA policy (OMOE, 2005a, b). Measures of their support were less conclusive and appeared to be influenced by demographic factors. Support was higher among parents employed in a field related to health promotion and was lower if their children were in Grades 4, 5 and/or 6. Perceived barriers surrounding out-of-school PA participation, such as time constraints and the cost associated with these activities, did not appear to influence parental support, but were more prevalent among parents living in South Western Ontario.

Perceived responsibilities and relative contribution: School versus family. Individual measures of the school's and family's responsibilities for promotion and delivery of children's PA indicated that parents believe both institutions play an important role. Comparing these measures indicate an imbalance, with the school having a greater perceived responsibility. Written responses suggested that the imbalance may be due to the amount of time that children spend at school, which, according to survey data collected by the Canadian Education Statistics Council (2014), averages 8,282 cumulative instructional hours between the ages of 6 and 14 years. However, family-mediated opportunities (organized sports, active play, and active transportation) contributed a greater amount to children's overall PA than school-based opportunities (DPA, HPE, and recess), suggesting that most children participate in more PA outside of school than during the school day. These ratings were based on parent perceptions and may be confounded by their unawareness of the DPA policy and its relative contribution.

Informed by multivariable analyses, parents whose attitudes align with the tenets of the DPA policy (i.e., regular PA has a positive impact on children) are more likely to believe that schools play an important role in PA promotion/delivery, and are distinguished from

parents whose children receive more of their PA at school, as their children receive a balanced amount of their PA from both institutions (school and family). Parents whose children receive more of their PA at school had significantly more home-based barriers, the reported presence of which distinguishes them from parents whose children receive most of their PA out of school (i.e., from family-mediated PA). This outcome is supported by written responses, which addressed the fact that schools offer a central location where the full socioeconomic spectrum of the population can be reached (Fox, Cooper, & McKenna, 2004; Konu & Rimpelä, 2002; Pate et al., 2006; Speigel & Foulk, 2006), and can therefore provide an opportunity to promote PA for all children, regardless of their life circumstances (Naylor & McKay, 2008). Finally, parents who are supportive of an active lifestyle are more likely to believe that family plays an important role in children's PA, and both characteristics, together with a belief in the importance of the DPA policy, are attributed to parents whose children receive most of their PA from family-mediated initiatives. This finding adds to the relevant evidence base advocating for parental support, which shows that parental modeling of PA (validation support) (van der Horst et al., 2007) and social support (De Lepeleere, DeSmet, Verloigne, Cardon, & De Bourdeaudhuij, 2013; Gustafson & Rhodes, 2006) promote children's PA.

Together, the perceived role of schools, and the finding that many children receive most of their PA at school rather than via family-mediated activities, underscores the importance of school-based initiatives for PA promotion and delivery. However, despite these perceptions and the amount of time that children spend at school, the home environment remains the most important setting for shaping children's PA (Golan, 2006). Further, given that the DPA policy covers only up to one third of the 60 minutes of PA

recommended for children, additional family-mediated PA is required. Therefore, resources should be developed to help extend tenets of the policy into homes, thereby increasing parents' capacity to provide support for their children's PA, which, as evidence herein, is predictive of increased family-mediated PA, and as shown elsewhere (Shen et al., 2016), is associated with children's enjoyment in school PA.

More in-depth qualitative exploration of parental beliefs and ideas for improving communication between the school and home settings is warranted through the use of parent focus groups and/or interviews. Further, additional formative research is required on how parents view their role in facilitating their children's participation in school-based PA. Although Study 2 was not designed using the Theory of Planned Behaviour (TPB), findings indicate that elements of this theory; namely, parents' attitudes, behaviours, and perceptions of their roles and barriers (i.e., Perceived Behavioural Control; PBC) surrounding their children's participation in regular PA were associated with DPA-related outcomes. The TPB proposes that behavioural intentions and behaviours result form a rational process of decision making that is influenced by attitudes, subjective norms, and PBC (Ajzen, 1991; Rimer, 2008), and its predictive utility has been demonstrated in parents' roles as health promoters for children (Andrews, Silk, & Eneli, 2010). Specifically, attitudes, subjective norms, and PBC predicted behavioural intentions, and behavioural intentions predicted parents' provision of healthy foods for their children (Andrews et al., 2010). Therefore, constructs from the TPB represent applicable variables to include in future studies designed to increase parent engagement and support of the DPA policy.

Some limitations of this study need to be addressed. Surveys are subjective measures and are therefore subject to human error in the form of recall bias and individual

interpretations of the questions (Kohl, Fulton, & Caspersen, 2000; Trost, 2007). Further, in light of the concurrent labour disputes with elementary school teachers at the time of survey distribution, parents' perceptions of teachers' roles may have been negatively influenced. For this study, the survey instrument was uniquely designed and as such did not undergo rigorous validation and reliability analyses. Results were generated from a sampled population that was not representative of the province's demographics; therefore, generalizability of the findings may be limited. Compared with the province's population (Statistics Canada, 2013a, b), the sample for this study has a much higher representation from the North, especially North Eastern Ontario, and a much lower representation from Central and South Western Ontario. Accordingly, representation from the First Nations population was higher than that of the provincial but lower than that of the regional (North East) average, and the reverse is true for respondents who identified in an 'other' racial/ethnic group. The sampled population also has a much higher income and education level than the provincial and regional averages, and an over-representation of teachers and workers in health promotion. Together, the demographics of the sampled population indicate an over-representation of motivated populations with respect to PA promotion and participation, and an under-representation of populations that have lower socioeconomic status and belong to a minority racial/ethnic group. This is a relevant gap in the data considering that the under-represented populations are at higher risk for physical inactivity and the associated negative health effects (Janssen, Boyce, Simpson, & Pickett, 2006; Marshall et al., 2007; Seefeldt, Malina, & Clark, 2002). Finally, some of the statistical findings need to be interpreted with caution. Survey items capturing children's participation in PA during and outside of school were based on parent ratings rather than being quantified objectively (e.g., PA log,

accelerometers); therefore, calculations for and analyses with the Main PA Source are open to interpretation. Two of the constructs (family responsibility and home-based barriers) had questionable reliability ($\alpha = 0.6 \geq 0.7$) suggesting that items within each composite may not have been measuring the same latent construct (George & Mallery, 2003). Moreover, the moderate predictive capacity and classification rate of the DFA, coupled with the relatively small univariate effect sizes of the variables, suggests that a different combination of variables not accounted for in this design would better predict group membership.

Conclusions

Findings from Study 2 indicate that the majority of the sampled parents were not previously aware of the DPA policy. Despite this lack of awareness, the school's role in PA promotion/delivery was perceived to be greater than the family's, and half of the parents relied on schools for at least an equal contribution to their children's PA. Adding to the evidence base advocating for parental support of children's PA promotion (De Lepeleere et al., 2013; Gustafson & Rhodes, 2006; van der Horst et al., 2007), parents who self-rated as supportive of an active lifestyle were more likely to believe that family plays an important role in children's PA, and less likely to rely on schools for their children's PA. The involvement of parents in school-based programs is an important and modifiable underlying influence of children's PA (Ickes, Mahoney, Roberts, & Dolan, 2016). While findings from this study support a need for increased parental involvement with the DPA policy, further research is required to determine how to effectively foster this involvement. Moving forward, recommended strategies informed by the findings herein include: (1) regular correspondence to parents about DPA and healthy living education (e.g., using school websites and/or social media); (2) formalizing learning outcomes for DPA to facilitate the

inclusion of a '(not) meeting DPA requirements' statement on report cards; and, (3) engaging parents in DPA planning, promotion and/or delivery (e.g., via information sessions and/or family-based "active homework"). The first and second recommendations directly address the lack of parental awareness surrounding the DPA policy, and the third, which re-iterates a suggestion from the Principal's DPA Resource Guide (OMOE, 2006b), strives to increase parents' capacity to provide support, both for PA in general and for the delivery of DPA in their children's schools.

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Chapter 5: Evaluation of Physical Activity Interventions in Children via the Reach, Efficacy/Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) Framework: A Systematic Review of Randomised and Non-Randomised Trials[1] (Study 3)

The importance of physical activity (PA) for health is evident and well-defined (Bailey, Hillman, Arent, & Petitpas, 2013). The literature suggests that participation in regular PA, especially in childhood, can foster healthy human development and equip individuals and communities with sustainable health promotion and disease prevention practices (Boreham & Riddoch, 2001; Kelder, Perry, Klepp, & Lytle, 1994). Unfortunately, global data suggest that the majority of school-aged children (5 to 11 years) and adolescents (12 to 17 years) are not participating in the recommended daily 60 minutes of moderate-to-vigorous physical activity (MVPA) (Physical Activity Guidelines Advisory Committee, 2008; Tremblay et al., 2011, 2014; WHO, 2010). Self-reported PA data from 39 countries show that only 23% of children aged 11 years met the recommended guidelines (Currie et al., 2012). Therefore, it is important to study the effectiveness and efficacy of different PA

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interventions in order to develop appropriate programmatic strategies to promote children's PA participation.

To that end, many systemic reviews and meta-analyses of PA interventions for young people have been conducted (Atkin, Gorely, Biddle, Cavill, & Foster , 2011; Brown & Summerbell, 2008; Jago & Baranowski, 2004; Kriemler et al., 2011; Lai et al, 2014; Lonsdale et al., 2013; Lubans, Morgan, & Tudor-Locke, 2009; Metcalf, Henley, & Wilkin, 2012; Rees et al., 2006; Salmon, Booth, Phongsavan, Murphy, & Timperio, 2007; Strong et al., 2005; van Sluijs, Kriemler, & McMinn, 2011). However, most of these studies include a broad age range for participants and have made little distinction between the intervention effects on younger (i.e., children) versus older (i.e., adolescents) participants. Further, of the studies that reviewed PA interventions in children exclusively (Biddle, Braithwaite, & Pearson, 2014; Kellou, Sandalinas, Copin, & Simon, 2014; Norris, Shelton, Dunsmuir, Duke-Williams, & Stamatakis, 2015; Salmon, Brown, & Hume, 2009) or separately from other age groups (Timperio, Salmon, & Ball, 2004; van Sluijs et al., 2007), all primarily focused on the efficacy/effectiveness (i.e., internal validity) of the interventions by attempting to provide evidence of a causal relationship between intervention strategies and increased PA levels. In so doing, the generalizability and translatability (i.e., external validity) of the results have not been addressed in this population, thereby underscoring the need for research that focuses on the translation of health behaviour interventions into practice (Loef & Walach, 2015).

To address the research-practice gap, Glasgow et al. (1999, 2004) designed the five-dimension RE-AIM (Reach, Efficacy/Effectiveness, Adoption, Implementation, Maintenance) evaluation framework. The RE-AIM model expands assessments of interventions beyond *Efficacy/Effectiveness*, which addresses the impact of an intervention

on important outcomes when tested under optimum conditions (efficacy) or in real-world settings by individuals who are not part of the research team (effectiveness) (Flay, 1986; Glasgow, Lichtenstein, & Marcus, 2003). *Reach* and *Adoption* dimensions address the generalizability of an intervention by respectively considering: (i) the extent to which a sample of participants reflects the entirety of the potentially eligible population; and, (ii) the potential influences of the intervention's site characteristics on the intervention's delivery (Glasgow, Vogt, & Boles, 1999; Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004). Translatability of an intervention into an applied setting is addressed via the *Implementation* and *Maintenance* dimensions, which jointly consider the extent and fidelity of the intervention, and the costs associated with its delivery and institutionalization (Glasgow et al., 1999, 2004). Collectively, the RE-AIM dimensions form a model that considers the population health impact of an intervention by balancing the emphasis on internal and external validity.

The RE-AIM framework has been successfully applied to a number of health behaviour interventions (e.g., obesity prevention) (Duffy et al., 2015; Martínez-Donate et al., 2015; Thomas, Krevers, & Bendtsen, 2015), and has demonstrated utility in guiding literature reviews focused on assessing the internal and external validity of health promotion intervention research (Akers, Estabrooks, & Davy, 2010; Allen, Zoellner, Motley, & Estabrooks, 2011; Bellicha et al., 2015; Dzewaltowski et al., 2004; Klesges, Dzewaltowski, & Glasgow, 2008). More specifically, the RE-AIM framework has been used to guide PA interventions in children (de Meij et al., 2010; Dunton, Lagloire, & Robertson, 2009; Janssen, Toussaint, van Mechelen, & Verhagen, 2013; Nigg et al., 2012), adolescents (Jenkinson, Naughton, & Benson, 2012), and adults (Caperchione et al., 2015; DerAnanian,

Desai, Smith-Ray, Seymour, & Hughes, 2012), and to evaluate reviews of PA interventions in adolescents (McGoey, Root, Bruner, & Law, 2015) and/or adults (Antikainen & Ellis, 2011; Bellicha et al., 2015; Blackman et al., 2013; White, McAuley, Estabrooks, & Courneya, 2009). However, there has yet to be a review of PA interventions in children conducted using the RE-AIM framework. Therefore, the purpose of this article is to present the findings of a RE-AIM review in order to address the following research question: to what extent are randomised and non-randomised PA interventions in children reporting internal and external validity measures. These findings will be used to inform future intervention strategies to improve the implementation of school-based policies intended to increase the PA levels of elementary school children. To facilitate a comprehensive investigation of effective strategies, the scope of the review was broadened from the school setting to include all contexts in which children's PA behaviour can be targeted. The findings reported herein complement those reported in a previous review (McGoey et al., 2015), which focused on PA interventions in adolescents and similarly assessed their generalizability across settings and populations, and considered variables that may have moderated the interventions' efficacy/effectiveness, such as cost and implementation fidelity (Glasgow et al., 2003, 2004).

Method

Database Search and Study Inclusion

Five electronic databases (Pubmed, Nursing and Allied Health Literature, SPORTDiscus, PsycINFO, and Educational Resources Information Center) were searched for articles written in English and published in peer-reviewed journals from January 2003 to January 2015. At the time of study commencement, 2003 represented a 10-year period. For each database, the following search terms were used: (physical activity OR fitness OR

exercise OR physical education OR sport OR running) AND (random OR controlled OR trial OR clinical OR intervention) AND (programs OR strategy OR initiative OR promotion OR curriculum) AND (effectiveness OR sustainability OR feasibility OR implementation) AND (child OR youth OR juvenile OR boy OR girl). After removal of duplicate citations and screening of abstracts, 692 full-text articles were assessed. To be eligible: studies had to include a direct comparison between intervention and control/comparison groups, which could be formed by random assignment (experimental) or included in the study as intact units (quasi-experimental); mean age for participants had to be 5 to 11 years old (defined as the age range for children in the Canadian Physical Activity Guidelines; Tremblay et al., 2011) and not selected on the basis of having a health problem; and, outcomes had to include a measure of PA participation and/or psychosocial status related to PA behaviour change. All intervention settings, strategies, and types of assessment were eligible for inclusion. The final review included 104 articles representing 78 unique interventions (see Figure 5.1).

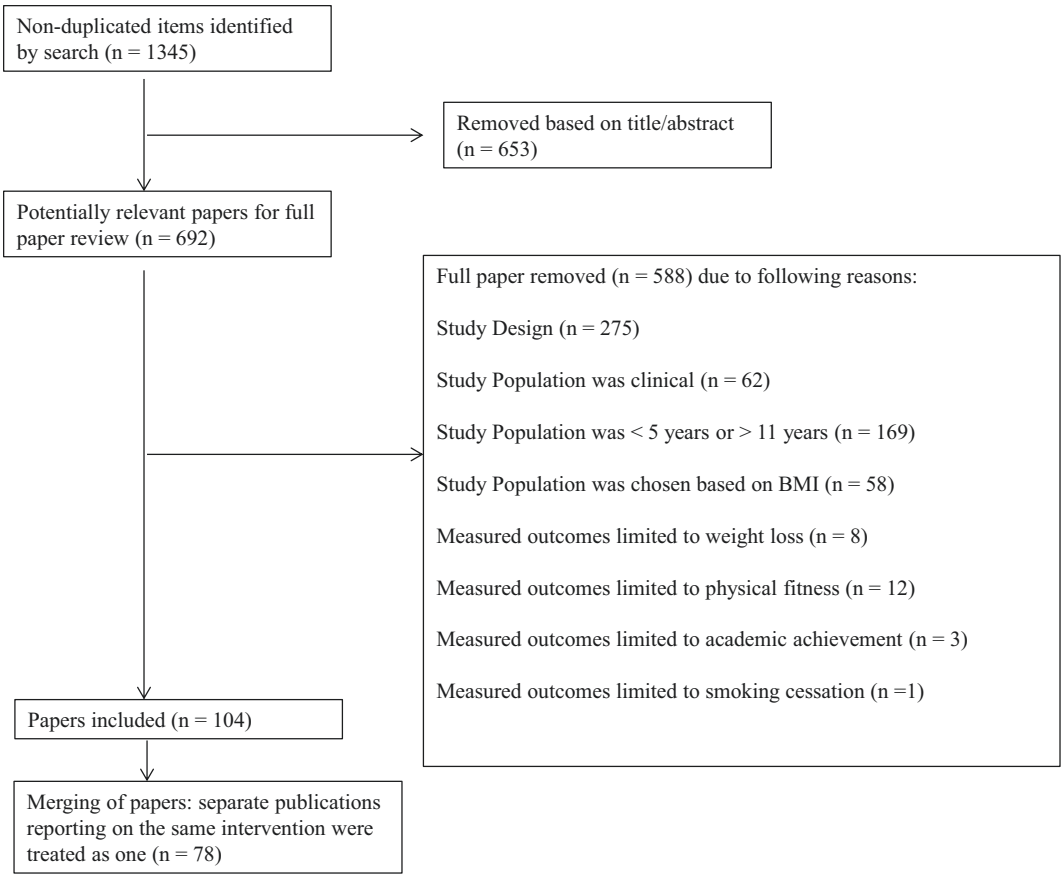

Figure 5.1: Selection of Physical Activity Interventions for Inclusion in RE-AIM Review.

RE-AIM Coding and Scoring

Two members of the research team (first and second authors) independently coded all eligible articles based on the presence (1) or absence (0) of components for each RE-AIM dimension (defined in Table 5.1). Initial percent agreement was 89.8%, and all discrepancies were resolved by discussion. Following resolution, frequency counts and percentages were recoded for each RE-AIM component, and means were calculated for each RE-AIM indicator using Microsoft Excel 2007. Components were derived from a reliable extraction tool (Akers et al., 2010; Dzewaltowski et al., 2004; Estabrooks et al., 2002; Glasgow et al., 2004) that was developed based on the RE-AIM framework. Presence of psychosocial measures, baseline activity, and use of theory were added to the Efficacy/Effectiveness

dimension to ensure relevancy with the behaviour (PA) and population (children) under review. Descriptions of the intervention location and staff delivering the intervention were added to the Adoption dimension, and cost of maintenance was added to the Maintenance dimension, as informed by other RE-AIM reviews of health behaviour interventions (Allen et al., 2011; Blackman et al., 2013)

Table 5.1

Proportion of Physical Activity Interventions Reporting RE-AIM Dimensions and Components

Dimension Component	Number Reporting	Percent Reporting[a]
Reach		
Method to identify target population	73	93.6
Inclusion criteria	78	100.0
Exclusion criteria	24	30.8
Sample size	78	100.0
Participation rate	58	74.4
Characteristics of participants	78	100.0
Characteristics of non-participants	8	10.3
Efficacy/Effectiveness		
Measures and results	78	100.0
Intent-to-treat analysis utilized	19	24.4
Presence of psychosocial measures	37	47.4
Participant attrition	62	79.5
Baseline activity reported	64	82.0
Theory-based	46	59.0
Adoption		
Description of intervention location	77	98.7
Description of staff delivering intervention	76	97.4
Methods used to identify staff	8	10.3
Level of expertise of staff	58	74.4
Inclusion/exclusion criteria for setting and staff	0	0.0
Adoption rate	1	1.3
Characteristics of adoption/non-adoption	1	1.3
Start-up costs	12	15.4
Implementation		
Type, frequency, intensity of intervention	78	100.0
Extent to which protocol was delivered	47	60.3
Cost of delivery	15	19.2
Maintenance		
Assessed outcomes ≥ 6 months post-intervention	10	12.8
Current status of program/policy	17	21.8
Cost of maintenance	5	6.4

Notes. [a]Based on denominator of 78 interventions

Results

The characteristics of the reviewed interventions and measured outcomes are summarized in Table 5.2 and expanded upon in Appendix J.

Table 5.2

Intervention Characteristics of Studies Reviewed

Intervention (+ companion publications[a])	Int. Setting + Strategy[b]	Int. Length (wks)[c]	Int. Focus	PA measure	Targeted sub-population	Sig. Outcomes[d]	
						PA[e]	PS[f]

Table 5.2

Intervention Characteristics of Studies Reviewed

Intervention (+ companion publications[a])	Int. Setting + Strategy[b]	Int. Length (wks)[c]	Int. Focus	PA measure	Targeted sub-population	Sig. Outcomes[d]	
						PA[e]	PS[f]
Cluster randomized controlled trials (51.3% of studies)							
Angelopoulos et al., 2009[a1]	III[b3]	48	Effect[1]	S-R	Low SES	Yes	NM
Butcher et al., 2007	II	1	Effect[2]	Ped	No	Yes	NM
Caballero et al., 1998[a2]	III[b3]	96	Effect[1]	S-R	Rural A. Indian	Yes[°1]	Yes
Christodoulos et al., 2006	III	32	Effect[2]	S-R	No	Yes	Yes
Efrat, 2013	II	6	Effic[2]	Acc	No	No	NM
Fairclough et al., 2013	I[b3]	20	Effect[2]	Acc	Low SES	Yes	NM
French et al., 2005	IV[b3]	104	Effic[2]	S-R	♀s	No	NM
Gentile et al., 2009	III[b3]	32	Effect[2]	Ped	No	No	NM
Goran and Reynolds, 2005	III[b2]	8	Effic[1]	Acc	No	Yes[◊2]	Yes
Grydeland et al., 2013[a3]	III[b3]	80	Effect[2]	Acc	No	Yes	Yes
Hands et al., 2011	V	24	Effic[2]	P-R	No	Yes[°2]	NM
Horne et al., 2009	I	14	Effic[1]	Ped	No	Yes	NM
Huberty et al., 2014[a4]	II[b1]	32	Effect[1]	Acc,	No	Yes[◊5]	NM
Kain et al., 2014	III[b3]	48	Effect[1]	Ped	No	No[□]	NM
Keihner et al., 2011	I[b3]	8	Effect[2]	N/A	Low SES	NM	Yes
Kipping et al., 2014[a5]	III[b3]	32	Effect[1]	Acc	No	No	NM
Kiran et al., 2010	I	12	Effect[1]	S-R	No	No	No
Levy et al., 2012	III[b3]	24	Effect[1]	S-R	No	No	Yes
Loucaides et al., 2009	II[b1]	4	Effect[1]	Ped	No	Yes	NM
Magnusson et al., 2011	I[b3]	64	Effect[2]	Acc	No	Yes[◊3,4]	NM
Mahar et al., 2006	I	12	Effect[1]	Ped	No	Yes	NM
McNeil et al., 2009	III	44	Effect[1]	S-R	Low SES	Yes	No
Meyer et al., 2014[a6]	I	32	Effect[1]	Acc	No	Yes	No
Michaud et al., 2012	I	12	Effect[1]	S-R	No	Yes	NM
Muth et al., 2008	I[b3]	12	Effect[1]	S-R	Rural area	No	No
Naylor et al., 2008[a7]	III	44	Effect[2]	S-R, Ped	No	Yes[◊1,8]	NM
Olvera et al., 2010[a8]	V[b3]	12	Effic[1]	Acc	♀s (Latina)	No	NM
Pangrazi et al., 2003	I	12	Effect[1]	Ped	No	Yes[◊2]	NM
Rosenkranz et al., 2010	IV+V[b3]	16	Effect[1]	S-R, Acc	♀s	Yes[◊5]	NM
Rowland et al., 2003	III	32	Effic[2]	P-R	No	No	NM
Salmon et al., 2005[a9]	I	36	Effect[1]	Acc	Low SES	Yes	Yes
Salmon et al., 2011	I	7	Effect[1]	S-R	Low SES	No	No
Spiegel et al., 2006	III[b3]	24	Effect[1]	S-R	No	No	NR
Trost et al., 2009	IV	4	Effic[1]	Ped	No	Yes	No
Verstraete et al.,2007a[a10]	III	64	Effect[2]	S-R,	No	Yes[°°]	No
Verstraete et al., 2006	II	12	Effic[2]	Acc	No	Yes	NM
Wen et al., 2008	III	64	Effect[1]	S-R, P-R	No	Yes[◊9]	NM
Williamson et al., 2007	III[b3]	64	Effic[1]	S-R	No	No[□]	No[d]
Wilson et al., 2011	II	17	Effic[1]	Acc	Low SES	Yes[◊4]	Yes[◊4]
Yildrim et al., 2014	III[b1]	72	Effect[2]	Acc	No	Yes[◊4]	Yes[◊2,4]
Non-randomized trials with a comparison group (38.5% of studies)							

Table 5.2

Intervention Characteristics of Studies Reviewed

Intervention (+ companion publications[a])	Int. Setting + Strategy[b]	Int. Length (wks)[c]	Int. Focus	PA measure	Targeted sub-population	Sig. Outcomes[d]	
						PA[e]	PS[f]
Barr-Anderson et al., 2012	III[b3]	6	Effect[2]	S-R	Low SES	Yes[◊2]	NM
Boyle-Holmes et al., 2010	I	64	Effect[2]	S-R	No	Yes[◊7]	Yes
Chin & Ludwig, 2013	II	12	Effect[2]	PAO	No	Yes	NM
Coleman et al., 2005	III[b3]	96	Effect[2]	PAO	Low SES	Yes	NM
Cradock et al., 2014	III	12	Effect[2]	Acc	No	Yes	NM
Digelidis et al., 2003	I	32	Effect[2]	S-R	No	No	Yes
Erwin et al., 2011	I	32	Effect[2]	Ped	No	Yes	NM
Farley et al., 2007	IV	104	Effect[2]	PAO	Low SES	Yes	NM
Gabriel et al., 2011	II	12	Effic[2]	S-R	♀s	Yes	Yes
Gao & Xiang, 2014	II[b2]	36	Effic[2]	S-R	Low SES	Yes	NM
Gorely et al., 2009	III[b3]	40	Effect[2]	Ped	No	Yes[◊◊]	No
Gortmaker et al., 2012	IV[b3]	24	Effect[1]	Acc	No	Yes	NM
Harrison et al., 2006	I	16	Effic[1]	S-R	Low SES	Yes	Yes
Herbert et al., 2013	III[b3]	12	Effect[1]	S-R	No	No	NM
Herrick et al., 2012	II	20	Effect[1]	S-R, Acc	Low SES	No	Yes
Janssen et al., 2011[a11]	II	32	Effect[1]	PAO	Low SES	Yes	NM
Jordan et al., 2008	I[a3]	32	Effect[1]	S-R	No	No	NR
Jurg et al., 2006[a12]	III	32	Effect[1]	S-R	Low SES	Yes[◊7]	Yes
Kafatos et al., 2007[a13]	III[b3]	192	Effect[1]	S-R	Rural	Yes	NM
Kelder et al., 2005	IV[b3]	20	Effect[1]	PAO	No	Yes	No
Kelly et al., 2012	II[b1]	6	Effect[1]	PAO,	Low SES	No	NM
Pate et al., 2003	III	72	Effect[1]	S-R	Rural, low SES	No	No
Puma et al., 2013	I[b3]	64	Effect[1]	S-R	Rural	No	No
Ridgers et al., 2007	II[b1]	< 1	Effect[1]	Acc	Low SES	Yes	NM
Sharpe et al., 2011	IV	32	Effect[2]	PAO	No	No	NM
Stratton & Mullan 2005	II[b1]	< 1	Effect[2]	Tel	Low SES	Yes	NM
Taylor et al., 2007[a14]	III[b3]	64	Effect[1]	S-R, Acc	No	Yes[◊4,5]	NM
vanBeurden et al., 2003	I	32	Effect[2]	PAO	No	Yes	NM
Wilson et al., 2005	II	4	Effic[2]	Acc	Low SES	Yes	Yes
Wood et al., 2014	II	2	Effect[2]	Acc	No	Yes	No
Randomized controlled trials (10.2% of studies)							
Armitage et al., 2010	II	< 1	Effic[2]	S-R	Low SES	Yes	Yes
Chen et al., 2010	V[b3]	8	Effic[1]	Ped	Chinese A.	Yes	Yes
Hovell et al., 2009	V[b3]	8	Effic[2]	S-R	No	No	NM
Mark & Rhodes, 2013	V[b2]	6	Effect[1]	S-R	No	Yes	NM
Morgan et al., 2011	V[b3]	12	Effic[1]	Ped	No	Yes	NM
Morrison et al., 2013	V	10	Effic[1]	S-R, Acc	No	No	No
Roemmich et al., 2004	V	6	Effic[1]	Acc	No	Yes	NM
Warren et al., 2003	III[b3]	32	Effic[1]	S-R	No	No	NM

Notes. Int.= intervention, *PA* = physical activity, *PS* = psychosocial, *PE* = physical education, *Sig* = statistically significant, *NM* = not measured/not compared to a control or comparison group, *NR* = not reported, *PAO* = physical activity observation, *S-R* = self-report, *Acc* = accelerometer, *Ped* = pedometer, *Tel* = telemeter, *P-R* = parental-report, *SES* = socioeconomic status, *A* = American; *Effect* = Effectiveness; *Effic* = Efficacy ([1]specified in study; [2]coded by researcher), *I* =

school-based (curricular), *II* =: school-based (extra-curricular), *III* = school-based (multi-level), *IV* = community-based, *V* = family-based.
[a] Interventions with separate publications in which additional outcomes were measured: ([1]Angelopoulos et al., 2006) ([2]Caballero et al., 2003; Davis et al., 2003; Stevens et al., 2003; Stone et al., 2003; Teufel et al., 1999; Going et al., 2003; Steckler et al., 2003) ([3]Bergh et al., 2012; Lien et al., 2010) ([4]Huberty et al., 2011) ([5]Lawlor et al., 2011; 2013) ([6]Kriemler et al., 2010; Zahner et al., 2006) ([7]Naylor et al., 2006) ([8]Olvera et al., 2008) ([9]Salmon et al., 2006; 2008) ([10]Verstraete et al.,2007b; Cardon et al.,2009) ([11]Janssen et al., 2013) ([12]de Meij et al., 2011; 2010) ([13]Manios et al., 2006) ([14]Taylor et al., 2006). [b] Intervention strategy ([1] included the use of playground markings) ([2]incorporated computer-based delivery) ([3]targeted both PA and dietary behaviour). [c]32 weeks = 1 school year; 64 weeks = 2 school years; 96 weeks = 3 school years; 128 weeks = 4 school years, 4 weeks=1 month. [d] Yes = primary PA and/or PS measure reported a statistically significant difference compared to a control or comparison condition. [e] PA context (with output measures) include: leisure time PA (measured via the implementation of school travel plans and percentage of students who walked to and from school, in minutes of MVPA/day, as percentage of time spent in MVPA on the playground or during girl scout troop meeting, number of children outdoors and physically active, usage of exercise equipment, and steps/minute); overall PA participation (measured in steps/day, daily counts/minute and minutes of accumulated MVPA, MPA and/or VPA, frequency of engagement in organized sport activities, and energy expenditure in METS); recess PA levels (measured in counts/minute, as percentage of students engaged in VPA, percentage of time spent in MVPA, VPA and/or LPA, energy expenditure in METS, and steps/minute); and, in-school PA levels (measured in minutes spent in bouts of VPA, counts/minute, and steps/day). [f] measured outcomes include: PA-based knowledge, self-efficacy, enjoyment, intentions, attitude, outcome expectancy, motivation, self-esteem, and perceptions of social support from teachers, school environment, advantage of regular PA, and individual PA levels. □ Not adequately powered to detect statistically significant differences or statistical significance not specified. [◊]only for: [1]S-R data; [2]♀s; [3]♂s; [4]mid-point data; [5]Acc data; [6]sedentary children, [7]select age groups, [8]♂s Ped data, [9]P-R data. °sub-sample measured with ([1]Acc) ([2]Ped) did not have significant outcomes. °°sub-sample(s) measured with Acc also had significant outcomes

RE-AIM Dimensions and their Components

Table 5.1 summarizes the number and percent of studies reporting on each of the RE-AIM components. The average comprehensiveness of reporting score was 14.2 (ranged from 9 to 20) out of a possible 27 components. The majority of the studies (80.8%) reported on approximately 50% (11 to 17) of the RE-AIM components. Of the remaining studies, five reported on only 35% (9 or 10) and ten reported on more than 65% (18 to 20) of the RE-AIM components.

Reach. Baseline sample sizes ranged from 18 to 2258 (*Mdn* = 319.5) participants. In the cluster RCTs, the number of clusters ranged from 2 to 69 (*Mdn* = 15). All studies reported the age (range = 5 to 11 years) and sex of the participants; most included a racial/ethnic distribution, measures of socioeconomic status (SES), and anthropometry (e.g., weight, height); and some reported characteristics such as language literacy and geographical residence (e.g., urban versus rural). Some of the interventions (38.5%) targeted specific sub-

populations (see Table 2) and most were conducted in North America (53.8%) or Western Europe (25.6%).

When reported, participation rate was between 4.3% and 100% (*Mdn* = 76.7%) at the student level and between 12% and 100% (*Mdn* = 44.5%) at the school level. The eight studies that reported on the representativeness of the recruited participants compared to the non-participants found no differences (Cradock et al., 2014; Gortmaker et al., 2012; Grydeland et al., 2013), that participating students were more likely to have been already active (Jurg, Kremers, Candel, Van der Wal, & de Meij, J., 2006), or that non-participating schools had lower (Gabriel, DeBate, High, & Racine, 2011) or higher (Janssen et al., 2013) enrolment, or were already involved in community-based health initiatives (Rowland, DiGuiseppi, Gross, Afolabi, & Roberts, 2003). The authors of the eighth study (McNeil, Wilson, Siever, Ronca, & Mah, 2009) were denied access to the non-participant data and were therefore unable to make comparisons.

Efficacy/Effectiveness. All reviewed articles included measures of PA participation (52.6%), PA-related psychosocial outcomes (1.3%), or both (42.3%) (see Table 2). PA outcomes (reported most frequently as time engaged in overall PA) were measured in 77 studies, 53 of which reported statistically significant improvements in PA behaviour compared to controls. Psychosocial outcomes were measured in 34 of the studies (54.3% were theory- and 28.1% were non-theory-based), 18 of which reported statistically significant improvements. Of the studies that specified an intervention focus, 33 and 12 identified as effectiveness and efficacy trials, respectively. The remaining 33 were coded as effectiveness trials (n = 23) if they were implemented by regular staff and relied on existing resources and/or procedures, or as efficacy trials (n = 10) if they were implemented by the

research staff (Glasgow et al., 2003). The percentage of studies that assessed PA with objective measures (e.g., accelerometers, pedometers, telometers) alone (40.3%) or in combination with observation or self-report measures (9.1%) was roughly equal to the percentage of studies that assessed PA solely by observation and/or self-/parental-report (50.6%).

Sub-analyses of PA outcomes indicated that study design did not appear to influence results, with 62.5%, 66.7%, and 73.3% of the randomised controlled trials (RCT), cluster RCT, and non-randomised trials reporting significant findings, respectively. Similarly, the percentages of studies reporting significant findings were comparable for effectiveness (70.9%) and efficacy (63.6%) trials, as well as for studies that did (72.4%) and did not (66.7%) target sub-populations. However, the PA measure used, as well as the intervention setting and strategy did appear to influence measured outcomes. Of the interventions that used objective measures (alone or in combination with self-report or observation), 78.9% reported significant differences in PA levels between experimental and control groups, compared with 59% of those that relied solely on observation and/or self-/parental-report.

Considering intervention setting, school-based studies (n = 62) were the most successful, with 69.3% of the studies reporting significant positive PA outcomes. Of these, the extra-curricular interventions delivered after-school and/or during recess (n = 17) were most promising, with 82.3% of the studies showing significant differences between intervention and control groups. The school-based interventions that included policy strategies and/or community and family linkages (multi-level) (n = 27) and those that were curriculum-based (n = 18) were also relatively successful, with 63% and 66.7% of the studies, respectively, reporting significant results. For the interventions that were performed

in a community- and/or family-based setting (n = 15), 66.7% reported statistically significant differences in PA outcomes. Examining intervention strategy, of the school-based interventions that included playground markings, 83.3% reported significant findings. Across setting types, the use of computer-based implementation tools (n = 3) was unanimously effective, with one delivered as curricular interactive animated lessons (Goran & Reynolds, 2005) and two delivered in the form of exergaming during recess (Gao & Xian, 2014) or at home (Mark & Rhodes, 2013).

Slightly more than half of the interventions (59%) were theory-based, most of which applied one or more of the following theories: social cognitive theory (SCT) (Bandura, 1998), the theory of planned behaviour (TPB) (Ajzen, 1991), and social-ecological (SE) models (McLeroy, Bibeau, Steckler, & Glanz, 1988; Stokols, 1992). The SCT was the most frequently referenced theory and was applied either alone (n = 15) or in combination with another theory (n = 13). The TPB and a SE model each singularly informed four studies, and were combined with each other in one study, and with the SCT in one and four studies, respectively. Of the 46 theory-based studies, 69.6% reported significant findings in measured PA and/or psychosocial outcomes, compared with 68.7% of the 32 non-theory-based studies. Studies that combined theories (n = 15) did not appear to be more or less successful than those using only one (n = 31), with 66.7% and 71% reporting significant findings, respectively. Of the studies that used the TPB or SCT (alone and in combination with other theories), 71.4% and 67.9% reported significant outcomes, respectively. Comparatively, 88.9% of the studies using a SE model (alone and in combination with other theories) reported significant outcomes.

Attrition data were provided in 79.5% of the studies, with a median attrition rate of 14%. Reasons for attrition included participant absence or re-location and improper use of the assessment tool (e.g., pedometer malfunction). Some of the highest attrition rates (> 35%) occurred when the intervention was delivered in a community or family setting, while all of the lowest attrition rates (< 5%) occurred in school-based interventions.

Adoption. At the setting level, all of the studies specified the location of the study site, except for one (Chen, Weiss, Heyman, & Lustig, 2010), which simply identified as family-based. The percentage and representativeness of the settings that adopted the intervention program were reported in one study (Janssen et al., 2013), which cited a 90% adoption rate, and specified that the decision to adopt was discussed with teachers first, rather than made top-down by administration. No studies included information on why the locations were selected.

At the staff level, all but two of the studies described the intervention's delivery agent, which included on-site staff (e.g., teachers) (60.5%), the research staff (10.5%), experts or trained staff (e.g., fitness specialist) (10.5%), or a combination thereof (18.5%). The studies that did not specify a delivery agent examined the effects of the school play environment on student PA levels (Loucaides, Jago, & Charalambous, 2009; Wood, Gladwell, & Barton, 2014). When specified, the level of expertise of the staff was pre-existing (n = 8), and/or was augmented through the provision of intervention-specific training, support and/or resources (n = 55). When reported, start-up costs were associated with assessment tools, delivery agents (training of/salary for), and equipment acquisition. Two interventions (Erwin, Beighle, Morgan, & Noland, 2011; Grydeland et al., 2013) were

reportedly designed to not require any additional resources relating to facilities, space or equipment.

Implementation. All studies described the intervention and documented its duration, which ranged from a single session (n = 3) to one or more (max = 6) school years (n = 36). Fidelity of implementation was reported in 60.3% of the studies, 17 of which included process evaluations, and was either considered a non-issue (i.e., protocol was deliberately flexible) (n = 2), or was influenced by staff adherence to protocol (n = 16) or training (n = 2), student attendance/participation (n = 7), scheduling or technical barriers (e.g., equipment malfunction) (n = 3), and differences in implementation across study sites (n = 1). Implementation cost data were collected in four studies, and were either not reported (Cradock et al., 2014; Kipping et al., 2014), or were itemized as participant remuneration (Chen et al., 2010) and required resources (Erwin et al., 2011). Four studies indicated that they received funding for implementation (Coleman et al., 2005; Janssen et al., 2013; Kelder et al., 2005; Stratton & Mullan, 2005), and seven were designed to be either low-cost (Chin & Ludwig, 2013; Gortmaker et al., 2012; Harrison, Burns, McGuinness, Heslin, & Murphy, 2006; Loucaides et al., 2009), or to not incur any extra costs (Grydeland et al., 2013; Salmon, Ball, Hume, Booth, & Crawford, 2008; Verstraete, Cardon, de Clercq, & de Bourdeaudhuij, 2007).

Maintenance. Most studies followed up immediately post-intervention (74.3%), some within 6 months (16.7%), and the remaining at least 9 months (max = 4 years) following completion of the intervention (9%). When follow-up measures were collected immediately or between 2 weeks and 6 months post-intervention, the same percentage of studies (69%) indicated that significant differences between experimental and control

conditions were maintained, compared to only 42.8% of those that reported follow-up measures after 6 months post-intervention. The current status of the intervention was indicated in 17 of the studies; four of which are either works-in-progress (Herbert, Lohrmann, Seo, Stright, & Kolbe, 2013; Yildrim et al., 2014) or being followed-up with a companion study (Horne, Hardman, Lowe, & Rowlands, 2009; Morrison et al., 2013). Of the remaining, three have not been continued (Kelder et al., 2005; Kiran et al., 2010; Meyer et al., 2014), five were already (Cradock et al., 2014; Gabriel et al., 2011), or have developed into (Jordan et al., 2008; McNeil et al., 2009; Pangrazi, Beighle, Vehige, & Vack, 2003) ongoing programs or policies, and five are currently (as of the date of each publication) being implemented at additional sites (Chin & Ludwig, 2013; Coleman et al., 2005; Gortmaker et al., 2012; Jurg et al., 2006; Muth, Chatterjee, Williams, Cross, & Flower, 2008). The cost of maintenance was referenced in five studies, of which one itemized the annual total implementation costs (Cradock et al., 2014), three indicated that their PA program received ongoing funding/support (Chin & Ludwig, 2013; Janssen et al., 2013; Jurg et al., 2006), and one acknowledged that the cost would make the intervention unsustainable (Warren, Henry, Lightowler, Bradshaw, & Perwaiz, 2003).

Discussion

This study used the RE-AIM framework to systematically review the degree to which randomised and non-randomised PA interventions in children report on internal and external validity factors, and to identify promising strategies to incorporate into school policy-based interventions for enhancing PA levels of children. The results indicate that, on average, studies reported on 52.6% of the RE-AIM components, the majority of which are related to internal validity. A shared characteristic of the studies that reported on more than 65% of the

RE-AIM components was a recent publication date (2013 or later), which suggests that the importance of reporting on external validity factors is gaining recognition amongst researchers in this field; however, the significance of this finding is controverted by the concurrent finding that not all recently published studies scored highly on RE-AIM component reporting. Further, those reviewed studies with a common purpose of replicating a PA intervention in a different setting/with a different population (Coleman et al., 2005; Herrick, Thompson, Kinder, Madsen, 2012; Kelder et al., 2005; Sharpe, Forrester, & Mandigo, 2011; Verstraete et al., 2007a) were not more likely to report on RE-AIM components, highlighting that the reporting of translation-relevant data is not necessarily linked to study purpose, but rather represents a comprehensive gap in the literature.

Reach

Reach was the most consistently reported RE-AIM dimension across all studies, with sample size, characteristics of the participants, and inclusion criteria specified for each study. However, consistent with past research in the field of PA promotion (Blackman et al., 2013; McGoey et al., 2015; White et al., 2009), very few studies indicated the degree to which their study samples were representative of the larger population. Without data on the characteristics of the external population from which the study samples were drawn, it is difficult to generalize the findings to populations with different demographic, economic and/or behavioural characteristics. For example, one of the reviewed studies that did examine the representativeness of the study sample found that participating children were more likely to have been already active (Jurg et al., 2006). Although high-risk groups were targeted in a few of the studies, the reporting of non-participant data, across all studies, is

crucial for ensuring that PA interventions for children are designed to address the needs of subgroups that are most in need (e.g., those at risk for obesity).

Efficacy/Effectiveness

Intervention outcomes (PA and/or psychosocial) were reported with unanimous consistency across studies. This was expected since it was an inclusion criterion for study selection and is the focus of most efficacy/effectiveness studies (Flay, 1986). Almost half of the studies reviewed for this paper relied solely on objective PA measures. By contrast, similar studies conducted with adolescents were less likely to use only objective (16%) and more likely (73%) to use only self-report PA measures (McGoey et al., 2015). Potential reasons for the increased frequency of use of objective measures in children could be related to concerns surrounding their ability to accurately recall PA, thus introducing limitations to the self-report measure (Cale, 1994; Sallis, 1991).

Systematic reviews have reported that the outcomes of PA interventions in children range from negligible (Timperio et al., 2004; van Sluijs et al., 2007) to inconclusive (Norris et al., 2015) to positive (Biddle et al., 2014; Kellou et al., 2014; Salmon et al., 2009). Results from Study 3 provide positive findings, with 68.8% of the reviewed studies reporting statistically significant improvements in intervention children's PA behaviour compared to controls. The high percentage of positive effects found across studies may be overestimated due to (i) the use of broad inclusion criteria for study selection; and, (ii) the degree to which attrition was considered in follow-up analyses within the reviewed studies. The focus of this review was on the quality of reporting across the RE-AIM dimensions; therefore, leniencies in study selection were conceded in order to ensure a broad representation of how intervention strategies are being implemented with children. Comprehensive consideration

of how individual study quality may have influenced its relative statistical significance, such as analyses of effect sizes and risks of biases (e.g., publication bias, selection bias, reporting bias), were beyond the scope and purpose of this paper. Regarding follow-up analyses, only 19 of the studies reported using intent-to-treat analyses while the remaining studies either did not specify or limited study results to those participants who were present at follow-up, which introduces a potential bias in generalizability of the findings.

Previous reviews conducted with children and/or youth have indicated that school-based interventions that target individuals while involving families and/or the community had a greater potential to increase PA levels of the students (Kellou et al., 2014; McGoey et al., 2015). Results from this review support the efficacy/effectiveness of this intervention setting and further highlight the potential leadership role of schools in the provision and promotion of daily PA for young people (Pate et al., 2006). The most successful setting in this review was after-school and/or during recess, and the use of playground markings and computer-based implementation tools (e.g., exergaming) were successful intervention strategies across settings. Collectively, and consistent with recently published research (Gao, Chen, & Stodden, 2015), the data reviewed herein suggest that recess and exergaming provide more effective opportunities for children to accumulate daily PA at school, compared with curriculum-based programs. Suggested reasons for the success of recess may be related to time spent outdoors, which is positively associated with children's PA (Cleland et al., 2008; Gray et al., 2015; Sallis, Prochaska, & Taylor, 2000; Schaefer et al., 2014). For exergaming, data suggest that it has a strong motivational power due to the appealing effect of technology for children (Sun, 2012); however, reviews of the relevant literature have concluded that there is currently insufficient evidence to recommend exergaming as a

sustainable means of contributing to daily PA (Biddiss et al., 2010; LeBlanc et al., 2013). Together, these findings suggest that exergaming could provide a potential alternate strategy for communities susceptible to inclement weather, which would otherwise limit children's opportunities to be active outside during recess. Further research in this area of blended recess (outdoor and exergaming) is merited in order to determine feasibility and the optimal frequency of use of computer-based tools, since their increased motivational power is sensitive to exposure length (Sun, 2012).

Comparing effective strategies of the reviewed school-based interventions to the barriers associated with relatively unsuccessful school-based policies (Olstad, Campbell, Raine, & Nykiforuk, 2015; Public Health Ontario [PHO], 2015, Study 1) reveals some parallels. For example, all of the interventions that successfully increased children's PA levels provided the implementation setting with teacher training and/or the provision of resources that facilitate family engagement. Comparatively, insufficient teacher training (Olstad et al., 2015) and lack of family engagement (Study1) have been identified as real-world barriers that influence policy implementation in elementary schools. These barriers, especially lack of family engagement, which is supported by findings from Study 2, represent goals for future interevention studies designed to optimize and maintain consistent school-based policy implementation.

The literature proposes that theory-based PA interventions are more successful than atheoretical approaches in both adults (Antikaninen & Ellis, 2001) and adolescents (McGoey et al., 2015); however, the results from the present review are less convincing, with theory-based and atheoretical studies being equally successful. Comparing the results from this review with those from McGoey et al. (2015) indicates that PA interventions in children in

comparison with adolescents are less likely to be informed by a theory (78% versus 59% for adolescents and children, respectively), and are much less likely to report on psychosocial measures (70% versus 47.4% for adolescents and children, respectively) (McGoey et al., 2015). The latter is consistent with findings reported by Sallis et al. (2000), who indicated that the paucity of data surrounding psychosocial measures in children may be a reflection of their developing cognitive abilities, which can influence the accuracy of self-reported measures such as those used to assess theory-based constructs (Cale, 1994; Saunders et al., 1997; Wallander, Schmitt, & Koot, 2001).

Structuring study design on a theoretical framework has been argued to promote an understanding of causal mechanisms when studying complex behaviour change such as regular participation in PA (Baranowski, Anderson, & Carmack, 1998; Michie, Fixsen, Grimshaw, & Eccles, 2009). To that end, the successful application of a SE framework herein supports the use of this broader theoretical framework in future PA promotion studies conducted with children. By addressing multiple levels of influence, including the larger school community, parent- and teacher-support, and accessibility to resources, a SE framework considers the real-world environmental variables that may moderate intervention implementation. Further, as potential mediators of behaviour change, psychosocial variables such as self-efficacy and outcome expectancy (Brown, Hume, Pearson, & Salmon, 2013; Sallis et al., 2000) are relevant measures that could inform how interventions are affecting PA behaviour in children. Since this type of information could be used to adapt interventions to different settings and populations, it would facilitate the dissemination of interventions and increase the likelihood of widespread implementation. Collectively, these findings support those of a recent systemic review of school-based PA interventions in children and

adolescents (Lai et al., 2014), which concluded that future research examining the effectiveness of different theoretical constructs as mediators of change in PA levels in children is needed.

Adoption

Descriptions of both the intervention location and the staff delivering the intervention were well reported in the reviewed studies; however, consistent with other RE-AIM reviews (Akers et al., 2010; Antikainen & Ellis, 2011; Blackman et al., 2013; Dzewaltowski, Estabrooks, Klesges, Bull, & Glasgow, 2004; Klesges et al., 2008; McGoey et al., 2015), transparency surrounding the methods used to identify settings and staff was lacking, which makes it difficult to determine which types of delivery agents may be suitable based on the interventions' strategies.

Further, characteristics of intervention sites that agree to adopt the program, as well as the costs associated with start-up, are of significant interest to future program development. For example, some interventions reported findings or design characteristics that promote translatability, including no start-up costs (Erwin et al., 2011; Grydeland et al., 2013), the use of on-site delivery agents without requiring additional training (Gorely, Nevill, Morris, Stensel, & Nevill, 2009; Salmon et al., 2011; Stratton & Mullan, 2005), and effective communication among those involved in the program's delivery (Janssen et al., 2013). Future reporting of such findings/characteristics will add to the evidence base and ultimately promote adoption of PA interventions for children across a variety of contexts.

Implementation

Intervention duration was consistently reported across studies, with eight lasting less than 5 weeks in duration, and the remaining equally distributed (approximately 45% in each

group) between those that were implemented for at least one school year and those that were shorter than a school year but at least 5 weeks. Of these three categories, the studies of shortest duration were the most successful, with 100% of them reporting significant intervention effects on PA levels compared with controls. Most of these interventions were delivered either entirely (Loucaides et al., 2009; Stratton & Mullan, 2005; Ridgers, Stratton, Fairclough, & Twisk, 2007; Wilson et al, 2005; Wood et al., 2014) or partially (Butcher, Fairclough, Stratton, & Richardson, 2007) during recess or after-school. For each of the other intervention length categories (5 weeks to < 1 school year and ≥ 1 school year), approximately 65% of the studies reported significant differences between groups, suggesting that sustained contact does not influence behaviour change in children. These data do not support findings that sustained contact over a prolonged period of time (at least 1 school year) may increase the likelihood of positive behaviour change (Lai et al., 2014; McGoey et al., 2015); rather, they provide an evidence base for the use of recess and/or after-school periods in children's PA interventions of short duration (< 5 weeks). In their review of PA interventions targeting young girls, Biddle et al. (2014) also reported that interventions of short duration (< 12 weeks) were more effective, citing decreased motivation and increased boredom over time as potential reasons for the finding.

Consistent with some RE-AIM evaluations of behaviour change interventions (McGoey et al., 2015; White et al., 2009), but in contrast to others (Allen et al., 2011; Antikainen & Ellis, 2011; Blackman et al., 2013; Klesges et al., 2008), the majority of the reviewed studies herein reported information on the fidelity of protocol implementation. For example, RE-AIM process evaluations (de Meij et al., 2010; Janssen et al., 2013) have been published for two of the reviewed studies (Jurg et al., 2006; Janssen, Toussaint, van Willem,

& Verhagen, 2011), and based on reported facilitators and barriers, the researchers were able to make informed recommendations towards improving program content and organization for future implementation. However, although they both applied the RE-AIM framework, only one of the interventions (Janssen et al., 2011, 2013), along with only eight of the other reviewed studies, mentioned the cost associated with program delivery, making it one of the least reported components amongst the RE-AIM dimensions.

Of the successful school-based studies, two (Coleman et al., 2005; Gorely et al., 2009) reported that the protocol was deliberately flexible, and three (Grydeland et al., 2013; Salmon et al., 2008; Verstraete et al., 2007a) were designed to not incur any additional costs. The goal in each study was to promote wider-spread dissemination of the intervention. These strategies, which ease program implementation by limiting reliance on external support, were also associated with many of the successful school-based PA interventions targeting adolescents (McGoey et al., 2015).

Maintenance

As is supported by the data herein, RE-AIM evaluations of PA interventions have consistently ranked maintenance as the least reported dimension (Antikainen & Ellis, 2011; Blackman et al., 2013; McGoey et al., 2015; White et al., 2009). For the present review, 52 of the 78 studies did not report on any of the maintenance components, making it difficult to assess the cost of continued delivery and institutionalization of the interventions. This paucity of data, which includes a lack of follow-up measures, is reflective of the fact that most of the studies did not have a goal to achieve and track maintained delivery, and means that the reported significant differences in PA levels can only be considered short term benefits. As is consistent with the general consensus among recent reviews of PA

interventions in children, studies need to conduct long-term follow-ups beyond post-intervention to assess behaviour maintenance (Biddle et al., 2014; Kellou et al., 2014; Norris et al., 2015).

For this review, which included all relevant publications for each intervention, the studies that conducted follow-up analyses immediately or within the first 6 months post-intervention indicated similar outcomes; however, longer-term follow-ups indicated a drop in behaviour change maintenance. These findings suggest recidivism of positive PA behaviour change in children, and suggest that accurate measurements of maintenance should occur after 6 months post-intervention.

Conclusions reached herein reflect the degree to which the reviewed studies reported on specific RE-AIM components. Recognizing that editorial criteria may limit the extent to which researchers report on issues of external validity, it is possible that some of these data have been collected, but not reported. In an effort to address this possibility, all available publications for each intervention were included in this review; however, a lack of reporting on an outcome cannot be equated to a lack of measurement, and it is possible that not all publications related to the interventions were recovered. Further, there was considerable heterogeneity across interventions due to different PA contexts and output measures which makes it difficult to develop a comprehensive understanding of the successful elements of the PA interventions.

Conclusion

Systematic reviews of PA interventions in children (Biddle et al., 2014; Kellou et al., 2014; Salmon et al., 2009) have highlighted an existing need for future interventions to evaluate indicators of external validity (Glasgow et al., 2004), and to study mediators of

behaviour change (Michie et al., 2009), thereby matching successful intervention strategies to population, setting and other contextual characteristics. To address this need, this review used the RE-AIM framework to expand the assessment of PA interventions in children beyond efficacy/effectiveness. Results of this RE-AIM review parallel those reported in a previous review that focused on adolescents (McGoey et al., 2015) and emphasize the need for future PA interventions in children to report on real-world challenges and limitations. The data provide evidence that, in children, extra-curricular school-based interventions of short duration are successful, and that long-term follow-up measures should be collected more than 6 months post-intervention. However, conclusions drawn from reviewing evidence can only reflect the data that are available (Rychetnik et al., 2012), and due to an underreporting of the representativeness of participants and settings, adoption rates, and costs associated with start-up, implementation and maintenance, there is currently not enough information for future users to adapt programs to different populations and settings. Therefore, in order to comprehensively address promotion of PA in children, the relevance of research findings needs to be increased and expanded to include these elements of external validity.

Real-world issues that influence the implementation of broad school-based PA initiatives (e.g., PA-related policies) extend beyond the individual, as modeled by the SE framework (McLeroy, Bibeau, Steckler, & Glanz, 1988; Stokols, 1992). For example, fiscal constraints, inclement weather, competing priorities, and lack of available training and resources are consistently reported as barriers to PA-related policy implementation in schools (Allison et al., 2014; Olstad et al., 2015; PHO, 2015; Study 1). Therefore, effective strategies that address all levels of the SE framework are required, which can be facilitated by

designing future children's PA interventions using the RE-AIM model, thus encouraging the collection of data that inform all aspects of the implementation context and increasing the potential success of the PA intervention.

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Chapter 6: Summary, Implications and Future Directions

Summary

Despite the abundance of evidence-based opportunities to engage children in PA during school, children in Canada continue to fall well short of the recommended levels of daily PA (Colley et al., 2011; ParticipACTION, 2016; Statistics Canada, 2015). This dissertation presents three interrelated studies that address the need for a school-based policy that is contextually appropriate and effective at increasing the PA levels of elementary school children in Ontario. To that end, this research focuses on the Daily Physical Activity (DPA) policy, which was instituted by the Ontario Ministry of Education (OMOE) to increase the PA levels of students in Grades 1 through 8 (OMOE, 2005). Consistent with a socio-ecological (SE) perspective (McLeroy, Bibeau, Steckler, & Glanz, 1988; Stokols, 1992), the DPA policy resource documents (OMOE, 2006a, 2006b) recognize the multiple levels of influence that can affect the success of DPA, including leadership from principals and on-going input from teachers, students, parents, and community partners.

This research surveyed perspectives from two Ontario DPA stakeholder groups that are under-represented in the literature; Study 1 surveyed teachers from all regions of Ontario, including a focus on the teaching context in Northern Ontario, and Study 2 surveyed parents. In light of the research findings from Study 1 and Study 2, which were relatively region-specific, the scope of the research was broadened in Study 3, which reviewed PA intervention strategies in children to determine how varying levels of influence can interconnect in different implementation contexts to successfully promote physical activity behaviour.

Study 1 was designed to assess the current status of the DPA policy in elementary schools, including representation from Northern Ontario. Implementation fidelity was measured based on teacher-reported practices related to the duration, frequency and intensity of DPA sessions. With teachers situated at the individuallevel of the SE framework, this study drew specifically from the Theory of Planned Behaviour (TPB) to examine how teachers' knowledge of and perspectives on PA influence DPA delivery (e.g., confidence, self-identity, subjective norms). In addition, interactions between DPA implementation strategies and the school environment (e.g., administrative support and availability of resources) were examined to illuminate whether or not the policy implementation is effective.

Results from this study are consistent with province-wide data (PHO, 2015), indicating that overall implementation fidelity is moderate, with only 42.4% of participants adhering to the DPA policy guidelines (i.e., delivering 20 minutes of MVPA daily most of the time). When considering only those teachers who reported full implementation (i.e., 100% compliant with the policy's directives), implementation fidelity was poor, with only 8.5% delivering 20 minutes of MVPA daily all of the time. The finding that very few teachers are fully compliant with the directives of the DPA policy is also consistent with PHO data, which indicated that only 3.3% of the teachers were meeting policy requirements all of the time (PHO, 2015), and further highlights a need for implementation improvement. Investigating individual policy components indicated that most teachers met the policy requirements in terms of frequency and intensity; however, most did not meet the duration requirement. Teacher-mediated strategies that were positively associated with DPA delivery included having DPA posted on a daily schedule, delivering a variety of different activities

across sessions, and including warm-up/cool-down components within each session. Based on teacher perspectives and perceptions, the results identified teachers' confidence, subjective norms and attitudes, and their perceived level of administrative support and availability of resources, as positive influences on DPA delivery. The relative contribution of each variable varied depending on the component of DPA being measured, with regular scheduling, increased confidence and a greater perception of support being associated with DPA duration. Qualitative findings identified competing curriculum pressures, lack of performance measures, and poor resource availability as barriers to DPA implementation. Among the resources identified as lacking was input from parent stakeholders, which supported the rationale for the second study.

Study 2 addressed a gap in the relevant literature with respect to parents' awareness and perspectives of the DPA policy. Results from this study highlight that most parents were previously unaware of the DPA policy. Further, while parents appear to be supportive of its specific directives, there is a belief that DPA is not being implemented due to its absence from report cards and ambiguity in delivery strategies. Parent suggestions included integrating DPA into academic curricula throughout the day, and having it posted on teachers' timetables. Additional findings showed that the school's role in PA promotion/delivery is perceived by parents to be greater than the family's, and that half of the sampled parents' children receive at least an equal amount of their PA at school. Considering the implementation issues surrounding DPA, and that it only contributes up to one-third of the total recommended amount of daily PA for children (OMOE, 2005; Tremblay et al., 2016), increasing parents' perceptions of their own role in PA promotion and delivery is important. Consistent with published findings that parental support promotes

children's PA (De Lepeleere, DeSmet, Verloigne, Cardon, & De Bourdeaudhuij, 2013; Gustafson & Rhodes, 2006; van der Horst et al., 2007), the data suggest that increasing parents' capacity to provide PA-related support for their children will help accomplish this objective.

Study 3 was conducted to identify successful strategies for optimizing the implementation of school-based policies intended to increase the PA levels of elementary school children. To that end, a systematic review was conducted using the RE-AIM framework to determine how effective strategies can be matched to setting and other contextual (i.e., real-world) characteristics. Results highlighted that school-based interventions were the most successful with recess providing more effective opportunities for children to accumulate daily PA, compared with curriculum-based programs. In turn, curriculum-based initiatives were slightly more successful than those based on policy strategies and/or community and family linkages. Successful intervention strategies included the use of playground markings and computer-based implementation tools (e.g., exergaming); however, due to a lack of reporting on external validity factors (e.g., representativeness of participants and settings, adoption rates, and costs associated with start-up, implementation and maintenance), it was not possible to identify how individual study findings need to be adapted for different populations and settings (i.e., for different DPA implementation contexts).

Only one of the reviewed interventions evaluated a school-based policy (Boston Active School Day Policy), which significantly increased student MVPA levels after three months (Cradock et al., 2014). Examining the specifics of this policy-based intervention indicated that its implementation was funded by an external body, and facilitated by the

provision of teaching resources, equipment, and assessment tools. Further, delivery characteristics included the use of cross-curricular lessons throughout the day as well as non-instructional time (Cradock et al., 2014). Collectively, these faciliators and delivery models address many of the DPA implementation barriers identified in Study 1; however, the evaluation of Boston's school-based policy was conducted within its first year of implementation and therefore does not include information on sustainability (Cradock et al., 2014). Comparatively, Ontario's DPA was implemented in 2005 (OMOE, 2005), and initial funding was required to be spent within a short period of time (Allison et al., 2015). Considering that the first government sponsored evaluation occurred a full ten years after the policy was released (PHO, 2015), and seven years after the last installment of funds (Allison et al., 2015), it is not possible to determine whether or not the DPA policy was initially effective at increasing children's school-based PA, or how the funding was allocated.

Implications

This dissertation adds to the limited research conducted on DPA policies provincially as well as nationally. Compared with other provinces that have elementary school DPA policies (Alberta Education, 2008; British Columbia Ministry of Education, 2011; Saskatchewan Ministry of Education, 2010), Ontario has received the most attention in the literature for policy delivery. While Saskatchewan's DPA policy has yet to receive any formal evaluations (Olstad, Campbell, Raine, & Nykiforuk, 2015), the adoption of Alberta's DPA policy has been evaluated qualitatively in one study (Gladwin, Church, & Plotnikoff, 2008), and implementation of British Columbia's policy has been evaluated in two studies; one qualitative (Mâsse, Naiman, & Naylor, 2013) and one quantitative (Watts, Mâsse, & Naylor, 2014). Comparatively, Ontario's DPA policy has been evaluated qualitatively and

quantitatively in seven separate studies (Allison et al., 2014; Gilmore & Donahue, 2016; Hobin, Leatherdale, Manske, & Robertson-Wilson, 2010; Strampel et al., 2014; Patton, 2012; PHO, 2015; Stone et al., 2012), as discussed throughout this dissertation. Taken together, the available published data suggest that Canadian DPA policies are not increasing children's PA levels (Olstad et al., 2015); however, the small number of studies and the variability across studies based on design, methodology, purpose, and output variables make it difficult to generate any conclusions regarding DPA policy implementation fidelity across provinces.

The two main implications of this dissertation are that the directives of the OMOE's DPA policy are not being satisfied by elementary school teachers (Study 1), nor are they being communicated to parents (Study 2). Full implementation requires that students participate in 20 minutes of MVPA daily; however, the majority of surveyed teachers reported that they were not meeting the duration requirement, which was influenced by teachers' scheduling and delivery practices, level of confidence, and perceived availability of support for DPA delivery. Further, DPA resource guides include parents as key stakeholders in the promotion and implementation of DPA; however, most parents are not aware of the DPA policy, suggesting that schools are not utilizing them as an implementation resource.

Further to the under-utilization of parents as important resources, a third implication of this research associates a perceived lack of resource availability with non-adherence to the DPA policy (Study 1). This finding has some region-variable implications; compared with Southern regions of the province, Northern Ontario has significantly less access to PE specialists, which serve as important resources for DPA (People for Education, 2015). Further, Northern Ontario is more susceptible to severe weather in the winter, which limits the use of outdoor space and equipment. The RE-AIM review identified the use of

playground markings among the most successful strategies for increasing PA in children; however, inclement weather in Ontario, and especially in Northern Ontario, may exacerbate the reported unavailability of space and equipment for DPA. Some teachers identified barriers that were indicative of their lack of awareness of the existing resources, such as curriculum supports and implementation guides (e.g., OMOE, 2006c).

A fourth implication of this research highlights a need for scheduling accommodations that would facilitate teachers' delivery of DPA (Study 1). Principals are responsible for checking teachers' timetables to ensure that DPA is scheduled for all students in each school day (OMOE, 2006b); however, most teachers reported not having DPA on a schedule. The finding that DPA's presence on a schedule is positively associated with its frequency of delivery underscores the importance of consistent scheduling practices.

A fifth implication is that PA interventions need to be designed and reported on so that they can provide information on all aspects of the RE-AIM framework (Study 3). Most of the reviewed studies focused on internal validity (e.g., sample size; effectiveness/efficacy; type, frequency, intensity of intervention) rather than on issues of external validity (e.g., the percentage and representativeness of individuals and settings willing to participate in and adopt an intervention; costs associated with start-up, delivery, and maintenance). In light of the fiscal challenges surrounding the implementation of DPA in Ontario (OMOE, 2015), comparing the relative costs of effective intervention strategies and how they are influenced by regional differences would help balance the cost-benefit ratio when considering future implementation approaches across the province. The lack of data from its initial implementation phase, coupled with its current relative ineffectiveness at increasing children's school-based PA (Study 1), underscores the importance of desiging future DPA-

related inteventions using the RE-AIM framework, thus facilitating the collection of important data for informing effective practices that target all levels of the SE model.

Collectively, the results of this research highlight characteristics of the DPA policy itself that may be contributing to scheduling barriers and lack of parent awareness and engagement in DPA programming and delivery. Although the use of recess was supported by the RE-AIM review as a successful strategy for increasing children's PA, an important characteristic of the DPA policy is that PA be delivered during instructional time. This creates scheduling issues due to competing curriculum demands, which are exacerbated by a lack of accountability for DPA delivery. While students' performance in academic subjects is communicated to parents and the provincial government via report cards and standards-based assessment test scores, there is no requirement that DPA participation be included in report cards, nor are there performance measures in place to facilitate this communication. Therefore, when confronted with time constraints, teachers may be prioritizing other academic subjects, leaving limited time for adequate DPA, as evidenced by its sub-optimal delivery and lack of communication with parents.

Recommendations and Future Directions

The DPA policy promotes regular patterns of PA in children, thereby building healthy habits and contributing to overall student wellness; however, it is not fulfilling its potential. Since its release in 2005, the DPA policy has been linked to the OMOE's 'Foundations for a Healthy School' framework (OMOE, 2014). Consistent with the tenets of the SE model that was used to frame this dissertation (McLeroy et al., 1988), the Healthy Schools framework advocates for a comprehensive approach to school health and organizes its policies, programs and initiatives in five interconnected areas: curriculum, teaching, and learning; school and

classroom leadership; student engagement; social and physical environments; and, home, school, and community partnerships (OMOE, 2014). For the PA portion of the health-related topics, which cross-references the DPA policy, sample strategies and activities targeting students, classrooms, and schools are provided within each of the five areas.

In light of these recognized multiple levels of influence on DPA delivery (OMOE, 2006a, 2006b; 2014), and the documented application (Leatherdale, Manske, Faulkner, Arbour, & Bredin, 2010; Millstein et al., 2011; Naylor, Macdonald, Reed, & McKay, 2006) and successful utility (Webster et al., 2013) of SE frameworks in the field of PA promotion/delivery, it is suggested that future Ontario DPA implementation research be conducted using a SE model. To that end, recommendations and future research directions for improving DPA delivery are positioned within the SE model used for this dissertation, which illustrates the interactions amongst all elementary school stakeholder groups (see Figure 6.1).

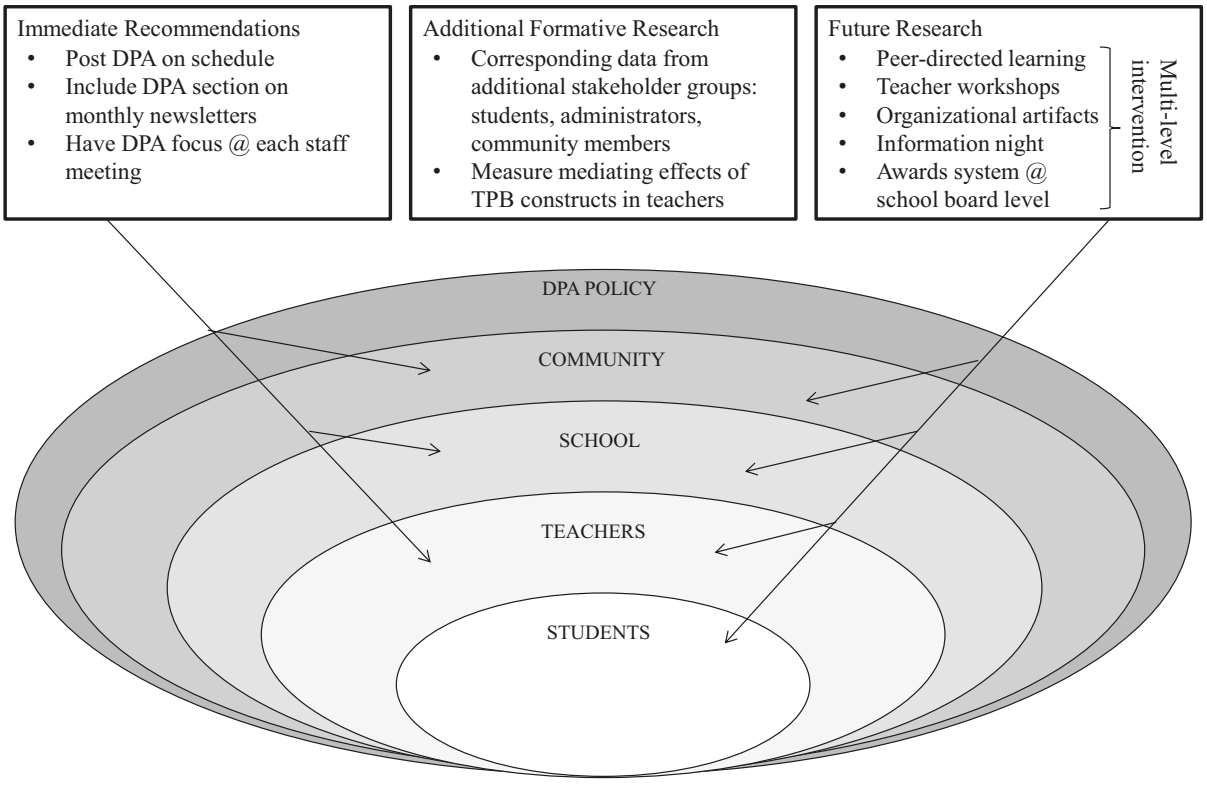

Figure 6.1: Recommendations and Future Directions Situated within the Social-Ecological Model

Immediate recommendations support those of PHO (2015) and advocate for the inclusion of DPA on teachers' daily schedules, and for increased utilization of available DPA resources (Study 1). While the findings on which these recommendations are based require further data to substantiate a causal link between the strategy and DPA delivery outcomes, the results are nonetheless important reference points for future directions. Having DPA on their schedule may increase teachers' accountability to the students and parents, and by extension, having to ensure that teachers' schedules include DPA necessitates increased administrative monitoring, thereby involving multiple stakeholder groups. Regarding resources, PHO (2015) specified public health personnel and partner organizations (e.g., OPHEA) as underutilized, while this research (Study 2) identifies the family as such. In

addition, Study 1 suggests that teachers are unaware of existing curriculum support and implementation guides (e.g., OMOE, 2006c), which include sample timetables, activities and delivery models. Recommendations for increasing teacher awareness include knowledge translation initiatives, such as the generation and dissemination of an infographic to elementary school staff stakeholders. An infographic (1) highlighting key research findings, (2) identifying locations of accessible resources, and (3) including suggestions that there be (i) a DPA focus at each staff meeting and (ii) a DPA section on monthly newsletters, may promote communication within the schools as well as between schools and homes to increase teacher and parental awareness and engagement.

This dissertation also provides valuable insight into future research and policy directions for DPA implementation. In order to further contextualize the findings reported herein, additional formative research in Northern Ontario is required to collect corresponding data and input from key stakeholders not targeted by this research, including students, administration, and community members. Regarding teachers, further investigation of the psychological processes that influence teacher behaviour is important for improving teaching practices, intitial teacher education, and professional development for consistent delivery of DPA across Ontario. For example, examining the effects of strategies that target constructs of the TPB on behaviour intention and ultimately behaviour will strengthen the predictive utility of this theory in teachers' delivery of PA-related curricula (e.g., Bartholomew & Jowlers, 2011) and inform future intervention strategies with this population.

Broadening the scope for future research, a multi-strategy intervention targeting multiple levels is recommended (see Figure 6.1). At the school-level, recommended strategies include (1) teacher workshops facilitating cross-curricular implementation of DPA

activities, (2) peer-directed learning initiatives, and (3) use of organizational artifacts such as DPA 'champion' (progressive and innovative) teachers. Together, these strategies target teacher confidence and student engagement while promoting a collaborative culture wherein DPA becomes a shared commitment. The first strategy was mentioned in the relevant literature as a proposed facilitator for DPA implementation (Strampel et al., 2014), and the second is cited as a strategy employed by featured schools through OPHEA's Healthy Schools Certification Program (OPHEA, 2016). The third strategy is informed by Schein's model of organizational culture (1992), and employs an approach that was highlighted during the initial development and implementation of DPA (Allison et al., 2014). At the community-level, recommended intervention strategies include (1) an information night for parents, school personnel and community members that allows for increased communication among key stakeholder groups; and, (2) an awards system at the school board level that employs exsiting checklists from the OMOE resource guides (OMOE, 2006a, 2006b) and promotes collaboration between schools and contributes to school culture by placing a priority on DPA implemention. The first strategy is informed by the existing Welcome to Kindergarten™ model, which combines community and educational resources and fosters engagement of families, school personnel, and community agency partners (The Learning Partnership, 2016). The second strategy draws on existing resources and incorporates an Ontario school Healthy School Strategy initiative, which was identified in a report compiled for the OMOE that reviewed healthy schools evaluations (Craig, Freeman, & Husssain, 2012).

Methodological gaps in the relevant literature can be addressed by using objective data to quantify children's participation in DPA to strengthen the internal validity of the

findings, and ensuring that the intervention reports on dimensions of the RE-AIM framework. This will facilitate context-specific delivery modifications in order to benefit students province-wide. In addition, examining the effectiveness of theoretical constructs as mediators of change in children's school-based PA levels (Study 3) would address a theoretical gap in the literature, and incorporate student perspectives on the importance and suitability of the DPA policy.

Finally, as it stands, the DPA policy is not being delivered consistently (Study 1; PHO, 2015), suggesting a need for a change in the policy's design. Considering the implementation barriers identified herein and the characteristics of other school-based policies that have positively impacted student PA levels (Cradock et al., 2014), a more accountable and flexible model for Ontario's DPA policy is recommended. Including key learning outcomes as part of the policy and linking these to an accountability measure would address suggestions made by parents (Study 2), and may increase teacher motivation to overcome constraints for policy implementation (Brownson et al., 2010). Unlike other provincial DPA policies (Alberta Education, 2008; British Columbia Ministry of Education, 2011; Saskatchewan Ministry of Education, 2010), Ontario's DPA policy mandates a shorter duration (20 versus 30 minutes), requires that it be delivered during instructional time, and specifies that the MVPA be sustained (OMOE, 2005). Making Ontario's DPA policy more consistent with those from other provinces by allowing for the use of non-instructional time and for its delivery to occur in multiple sessions would facilitate a more integrated delivery system that nurtures flexible and adaptive healthy habits. For example, teaching recess games during Health and Physical Education classes and supplying game equipment with interactive supervision would capitalize on non-instructional time, which corresponds to the

most successful setting in which to promote children's PA (Study 3). In light of the overall goal of the DPA policy and its link to the OMOE's 'Foundations for a Healthy School' framework (2014), teaching children to incorporate PA throughout the day, including during their free time, will better equip them with effective and sustainable health habits. Several of these recommendations and implications, including lack of space, competing curriculum demands, and lack of administrative support need to be addressed at the provincial and school board levels. However, the Ontario government only recently sponsored evaluations of DPA implementation (PHO, 2013, 2015), suggesting that DPA delivery is not a priority. Dwyer et al. (2003) identified the high perceived priority of other academic subjects and low perceived priority of PA-based curricula in Ontario's education system as an issue, before the release of the DPA policy. Considering that this barrier has persisted into 2016 suggests a need for increased public awareness of the expanding evidence base relating PA to improved academic outcomes (Bangsbo et al., 2016). In addition, since the initial implementation of the DPA policy, mental health and bullying prevention have emerged to take prominence in provincial education policy (OMOE, 2012; Ontario Government, 2013). Therefore, strengthening and effectively communicating the evidence base linking PA participation with improved mental health (Brown, Pearson, Braithwaite, Brown, & Biddle, 2013; Kirkcaldy, Shephard, & Siefen, 2002; Larun, Nordheim, Ekeland, Hagen, & Heian, 2009), and investigating the potential link between school-based PA participation and bullying prevention is suggested to promote the compliant and sustainable implementation of DPA.

In conclusion, disseminating the findings generated and summarized herein to policy-makers, elemenetary school stakeholder groups, and teacher education program providers

will elevate the value placed on school-based physical activity and promote the integration of Daily Physical Activity into the whole school day and broader school culture.

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Appendix A – Data Collection Tool for Study 1

Implementation of DPA in Ontario Elementary Schools

Participant Letter of Information

You are invited to participate in a study entitled, *The Ontario Ministry of Education's Daily Physical Activity (DPA) Policy: A Descriptive Study of its Delivery in Elementary Schools*, conducted by Tara McGoey, a doctoral student in the Schulich School of Education at Nipissing University. The results of this study will contribute to the partial fulfillment of a Doctor of Philosophy degree in Educational Sustainability from Nipissing University.

The purpose of the research is to gain insight into factors that influence your ability to implement DPA within your school. The study will be used to identify recommendations and to advocate for how we can facilitate the implementation of DPA in Ontario elementary schools. The study is descriptive in nature and as such will not evaluate practices, strategies or perspectives.

If you agree to participate in this study, you will be asked to:

Complete an anonymous online survey. The survey asks for information regarding: basic demographics (e.g., sex, years of teaching, grade(s) that you teach), the strategies that you or your school use to implement DPA, the facilitators and barriers to DPA implementation, and your knowledge and perspectives surrounding DPA and health. All questions require either selecting your response by checking one (or more) options, or by typing a short response into text boxes. Completion of the online survey will take approximately 20 to 30 minutes, and should not be completed while on school board property.

There are no known physical or social risks associated with participation in this study. There is a minimal risk that you may become concerned about your delivery of DPA and/or your school's reputation. If you would like to receive additional information about the benefits of regular physical activity and/or access resources for the implementation of the DPA policy, you may contact the researchers or refer to the Ontario Healthy Schools Coalition (OHSC) and the Ontario Physical and Health Education Association (OPHEA) websites. Due to the nature of the study, you may feel that you are being asked to rate your school and/or school board; however, the study is descriptive rather than evaluative and is not designed to assess practices or to undermine the responsibilities of teachers or administrators. School boards will not have access to your data. All data will be presented in group format so that individual responses will not be shown and will not be matched with your demographics. You will not be asked to identify yourself or name your school.

Any information obtained from research participants in connection with this study is anonymous. Your participation in this study is voluntary.

You may choose not to answer specific questions and you may withdraw from the study at any time during survey completion by selecting the 'exit without submitting' link. If you choose this option, your data will not be saved. Once you have selected the final 'submit my responses' link at the end of the survey, you will no longer be able to withdraw from the study. This is because your data are anonymous and there is no way of identifying and removing it once you have submitted your responses.

Your survey results will be encrypted and stored within a password-protected file on the researcher's password-protected computer. The data will be kept for five years post-publication of the study's findings and will then be permanently deleted by the researcher.

Participation in this study may help you to become aware of the range of resources available for the delivery of DPA in schools and classrooms, as well as the extent to which regular physical activity is incorporated at your school and/or in your current teaching practices.

Your participation in this study will also contribute to the understanding of strategies and needs surrounding DPA implementation within Ontario, which will broaden the current understanding of how the environment of a school can facilitate or hinder the delivery of DPA.

If you would like to participate in this study, please check the 'Yes, I want to participate' box. This will take you to the first page of the survey.

If you do not want to participate in this study, please check the 'No, I do not want to participate' box. This will allow you to leave the survey monkey site without completing the survey.

Completion of the survey signifies your consent. Please keep a copy of this information letter for your records. This study has been reviewed and has received ethics clearance through Nipissing University's Research Ethics Board and your school board.

If you have questions about the research and/or would like information about the findings of the study, please feel free to contact the primary investigator, Tara McGoey, via email (m0259261@community.nipissingu.ca) or telephone (705-474-7600 ext. 5821), and/or the faculty supervisor, Barbi Law, via email (barbil@nipissingu.ca) or telephone (705-474-3450 ext. 4147). The researcher's contact information will also be provided again at the end of the survey. Findings will be shared at academic conferences and in peer-reviewed journal articles, and will serve as a portion of the researcher's Ph.D. dissertation.

If you have questions regarding your rights as a research participant, contact:

Ethics Coordinator
Nipissing University
100 College Drive
North Bay, ON Canada P1B 8L7
Email: ethics@nipissingu.ca

1. Please indicate whether or not you would like to participate in this study.

- ○ Yes, I consent to participate in this survey.
- ○ No, I do not consent to participate in this survey.

2. What is your sex?

- ○ Female
- ○ Male

3. How is your school funded?

- ○ Privately
- ○ Publicly

4. Using the map below, identify the region in Ontario in which you teach, and/or identify your school board in the space provided.[1]

- ○ North-East
- ○ North-West
- ○ Central
- ○ South-West
- ○ East

5. Which of the following best describes your current occupation within your school?

- ○ Administrator (Vice-Principal, Principal)
- ○ Teacher

Participant Information – Teacher

6. Please indicate the number of year(s) that you have been teaching (including elementary, secondary, post-secondary, part-time and/or occasional teacher):

7. Please indicate the grade level(s) you currently teach:

8. Please indicate the number of students in your largest class:

9. Which of the following reflects your teaching qualification?

- ○ Primary and Junior (Kindergarten to Grade 6)
- ○ Junior and Intermediate (Grades 4 to 10)
- ○ Intermediate and Senior (Grades 7 to 12)

10. Which of the following reflect(s) your background in Health and Physical Education? (check all that apply)

- ○ University degree in Physical Education, Kinesiology or related field
- ○ Additional Qualification (AQ) course in Health and Physical Education
- ○ Professional development at the school specific to DPA policy
- ○ No specific specialization related to Health and Physical Education

DPA Instruction and Programs (Strategies) – Teachers

Please report on the amount and characteristics of DPA your students receive, whether it is delivered by yourself, another teacher, or as part of a school-wide activity.

11. Has your school's position on physical activity in curricular education been outlined through written policies or practices?[2]

- ○ Yes, through existing written policies
- ○ Yes, through written policies still under development
- ○ Yes, through practices
- ○ No
- ○ I don't know

12. Is there a physical education specialist who provides your class with physical education?[3]

- ○ Yes, a specialist provides my class with physical education
- ○ Yes, I am the specialist who provides physical education to my classes
- ○ No, I provide physical education to my class
- ○ No, physical education is delivered through school-wide activities

13. On average, how many days per week do your students have Health and Physical Education class?[2]

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

14. In addition to physical education class, how many days per week does your class participate in DPA?[4]

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

15. What time(s) of day does DPA usually occur in your classroom?[3]

- ○ First thing in the morning
- ○ Just before lunch
- ○ Just after lunch
- ○ Last period of the day
- ○ It doesn't

16. On average, during a typical DPA session, for how long (in minutes) are the students engaged in moderate to vigorous physical activity?

17. Is there currently a daily schedule posted in your classroom?[4]

- ○ Yes
- ○ No

18. If you answered "yes" to the previous question, does your posted daily schedule have DPA on it?[3]

- ○ Yes
- ○ No
- ○ Not Applicable

19. How often do you implement a wide variety of activities across DPA sessions?[5]

- ○ 1 (never)
- ○ 2 (rarely)
- ○ 3 (sometimes)
- ○ 4 (often)
- ○ 5 (always)

20. How often do you include a warm-up and cool down during DPA sessions?[5]

- ○ 1 (never)
- ○ 2 (rarely)
- ○ 3 (sometimes)
- ○ 4 (often)
- ○ 5 (always)

21. On days when your students do not receive a physical education class, how often do you conduct DPA for a full 20 minutes?[5]

- ○ 1 (never)
- ○ 2 (rarely)
- ○ 3 (sometimes)
- ○ 4 (often)
- ○ 5 (always)

22. What types of activities do you use for DPA? (check all that apply)[5]

- ○ Games
- ○ Walks

- ○ Running
- ○ Dance
- ○ Sports
- ○ Yoga

Other (please specify)

23. Where do you conduct your DPA session? (check all that apply)[5]

- ○ Classroom
- ○ Gymnasium
- ○ Hallways
- ○ Sports fields
- ○ Outdoors

Other (please specify)

Facilitators and Barriers Influencing Delivery of DPA – Teachers

Read each statement below and check the appropriate number to indicate the degree to which the statement applies to you and your delivery of DPA. Any statement that does not describe your delivery of DPA should be given a low rating. In contrast, any statement that does describe your delivery of DPA should be given a high rating.

24. There are sufficient educational resources available to me to support the delivery of DPA.[5]

○ 1 (Disagree Strongly)	○ 2 (Disagree)	○ 3 (Neither Agree Nor Disagree)	○ 4 (Agree)	○ 5 (Agree Strongly)

25. My school's administration supports faculty participation in professional development opportunities that enhance my knowledge of physical activity and health.[5*]

○ 1 (Disagree Strongly)	○ 2 (Disagree)	○ 3 (Neither Agree Nor Disagree)	○ 4 (Agree)	○ 5 (Agree Strongly)

26. My school's administration supports faculty participation in professional development opportunities that enhance my knowledge of physical activity and health.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

27. I have access to a specialist who can help me plan DPA.[4*]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

28. My school administration provides scheduling opportunities that allow me to PLAN DPA sessions for my class.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

29. My school administration provides scheduling opportunities that allow me to CONDUCT DPA sessions for my class.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

30. I have sufficient space to conduct DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

31. I have sufficient equipment to conduct DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

32. My school administration promotes physical activity during, or as part of, special events.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

33. My school administration monitors my implementation of DPA.[3]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

34. I am satisfied with the level of support provided to me by my school administration for the implementation of DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

Knowledge and Perspectives Surrounding DPA and Health – Teachers

Read each statement and check the appropriate number to indicate the degree to which the statement applies to you. Any statement that does not describe your knowledge, attitudes or beliefs surrounding DPA and health should be given a low rating. In contrast, any statement that does describe your knowledge, attitudes or beliefs surrounding DPA and health should be given a high rating.

35. I have read Ontario's Health and Physical Education curriculum for Grades 1-8.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

36. I think of myself as a health conscience person.[7]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

37. When I implement DPA, I feel that I am doing something positive for the students.[8]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

38. I am familiar with the frequency (e.g., hourly, daily, weekly) of physical activity that is prescribed by the DPA mandate.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

39. I am familiar with the intensity (e.g., low, moderate, vigorous) of physical activity that is prescribed by the DPA mandate.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

40. I am familiar with the duration (e.g., number of minutes) of physical activity that is prescribed by the DPA mandate.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

41. The administrators at my school believe that it is important that I deliver DPA.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

42. I feel that I have the ability to teach physical activity-related lessons if I wish to.[10]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

43. I have used the teacher resources that were developed by Ontario's Ministry of Education to support the implementation of DPA.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

44. I administer physical activity, such as laps or push-ups, as a disciplinary measure.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

45. For me, DELIVERING DPA is easy.[8]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

46. I have used the teacher resources that were developed by the Ontario Physical and Health Education Association (OPHEA) to support the implementation of DPA.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

47. DPA is a beneficial initiative within the school system.[4]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

48. I think of myself as a sort of person who teaches physical education.[7]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

49. I am motivated to comply with the beliefs of my school's administration.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

50. I enjoy conducting DPA sessions.[5,11]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

51. My teaching colleagues at my school believe that the delivery of DPA is important.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

52. For me, SCHEDULING DPA is easy.[8]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

53. DPA is a valuable contributor to academic success.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

54. The students at my school believe that delivery of DPA is important.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

55. Whether I SCHEDULE DPA is not entirely up to me.[8]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

56. I cancel Health and Physical Education or other scheduled physical activity as a disciplinary measure.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

57. When implementing school-wide initiatives and programs in the classroom, doing what my teaching colleagues are doing is important to me.[12]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

58. Whether I DELIVER DPA is not entirely up to me.[8]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

59. Physical activity is a positive contributor to student wellness.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

60. I use physical activity as a reward in my classroom.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

61. Compliance with the DPA guidelines is important to me.[12]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

62. I think of myself as a physically active person.[7*]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

63. My students' parents believe that delivery of DPA is important.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

64. I think of myself as an active role model for staff and students.[7*]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

Participant Information – Administrator

65. What is your administrative role?

○ Principal

○ Vice-Principal

○ Other (please specify)

66. Please indicate the approximate number of students in your school.

67. Please indicate the number of year(s) that you have worked in administration for a school board.

68. Please indicate the grade range in your school.

DPA Instruction and Programs (Strategies) – Administrators

69. Is there someone in your school who is in charge of DPA?[4]

- ○ Yes
- ○ No, each teacher is responsible for his/her own class with regards to DPA

70. Which statement best describes how daily physical activity is implemented at your school?[2]

- ○ Daily physical activity is implemented as part of the daily scheduled Health and Physical Education classes
- ○ Daily physical activity is implemented during other instructional time on days when there are no scheduled Health and Physical Education classes
- ○ Daily physical activity is implemented during other instructional time in addition to scheduled Health and Physical Education classes
- ○ Our school is unable to offer at least 20 minutes of physical activity every day
- ○ Other (please specify)

71. Has your school's position on physical activity in curricular education been outlined through written policies and practices?[2]

- ○ Yes, through existing written policies
- ○ Yes, through written policies still under development
- ○ Yes, through practices
- ○ No

72. During the past 12 months, has your school worked on physical activity promotion and/or activities for students with a … (check all that apply)[2]

- ○ Health Organization (e.g., Heart and Stroke Foundation, Canadian Cancer Society, Canadian Diabetes Association)
- ○ Parks or Recreation department
- ○ Youth Organization (e.g., YMCA)
- ○ Health or fitness club
- ○ Board itinerant teacher (e.g., consultant, specialist)

Other (please specify)

73. During the past 12 months, has your school…[2]

	met with a parents' organization (e.g., school council) to discuss physical activity at school?	provided parents/families/ guardians with information on physical activities at school (e.g., newsletter)?	formally collected suggestions from parents/families /guardians about physical activity at school?	formally collected suggestions from students about physical activity at school?	formally collected suggestions from school staff about physical activity at school?	held a special event to educate the school community about physical activity (e.g., health fair, guest speaker?)
Yes	○	○	○	○	○	○
No	○	○	○	○	○	○
Don't know	○	○	○	○	○	○

74. During the past 12 months, have teachers who are involved in physical activity received…[2]

	current research and guidelines for physical activity among school-age children and youth?	information on how to promote physical activity?	ongoing professional development on physical activity by a trained person?	specific instruction by outside experts in physical activity (e.g., fitness professionals) on how to promote physical activity)?
Yes	○	○	○	○
No	○	○	○	○
Don't know	○	○	○	○

Facilitators and Barriers Influencing Delivery of DPA – Administrator

Read each statement and check the appropriate number to indicate the degree to which the statement applies to your school's delivery of DPA. Any statement that does not describe your school's delivery of DPA should be

given a low rating. In contrast, any statement that does describe your school's delivery of DPA should be given a high rating.

75. There are sufficient educational resources available in my school to support the delivery of DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

76. Faculty members are provided with professional development opportunities that enhance their knowledge of physical activity and health.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

77. Faculty members are provided with professional development opportunities that inform their delivery of DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

78. My faculty members have access to a specialist who can help with planning of DPA.[4]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

79. My school has sufficient space to conduct DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

80. My school has sufficient equipment to conduct DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

81. Faculty members are allocated time in their schedule to PLAN DPA sessions.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

82. Faculty members are allocated time in their schedule to CONDUCT DPA sessions.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

83. My school promotes physical activity during, or as part of, special events.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

84. My school board has allocated a specific budget to support implementation of DPA.

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

85. My school board monitors implementation of DPA in my school.[3]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

86. The administrative team monitors implementation of DPA in my school.[3]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

87. I am satisfied with the level of support provided to my faculty by the school board for the implementation of DPA.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

Knowledge and Perspectives Surrounding DPA and Health – Administrators

Read each statement below and check the appropriate number to indicate the degree to which the statement applies to your school's delivery of DPA. Any statement that does not describe your knowledge, attitudes or beliefs surrounding DPA and health should be given a low rating. In contrast, any statement that does describe your knowledge, attitudes or beliefs surrounding DPA and health should be given a high rating.

88. I have read Ontario's Health and Physical Education curriculum for Grades 1-8.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

89. My school board believes it is important to delivery DPA.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

90. I am familiar with the frequency (e.g., hourly, daily, weekly) of physical activity that is prescribed by the DPA mandate.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

91. I am familiar with the intensity (e.g., low, moderate, vigorous) of physical activity that is prescribed by the DPA mandate.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

92. I am familiar with the duration (e.g., number of minutes) of physical activity that is prescribed by the DPA mandate.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

93. My faculty members believe that delivery of DPA is important.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

94. I am familiar with the teacher and administrator resources that were developed by Ontario's Ministry of Education to support the implementation of DPA.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

95. I am familiar with the teacher resources that were developed by the Ontario Physical and Health Education Association (OPHEA) to support the implementation of DPA.[6]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

96. Compliance with the DPA guidelines is important to me.[12]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

97. DPA is a positive initiative within the school system.[4]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

98. Physical activity is a positive contributor to student wellness.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

99. When implementing school-wide initiatives and programs promoting physical activity, doing what other schools in my Board are doing is important to me.[12]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

100. DPA is a valuable contributor to academic success.[5]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

101. I think of myself as an active role model for school staff and students.[7*]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

102. I am motivated to comply with the beliefs of my school Board.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

103. It is acceptable for teachers to administer physical activity, such as laps or push-ups, as a disciplinary measure.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

104. The students at my school believe that delivery of DPA is important.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

105. I think of myself as a physically active person.[7*]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

106. It is acceptable for teachers to cancel Health and Physical Education or other scheduled physical activity as a disciplinary measure.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

107. My school uses physical activity as a reward.[2]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

108. I think of myself as a health conscience person.[7]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

109. Students' parents believe that delivery of DPA is important.[9]

○ 1 (Disagree Strongly) ○ 2 (Disagree) ○ 3 (Neither Agree Nor Disagree) ○ 4 (Agree) ○ 5 (Agree Strongly)

Additional Comments – Teachers and Administrators

Please use the following five questions below to share any additional comments you may have.

110. What do you like about the DPA policy?[5]

111. What do you dislike about the DPA policy?[5]

112. If you could change the DPA policy, what would you do to make it more effective?[5]

113. Are there any specific institutional and/or individual FACILITATORS that support your delivery of DPA? If so, please share them here.

114. Are there any specific institutional and/or individual BARRIERS that hinder your delivery of DPA? If so, please share them here.

Thank you for participating in this survey! Your interest in this study is appreciated.

Please select the 'Submit My Responses' button below to submit your survey responses and exit the survey.

If you would like to receive more information on the study and its findings, please contact one of the following members of the research team:

Tara McGoey, M.Sc.
Principal Investigator
e-mail: m0259261@community.nipissingu.ca
tel: 705-474-7600 ext. 5821

Dr. Barbi Law
Faculty Supervisor
e-mail: barbil@nipissingu.ca
tel: 705-474-3450 ext. 4147

Sources for Survey Items

1. Retrieved from http://www.ofa.gov.on.ca/graphics/ontario_map_e.jpg
2. Obtained from The School Health Environment Survey (SHES) (Manske, 2008)
3. Generated based on published facilitators and barriers for DPA delivery (Mâsse et al., 2013)
4. Obtained from Pascall (2010) dissertation. Items marked with an asterix (*) were adapted.
5. Obtained from Patton (2012b) dissertation. Items marked with an asterix (*) were adapted.
6. Generated to address extent to which teachers are familiar with DPA policy and its resources
7. Obtained from Faulkner, Reeves, & Chedzoy (2004). Items marked with an asterix (*) were adapted.
8. Generated using a Theory of Planned Behaviour guidance document (Ajzen, 2002)
9. Adapted from Martin, Kulinna, Eklund, & Reed (2001)
10. Adapted from Mummery, Spence, & Hudec (2000)
11. Adapted from Morgan & Hansen (2008)
12. Generated to gain insight into the school's social climate

Appendix B – REB Letter of Certification for Study 1

NIPISSING UNIVERSITY

February 11, 2015

Tara McGoey
320 Osprey Cres.,
Callander, ON P0H 1H0

Dear Tara:

Re: REB File # ***14-10-03(RV)*** (Please quote on all correspondence)
Project Entitled: The Ontario Ministry of Education's Daily Physical Activity (DPA) Policy: A Descriptive Study

It is our pleasure to advise that your *Request for Modifications to an Approved Protocol* at Nipissing University has granted ethical approval for your research noted above. ***Ethics approval is valid for one (1) year and will expire on February 28, 2016.*** It is your responsibility as a researcher to keep track of the expiry date.

Annual Renewal: If you require additional time or an extension you are required to complete a *Request for Renewal of an Approved Protocol* form ***prior*** to the anniversary of your expiry date.

Modifications: If there are any modifications/changes to the approved project you are required to submit a *Request for Modifications to an Approved Protocol* form.

Final Report: According to the Tri-Council Policy Statement (TCPS) you are required to submit a Final Report. A Final Report is due once you are no longer actively involved with participants/data collection.

Please note that all forms are located on the Research Ethics Board website at ***http://www.nipissingu.ca/academics/research-services/reb/Pages/Protocol-Forms.aspx***

At any time during your research should any participant(s) suffer adversely you are required to advise the Research Ethics Board at Nipissing University, (705) 474-3450 ext. 4055 within 24 hours of the event.

We wish you all the success in completion of your research.

Sincerely yours,

Dr. Susan E. Elliott-Johns, Chair
Research Ethics Board

cc: Research Services
Drs. Barbi Law and Jim McAuliffe, Physical and Health Education

100 College Drive, Box 5002, North Bay, ON P1B 8L7
tel: (705) 474-3450 • fax: (705) 474-5878 • tty: 877-688-5507
internet: www.nipissingu.ca

Appendix C – Participant Invitation Letter for Study 1

Dear Ontario Elementary School Teachers and Administrators,

This letter is to invite you to participate in a research study, entitled *The Ontario Ministry of Education's Daily Physical Activity (DPA) Policy: A Descriptive Study of its Delivery in Elementary Schools*. The purpose of the proposed research is to gain insight into factors that influence your ability to implement DPA within your school. The findings will be used to identify recommendations and to advocate for how we can facilitate the implementation of DPA in Ontario elementary schools.

You have been identified as a potential participant for this study because of your teaching or administrative position in an elementary school in Ontario. If you choose to participate in this study, you will be asked to complete an online survey that will take approximately 20 to 30 minutes to complete. Any information obtained from your participation in this study is anonymous, and your involvement in this study is completely voluntary. The survey does not ask you to identify yourself or name your school, and neither the school board nor your administrators will have access to the data, nor will they or the researchers be aware of whether or not you choose to participate.

In addition, with your help, I hope to ensure that the views from a diverse sample of Ontario elementary teachers (Grades 1 through 8) and administrators are included in the study. Therefore, if you know any other teachers and/or administrators who may be interested in participating, please forward this information to them via email and/or using other forms of social media (e.g., personal blog, Facebook page, twitter account).

If you have any questions about the study, please do not hesitate to contact me using the information provided below. Whether you choose to participate or not, you can request a copy of the findings from the principal investigator. If you are interested in further information on the study or would like to participate, please click the link provided below which will take you directly to the participant letter of information and consent form as well as the online survey.

https://www.surveymonkey.com/s/DPA_ON_ELEMENTARY

Thank you for your time and consideration.
Best Regards,

Tara McGoey, Ph.D. Candidate
Principal Investigator
Schulich School of Education
E-mail: m0259261@community.nipissingu.ca
T: 705-474-7600 ext. 5821

Barbi Law, Ph.D.
Faculty Supervisor, Associate Professor
School of Physical & Health Education
Schulich School of Education
E-mail: barbil@nipissingu.ca
T:705.474.3450 ext. 4147

Appendix D – Association Permission Letter for Study 1

Association/List Serv Permission Letter

You have been contacted to request your endorsement of a study being conducted by a doctoral student at Nipissing University, entitled *The Ontario Ministry of Education's Daily Physical Activity (DPA) Policy: A Descriptive Study of its Delivery in Elementary Schools.* The purpose of the proposed research is to gain insight into factors that influence a school's ability to implement the DPA policy. The findings will be used to identify recommendations and to advocate for how we can facilitate the implementation of DPA in Ontario elementary schools.

Due to your role as chair of [name of teacher association or list serv], I am contacting you in hopes of gaining your permission to invite teachers and/or administrators from your association to participate in this study. Specifically, I am requesting that you forward the attached invitation to elementary school administrators and teachers within your association. Participants will be invited to participate in an anonymous online survey that will take approximately 20 to 30 minutes to complete. Your Association's and teachers'/administrators' involvement in this study is completely voluntary. The link to the survey is provided in the attached invitation letter, and can be reviewed prior to being forwarded.

With your help, I hope to ensure that the views from a diverse sample of administrators and teachers are included in the study. I would like to hear from teachers of any Grade (1 through 8), and from teachers and administrators at any school that includes elementary grades within the province of Ontario.

If you are interested in assisting with this study or require further information, please do not hesitate to contact me using the information below. You can also contact me to request a copy of the study findings.

Thank you for your time and consideration.

Best Regards,

Tara McGoey, Ph.D. Candidate
Principal Investigator
Schulich School of Education
E-mail: m0259261@community.nipissingu.ca
T: 705-474-7600 ext. 5821

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Appendix E – Data Collection Tool for Study 2

Parents' Perceptions of Elementary School-Based Physical Activity: A Descriptive Study of Ontario's Daily Physical Activity (DPA) Policy

Participant Letter of Information

You are invited to participate in a study entitled, *Parents' Perceptions of Elementary School-Based Physical Activity: A Descriptive Study of Ontario's Daily Physical Activity (DPA) Policy*, conducted by Tara McGoey, a doctoral student in the Schulich School of Education at Nipissing University. The results of this study will contribute to the partial fulfillment of a Doctor of Philosophy degree in Educational Sustainability from Nipissing University.

The purpose of the research is to gain insight into parents' perceptions of their children's experiences in school-based physical activity. The study will be used to identify recommendations and to advocate for how we can facilitate the implementation of the Daily Physical Activity (DPA) policy guidelines, which mandate that all elementary school students participate in a minimum of 20 minutes of sustained moderate to vigorous physical activity each school day during the school year. Findings from this research may identify strengths and weaknesses of the policy, which could inform future policy debates, and will be used to generate recommendations for the development of policy implementation strategies in Ontario elementary schools. The study is descriptive in nature and as such will not evaluate personal beliefs or practices.

If you agree to participate in this study, you will be asked to:

Complete an anonymous online survey. The survey asks for information regarding: basic demographics (e.g., sex, age of children) and your thoughts about the DPA policy, the school's role in physical activity promotion and delivery, and family-based physical activity and health. All questions require either selecting your response by checking one (or more) options, or by typing a short response into text boxes. Completion of the online survey will take approximately 20 to 30 minutes. Completion of this survey entitles you to enter a draw to win one of eight Chapter's gift cards, valued at $25 each.

There are no known physical or social risks associated with participation in this study. There is a minimal risk that you may become concerned about your own or your child(ren)'s participation in physical activity. If you would like to receive additional information about the DPA policy, the benefits of regular physical activity and/or access parent resources for the promotion and delivery of physical activity, you may contact the researchers or refer to the links provided when you exit the survey site.

Your participation in this study is voluntary. Any information obtained from research participants in connection with this study is anonymous. You will not be asked to identify yourself or your child(ren). All data will be presented in group format so that individual responses will not be shown and will not be matched with your demographics.

You may choose not to answer specific questions and you may withdraw from the study at any time during survey completion by selecting the 'exit without submitting' link. If you choose this option, your data will not be saved. Once you have selected the final 'submit my responses' link at the end of the survey, you will no

longer be able to withdraw from the study. This is because your data are anonymous and there is no way of identifying and removing it once you have submitted your responses.

Your survey results will be encrypted and stored within a password-protected file on the researcher's password-protected computer. The data will be kept for five years post-publication of the study's findings and will then be permanently deleted by the research supervisor.

Participation in this study may help you to become aware of the range of parent resources available for the promotion and delivery of regular physical activity at home, as well as the extent to which regular physical activity is delivered at your child(ren)'s school. Your participation in this study will also contribute to the understanding of strategies and needs surrounding DPA implementation within Ontario.

If you would like to participate in this study, please check the 'Yes, I want to participate' box. This will take you to the first page of the survey.

If you do not want to participate in this study, please check the 'No, I do not want to participate' box. This will allow you to leave the survey site without completing the survey.

Completion of the survey signifies your consent. Please keep a copy of this information letter for your records. This study has been reviewed and has received ethics clearance through Nipissing University's Research Ethics Board and your school board.

If you have questions about the research and/or would like information about the findings of the study, please feel free to contact the primary investigator, Tara McGoey, via email (m0259261@community.nipissingu.ca) or telephone (705-474-7600 ext. 5821), and/or the faculty supervisor, Barbi Law, via email (barbil@nipissingu.ca) or telephone (705-474-3450 ext. 4147). The researcher's contact information will also be provided again at the end of the survey. Findings will be shared at academic conferences and in peer-reviewed journal articles, and will serve as a portion of the researcher's Ph.D. dissertation.

If you have questions regarding your rights as a research participant, contact:

Ethics Coordinator
Nipissing University
100 College Drive
North Bay, ON
Canada P1B 8L7
Email: ethics@nipissingu.ca

1. Please indicate whether or not you would like to participate in this study.

- ☐ Yes, I consent to participate in this survey.
- ☐ No, I do not consent to participate in this survey.

Participant Information

2. What is your sex?

- ☐ Female
- ☐ Male

3. To which racial or ethnic group(s) do you *most* identify?

- ☐ Caucasian (non-Hispanic)
- ☐ First Nations (North American Indian), Métis or Inuk (Inuit)
- ☐ African-American (non-Hispanic)
- ☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- ☐ South-East Asian (e.g., Vietnamese, Cambodian, Malaysian, etc.)
- ☐ West Asian (e.g., Iranian, Afghan, etc.)
- ☐ Arab
- ☐ Chinese
- ☐ Korean
- ☐ Japanese
- ☐ Filipino
- ☐ Latin American
- ☐ Other

4. What is the highest level of education that you have attained?

- ☐ No schooling
- ☐ Elementary
- ☐ Secondary
- ☐ Community/Technical College
- ☐ University
- ☐ Graduate University

5. Did you claim the Children's Fitness Tax Credit last year (2015)?

- ☐ Yes
- ☐ No
- ☐ Unsure
- ☐ Unaware of the Children's Fitness Tax Credit

6. What is your current household income from all sources?

- ☐ Less than $25,000
- ☐ $25,001 - $50,000
- ☐ $50,001 - $75,000
- ☐ $75,001 - $100,000
- ☐ More than $100,000
- ☐ Don't know / prefer not to answer

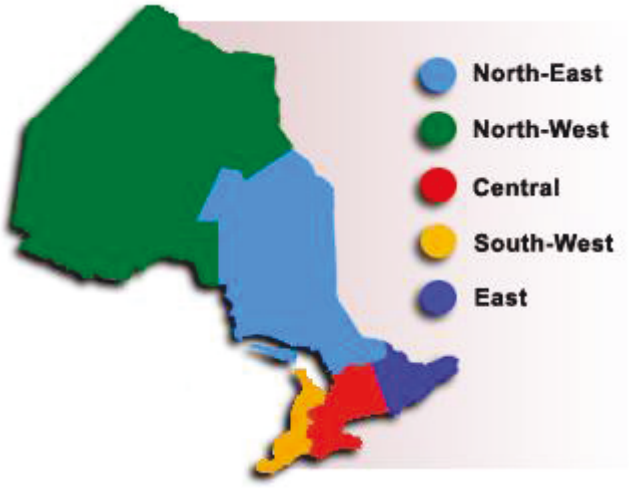
7. Using the drop-down lists below, indicate how many children you have based on the elementary grade in which they are enrolled for the current academic year (2015-2016 academic year).

Grade 1
Grade 2
Grade 3
Grade 4
Grade 5

Grade 6
Grade 7
Grade 8
Special Education

8. Using the map below, identify the region in Ontario in which your child(ren) attends school.

- ☐ North-East
- ☐ North-West
- ☐ Central
- ☐ South-West
- ☐ East
- ☐ Not in Ontario



9. Identify the school system to which your child's (children's) school belongs.

- ☐ Private or Independent school
- ☐ Publicly-funded: English Public
- ☐ Publicly-funded: English Catholic
- ☐ Publicly-funded: French-language Public
- ☐ Publicly-funded: French-language Catholic

10. Are you currently registered with the Ontario College of Teachers?

- ☐ Yes
- ☐ No

11. If you answered yes to the previous question, are you currently teaching in an Elementary school in Ontario?

- ☐ Yes
- ☐ No

12. Do you work in a field related to health promotion?

- ☐ Yes
- ☐ No

The Daily Physical Activity (DPA) Policy

In 2005, the Ontario Ministry of Education created the Daily Physical Activity (DPA) policy, which is incorporated into the current Health and Physical Education (H&PE) curriculum. The DPA policy requires school boards to ensure that all elementary students have a minimum of 20 minutes of sustained moderate to vigorous physical activity each school day during instructional time. DPA may occur during an H&PE class; however, on days when an H&PE class does not include physical activity, and on days when no H&PE class is scheduled, DPA should be delivered in conjunction with other curriculum areas.

Key terms are defined below for your reference:

Daily Physical Activity (DPA) Policy – Ontario Ministry of Education policy that requires all school boards to ensure that elementary students (Grades 1 to 8) have a minimum of 20 minutes of sustained moderate to vigorous physical activity each school day. DPA must be scheduled during instructional time and does not include activity obtained during lunch, recess, or breaks.

Health & Physical Education (H&PE) – Provincial curriculum that educates elementary students about the factors that contribute to health, safety, and well-being. These factors include movement skills, physical fitness, active participation, understanding health concepts, and making healthy choices.

Physical Activity – any bodily movement produced by skeletal muscles that expends energy (i.e., that burns calories). Physical activity in daily life includes active play, sports and exercise, as well as household, workplace and other activities that require energy expenditure. Moderate to vigorous physical activity is activity that noticeably increases the heart rate, such as brisk walking.

Active Play – a form of physical activity. Active play comes in many forms, but is generally freely chosen, spontaneous, self-directed and fun. It can occur indoors or outdoors, alone or with family or friends, and may be structured (e.g., a game with rules, such as tag) or unstructured (e.g., playing in the park, dancing to music spontaneously).

Read each statement below and check the appropriate number to indicate the degree to which you agree with the statement. Any statement with which you do not agree should be given a low rating. In contrast, any statement with which you agree strongly should be given a high rating.

13. The DPA guidelines are realistic in terms of the **duration** (20 sustained minutes) of recommended physical activity.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

14. The DPA guidelines are realistic in terms of the **frequency** of the recommended physical activity (i.e., every school day)

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

15. The DPA guidelines are realistic in terms of the **intensity** of recommended physical activity (moderate-to-vigorous) (e.g., activity that noticeably increases the heart rate, such as brisk walking).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

16. It is important to me that DPA is delivered in my child(ren)'s school as prescribed (e.g., 20 minutes of moderate-to-vigorous physical activity every day).[1]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

17. Prior to completing this survey, I was already familiar with the DPA policy.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

18. The DPA policy is useful because participation in DPA provides my child(ren) with the majority of his/her/their physical activity.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

19. I am aware of the current plan for implementing DPA at my child(ren)'s school.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

20. Report cards should include a section specific to DPA so that parents know if their children are meeting the DPA requirements.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

21. I have received information about the DPA policy from my child(ren)'s school (e.g., teacher's note, school poster, school website).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

22. The Ontario Ministry of Education should change the existing DPA policy to improve schools' success at increasing students' daily physical activity.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

23. It is important for elementary schools to have a policy that requires daily physical activity for students during the school day.[1]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

24. I have discussed the DPA policy with other parents.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

25. Teachers should be able to deliver DPA during non-instructional time, such as recess.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

26. I have read /heard information about the DPA policy from a source other than my child(ren)'s school (e.g., from the news, social media, website).[2]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

27. Delivering DPA during instructional time interferes with more important curriculum expectations (e.g., math).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

28. I am familiar with the Health and Physical Education curriculum content.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

29. Teachers should not be able to use Physical Education classes to meet the DPA requirement

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

Physical Activity in Children and the School's Role in its Promotion and Delivery

Read each statement below and check the appropriate number to indicate the degree to which you agree with the statement. Any statement with which you do not agree should be given a low rating. In contrast, any statement with which you agree strongly should be given a high rating.

30. Early experience with regular physical activity leads to lifelong participation in physical activities.[2,3]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

31. Children who participate in regular physical activity have more self-confidence.[2,3]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

32. Schools should be responsible for providing students with regular opportunities to be physically active while at school.[5]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

33. Educating students at school about the benefits of regular physical activity is important.[5]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

34. It is important for teachers to engage in physical activity with their students.[1]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

35. Schools play an important role in teaching children ways to be more physically active.[5]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

36. It is important to me that my child is physically active every day.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

37. Students should receive encouragement from their teachers to engage in regular physical activity at home and at school.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

38. Educating students at school about the benefits of regular physical activity is important.[5]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

39. Regular physical activity is associated with numerous health benefits in school-age children.[2,3]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

40. Parents should take the main responsibility in ensuring that their children are sufficiently active.[4]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

41.The following influence the amount of physical activity in which my child(ren) engages outside of school.[2,7]

a. Time constraints

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

b. Transportation problems

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

c. Competitiveness of organized sports

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

d. The cost associated with after-school activities

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

e. The lack of safe places for my child(ren) to be active

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

42. Participation in physical activity during the school day helps children stay focused in the classroom.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

43. Families play an important role in

a. the promotion of regular physical activity.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

b. providing opportunities for organized sport.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

c. encouraging children to engage in active free play (e.g., playing outside, dancing or skipping to music).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

44. During a typical school week, the majority of my child(ren)'s physical activity occurs during

a. recess

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

b. active free play (e.g., playing with friends outside after school).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

c. Health and Physical Education class.

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

d. his/her active commute to school (e.g., walking or biking to school).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

e. organized sporting events (e.g., hockey games, gymnastics practice).

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

45. Schools are doing enough to increase the physical activity levels of the students.[6]

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

46. It is important for parents to attend school-based events related to healthy, active living at their children's school

- ☐ 1 (Disagree strongly)
- ☐ 2 (Disagree)
- ☐ 3 (Neither Agree Nor Disagree)
- ☐ 4 (Agree)
- ☐ 5 (Agree Strongly)

Parental Behaviour Related to Participation in PA

Read each statement below and check the appropriate number to indicate the frequency with which you engage in the activity described. Any statement that describes an activity that you do not do should be given a low rating. In contrast, any statement that describes a common activity for you should be given a high rating.

47. In a typical week in the past month, how often were you physically active with your child(ren) for at least 10 minutes at a time (e.g., playing outside, going for a bike ride)?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

48. In a typical week in the past month, how often did you encourage your child(ren) to be physically active (e.g., play outside, dance to music)?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

49. In a typical week in the past month, how often did your family participate in physical activity together (e.g., going on bike rides together, hiking, making use of community facilities such as parks, rinks, pools)?[9]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

50. In a typical week in the past month, how often did your child(ren) see you

a. being physically active (e.g., going to the gym/for a run, participating in a sport)?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

b. doing house/yard work?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

51. In a typical week in the past month, how often did your child(ren) hear you talk about sports or physical activity?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)

- ☐ 6 (Daily)

52. In a typical week in the past month, how often did you transport your child(ren) for physical activity-related events?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

53. In a typical week in the past month, how often did your child(ren) hear you give reasons for not being physically active (e.g., too tired, too busy, don't enjoy it)?[8]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

54. In a typical week in the past month, how often did you educate your child(ren) about the benefits of regular physical activity?[10]

- ☐ 1 (Never)
- ☐ 2 (Less than once a week)
- ☐ 3 (1-2 times per week)
- ☐ 4 (3-4 times per week)
- ☐ 5 (5-6 times per week)
- ☐ 6 (Daily)

Additional Comments

Please use the following three questions below to share any additional comments you may have.

55. What do you like about the DPA policy?

56. What do you dislike about the DPA policy?

57. If you could change the DPA policy, what would you do to make it more effective?

Thank you for participating in this survey! Your interest in this study is appreciated.

Please select the 'Submit My Responses' button below to submit your survey responses and exit the survey.

If you would like to receive more information on the study and its findings, please contact one of the following members of the research team:

Tara McGoey, M.Sc.
Principal Investigator
email:
m0259261@community.nipissingu.ca
tel: 7054747600
ext. 5821

Dr. Barbi Law
Faculty Supervisor
email:
barbil@nipissingu.ca
tel: 7054743450
ext. 4147

Sources for Survey Items:

[1]Adapted from Kandra et al., 2007
[2]Adapted from Price et al., 2008
[3]Adapted from Berry et al., 2014
[4]Adpated from Alberta Health, 2014
[5]Adapted from Murnan et al., 2006
[6]Adapted from Murphy & Polivka, 2007
[7]Adapted from Henry et al., 2013
[8]Adapated from Gattshall et al., 2008
[9]Adpated from Davison et al., 2003
[10]Informed by Lox et al., 2014

Appendix F - REB Letter of Certification for Study 2

December 16, 2015

Ms. Tara McGoey
Schulich School of Education
Nipissing University

File No: 100764
Expiry Date: September 22, 2016

Dear Tara,

It is our pleasure to advise you that Research Ethics Board has reviewed your Request for Modification to protocol titled 'Parents' Perceptions of Elementary School-Based Physical Activity: A Descriptive Study of Ontario's Daily Physical Activity (DPA) Policy' and has granted ethical approval.

Modifications: Any changes to the approved protocol or corresponding materials must be reviewed and approved through the amendment process prior to its implementation.

Adverse/Unanticipated Event: Any adverse or unanticipated events must be reported immediately via the Research Portal.

Renewal/Final Report: Please ensure you submit an Annual Renewal or Final Report 30 days prior to the expiry date of your ethics approval. You will receive an email prompt 30 days prior to the expiry date.

Wishing you great success on the completion of your research.

Sincerely,

Dana R. Murphy, PhD
Chair, Research Ethics Board

100 College Drive, Box 5002, North Bay, ON P1B 8L7
tel: (705) 474-3450 • fax: (705) 474-1947 • tty: 1-877-688-5507
internet: www.nipissingu.ca

Appendix G – Participant Invitation Letter for Study 2

Dear Parents/Guardians,

Families play an important role in the school success of children. As a parent/guardian of a child who is attending an elementary school (Grade 1 through 8) in Ontario, you are invited to participate in a research study being conducted by Tara McGoey as part of her doctoral dissertation. The purpose of the study is to gain insight into parents' perceptions of their children's experiences in school-based physical activity, and specifically about the Daily Physical Activity (DPA) Policy. To make sure we have a realistic picture of parents' views, we would like to hear from as many parents as possible!

Participation in this study involves completion of an anonymous online survey that will take approximately 20-30 minutes and gives you an opportunity to enter a draw to win one of eight Chapter's gift cards, each valued at $25. The survey does not ask you to name yourself or your child, and your contact info provided for the draw is not linked to your survey responses. To help us reach as many parents as possible, we also ask you to share this invitation with other parents who may want to share their views as well.

If you are interested in participating in this study or would like more information, please click the following link, which will take you directly to the participant consent form and online survey: http://fluidsurveys.com/s/dpa/parents/

Thank you for your time and consideration!

If you have any questions about the study, please do not hesitate to contact the researchers:

Tara McGoey, Ph.D. Candidate
Principal Investigator
Schulich School of Education
E-mail: m0259261@community.nipissingu.ca
T: 705-474-7600 ext. 5821

Barbi Law, Ph.D.
Faculty Supervisor, Associate Professor
School of Physical & Health Education
Schulich School of Education
E-mail: barbil@nipissingu.ca
T:705.474.3450 ext. 4147

Appendix H – Association Permission Letter for Study 2

Dear [organizaton/coalition/group],

You have been contacted to request your endorsement of a study being conducted by a doctoral student at Nipissing University, entitled, *Parents' Perceptions of Elementary School-Based Physical Activity: A Descriptive Study of Ontario's Daily Physical Activity (DPA) Policy*. The purpose of the research is to gain insight into parents' perceptions of their children's experiences in school-based physical activity. The findings will be used to identify strengths and weaknesses of the Daily Physical Activity (DPA) policy, which mandates that all elementary school students participate in a minimum of 20 minutes of sustained moderate to vigorous physical activity each school day during the school year.

I am contacting you in hopes of gaining your permission to invite parent members of your Association/Coalition/Federation to participate in this study. Specifically, I am requesting that you post/share the attached invitation to parents of elementary school students. Participants will be invited to participate in an anonymous online survey that will take approximately 20 to 30 minutes to complete. Completion of the survey entitles participants to enter a draw to win one of eight Chapter's gift cards, valued at $25 each. Your Association's and parent's involvement in this study is completely voluntary. The link to the survey is provided in the attached invitation letter, and can be reviewed prior to being forwarded. With your help, I hope to ensure that the views from a diverse sample of parents are included in the study. I would like to hear from parents of children in any Grade (1 through 8) at any school that includes elementary grades within the province of Ontario. If you are interested in assisting with this study or require further information, please do not hesitate to contact me using the information below. You can also contact me to request a copy of the study findings. Thank you for your time and consideration.

Best Regards,

Tara McGoey, Ph.D. Candidate
Principal Investigator
Schulich School of Education
E-mail: m0259261@community.nipissingu.ca
T: 705-474-7600 ext. 5821

Barbi Law, Ph.D.
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T:705.474.3450 ext. 4147

Appendix I - Survey Exit/Completion Options for Participants

Participant Action:	Automated Survey Response:
1. Non-consent 'No, I do not consent to participate in this survey'	Thank you for your consideration. For your interest, please find below a list of resources pertaining to the benefits of regular physical activity and/or access the implementation of the DPA policy: Canadian Physical Activity Guidelines and Canadian Sedentary Behaviour Guidelines: http://64.69.79.155/en/guidelines/read-the-guidelines Ontario Physical and Health Education Association (OPHEA): https://www.ophea.net/programs-services. Participaction website: http://www.participaction.com/report-card-2015/ Ontario Ministry of Education DPA policy with links to resource guides: http://www.edu.gov.on.ca/eng/teachers/dpa.html
2. Withdrawal from study 'Exit without submitting'	Thank you for your consideration. For your interest, please find below a list of resources pertaining to the benefits of regular physical activity and/or access the implementation of the DPA policy: Canadian Physical Activity Guidelines and Canadian Sedentary Behaviour Guidelines: http://64.69.79.155/en/guidelines/read-the-guidelines Ontario Physical and Health Education Association (OPHEA): https://www.ophea.net/programs-services. Participaction website: http://www.participaction.com/report-card-2015/ Ontario Ministry of Education DPA policy with links to resource guides: http://www.edu.gov.on.ca/eng/teachers/dpa.html
3. Completion of survey 'Submit my Responses'	Thank you for participating in this survey! Your participation in this study is appreciated. To enter a draw to win one of eight Chapter's gift cards, valued at $25 each, please click on the following link to enter your personal information. This link will bring you to a separate page that is not connected with or traceable to your survey information. http://fluidsurveys.com/s/drawentry/completion/of/DPA/survey/ For your interest, please find below a list of resources pertaining to the benefits of regular physical activity and/or access the implementation of the DPA policy: Canadian Physical Activity Guidelines and Canadian Sedentary Behaviour Guidelines: http://64.69.79.155/en/guidelines/read-the-guidelines Ontario Physical and Health Education Association (OPHEA): https://www.ophea.net/programs-services.

Participaction website: http://www.participaction.com/report-card-2015/

Ontario Ministry of Education DPA policy with links to resource guides: http://www.edu.gov.on.ca/eng/teachers/dpa.html

Appendix J – Reviewed Intervention Characteristics: Physical Activity Output Measures and their Context

PA Output Measure	Context of Measured PA			
	Overall (e.g., Weekdays and Weekends) n = 39 (61.5% reported significant outcomes)	In-School n = 9 (88.9% reported significant findings)		Leisure Time (e.g., After-School) n = 17 (64.7% reported significant outcomes)
		Class-based only n = 4 (75% reported significant findings)	Recess only n = 8 (87.5% reported significant findings)	
PA Frequency n = 12 (50% reported significant outcomes)	n = 7 (Caballero et al., 1998*; Gabriel et al., 2011*; Herbert et al., 2013; Kiran et al., 2010; Levy et al., 2012; Puma et al., 2013; Warren et al., 2003)		n = 1 (Chin & Ludwig, 2013*)	n = 4 (Armitage et al., 2010*; Digelidis et al., 2003; Farley et al., 2007*; McNeil et al., 2009*)
Counts per minute n = 7 (57.1% reported significant outcomes)	n = 4 (Grydeland et al., 2013*; Morrison et al., 2013; Olvera et al., 2010; Taylor et al., 2007*)	n = 3 (Kelly et al., 2012; Magnusson et al., 2011*; Meyer et al., 2014*)		
Steps (per day, unless otherwise specified) n = 10 (90% reported significant outcomes)	n = 6 (Butcher et al., 2007 *; Chen et al., 2010*; Gentile et al., 2009; Horne et al., 2009*; Morgan et al., 2011*; Pangrazi et al., 2003*)		n = 1 (Loucaides et al., 2009 [per minute]*)	n = 1 (Trost et al., 2008 [per minute]*)
		n = 2 (Erwin et al., 2011*; Mahar et al., 2006*)		

PA Duration and Intensity (reported as: time engaged in PA, exercise, or specific intensity of PA; or, percent of time engaged in specific intensity of PA) n = 41 (73.2% reported significant outcomes)	n = 19 (Barr-Anderson et al., 2012*; Cradock et al., 2014*; Fairclough et al., 2013*; Goran & Reynolds, 2005*; Gorely et al., 2009*; Gortmaker et al., 2012*; Hands et al., 2011*; Harrison et al., 2006*; Hovell et al., 2009; Jurg et al., 2006*; Kipping et al., 2014; Muth et al., 2008; Roenmich et al., 2004*; Salmon et al., 2005*; Salmon et al., 2011; Spiegel et al., 2006; Wilson et al., 2011*; Wilson et al., 2005*; Williamson et al., 2007)	n = 4 (Coleman et al, 2005*; Kain et al., 2014; van Beurden et al., 2003*; Verstraete et al., 2007a*)	n = 5 (Efrat, 2013; Huberty et al., 2014*; Ridgers et al., 2007*; Stratton & Mullan, 2005*; Wood et al., 2014*)	n = 9 (Angelopoulos et al., 2006*; Christodoulos et al., 2006*; Herrick et al., 2012; Kafatos et al., 2007*; Kelder et al., 2005*; Mark & Rhodes, 2013*; Pate et al., 2003; Rosenkranz et al., 2010*; Sharpe et al., 2007)
		n = 4 (Michaud et al., 2012*; Naylor et al., 2006*; Verstraete et al., 2006*; Yildrim et al., 2014*)		
Active Transportation n = 3 (33.3% reported significant outcomes)				n = 3 (Jordan et al., 2008; Rowland et al., 2003; Wen et al., 2008*)
Energy Expenditure (METS) n = 4 (75% reported significant outcomes)	n = 3 (Boyle-Holmes et al., 2010*; French et al., 2005; Gao & Xiang, 2014*)		n = 1 (Janssen et al., 2011*)	

Notes: * Reported a statistically significant difference compared to a control or comparison condition. METS: Metabolic Equivalents