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School-based physical activity in children: An evaluation of the Daily Physical Activity program in Ontario elementary schools.

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Kinesiology

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Abstract

Ontario implemented the Daily Physical Activity (DPA) program in all elementary schools to counteract the recent decline in children's physical activity levels. The program mandates that all students in kindergarten to grade 8 are provided with 20 minutes of physical activity every day. The purpose of this thesis was to evaluate the delivery of Daily Physical Activity as well as identify any supports or barriers to program delivery.

Study 1 consisted of objectively measuring the school-day physical activity of students participating in the DPA program. Students wore accelerometers for 4 days. Results indicate that there is very little meaningful physical activity during the DPA class. Students averaged just over 3 minutes MVPA within the allotted 20 minutes of DPA. The inclusion of DPA in the school day had no effect on the total school-day physical activity of students.

Study 2 consisted of a questionnaire investigating the perspectives of the teachers involved in the Daily Physical Activity program. Teachers were questioned about how they implement the DPA program, the supports and barriers to program delivery. Teachers admitted that they do not implement the DPA program as mandated on all days without physical education. They report that time is the single most important barrier to program delivery. Many teachers felt that DPA takes valuable time away from other more important subjects.

Study 3 consisted of a questionnaire investigating the perspectives of the students involved in the DPA program. Students confirmed that teachers do not implement the

DPA program on all days that it is mandated. They also indicated that there is a lack of intensity in the activities used during DPA. Students however looked very favorably on the DPA program and did not feel that time was a barrier to program delivery.

In general the DPA program is not being run as intended in regards to time, intensity or frequency. DPA has shown to have very little effect on the physical activity levels of the students. In order to properly address the decreasing levels of physical activity in Canadian children, the Daily Physical Activity program needs significant changes in order to be effective.

Keywords: Physical activity, children, school, physical education, child health, childhood obesity.

Co-Authorship Statement

The material presented in this dissertation is the result of my original work; however I would like to acknowledge the important contributions of four co-authors. First Dr. Tom Overend, as my supervisor had a significant role in the conceptualization, insight and support in all areas of the three studies included in this dissertation. Second, I would also like to acknowledge Dr. Linda Miller for her support as a member of my advisory committee as well as her contributions to project design and development of all three studies presented as well as analytical support and guidance for all three studies. I would also like to thank Dr. Angela Mandich for her support and guidance throughout this body of work as well as her contributions to the design and development of all three studies presented. Finally I would like to acknowledge Dr. Janette McDougall for her support in the development of the review article presented in the introductory chapter of this dissertation.

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Chapter 1

1.1 Introduction

Physical inactivity is becoming an increasingly significant element to poor health status among Canadian children. Physical activity plays an important role in the development of children, not only physically but mentally and socially (Colley et al., 2011; Janssen & LeBlanc, 2010). Furthermore, the benefits of physical activity are far-reaching, including decreased weight status, decreased risk of disease, increased self-esteem, and better academic performance (Active Healthy Kids, 2011; Tremblay et al., 2010). On the basis of these benefits, it is a wonder that physical activity has played such a small role in the lives of Canadian children. Current physical activity guidelines state that children should be moderately to vigorously active for a minimum of 60 minutes a day (Tremblay et al., 2011a). The new guidelines on sedentary activity state that children should be limited to less than 2 hours a day of screen time such as television, video gaming and computers (Tremblay et al., 2011b).

Currently a significant amount of attention is being placed on the 'epidemic' of obesity. Canadians as a whole have become more overweight and obese in the last 20 years (Katzmarzyk, 2002; Katzmarzyk & Mason, 2006; Sheilds & Tremblay, 2010; Willims, Tremblay, & Katzmarzyk, 2003; Tremblay, Katzmarzyk, & Willims, 2002; Raine, 2004; Tremblay & Willims, 2000; Sheilds et al, 2010; Tremblay et al, 2010b). Poor nutrition, genetics, environmental and social factors as well as a lack of physical activity all play roles in this trend. Despite using different cut-off levels for obesity clasification, studies

have shown a significant increase in overweight and obesity over the last two decades (Ball & Macargar, 2003). Furthermore, they state that type 2 diabetes and cardiovascular disease are appearing more frequently in younger ages. Physical inactivity both exacerbates and results from the outcomes; an individual who has a low level of physical activity may develop negative outcomes which in turn cause a further decrease in the level of physical activity (Active Healthy Kids, 2009; Active healthy Kids, 2010). Physical inactivity creates a 'slippery slope' for the health of Canadians. Coordinated efforts are required from all health stakeholders including parents and families, educators, community leaders and government.

Children spend a great deal of their time in school. Upwards of 6-7 hours of their day is spent in the educational system. It is reasonable to suggest then, that with this significant time allotment, the school system has a responsibility for a fair portion of the total daily physical activity of the students. A major contributor would come in the form of physical education classes. Not only are the students physically active during their time in physical education but the skills they learn often have the secondary effect of making the children more confident and comfortable to take up activity in their free time outside of school. Physical education is an important starting point for children and their healthy development. A proper physical education program can not only get students active but it can improve academic performance, improve classroom behavior, and improve self-esteem among other benefits (Veugelers & Fitzgerald, 2005; Keays & Allison, 1995).

The current trend however in the Canadian educational system is to devalue the importance of physical education (PE) programs compared to the academic subjects. Many schools do not employ a PE specialist, leaving the brunt of responsibility on classroom teachers who may or may not have any background in PE (Active Healthy Kids, 2009). When PE is delivered by non-specialists, the students may suffer in terms of the quality of the program and they do not reap the significant benefits of a properly run PE class. Furthermore, the inclusion of daily PE classes is a thing of the past. Many schools operate on a system where students get 2-3 PE classes per week and some as few as one class per week. With such advantages of daily PE, not only for the students but the class environment, the current model of PE is deficient and does not seem to be evidence-based.

In response to the gaps in PE, and the growing concern for the physical heath and development of Ontario students, Ontario's Premier announced the Daily Physical Activity (DPA) program in 2005 (Ontario Education, 2005a,b,c; Ontario Education 2006a,b). This program mandates that all students are provided with a structured 20 minutes of moderate to vigorous physical activity every day. The DPA requirements are met on the days of the week that a normal PE class is scheduled. However, on days when there is no PE class, the teacher is responsible for getting the students up and moving for 20 minutes at some point through the school day. The activity must be of adequate intensity to elevate the heart rate of the children and it is encouraged to incorporate a variety of activities that are fun, exciting and inclusive of all children. Generally, DPA is not incorporated into the school's official schedule and is left up to the

discretion of the teacher when to take this physical activity break. Depending on weather and space restrictions, the DPA program is performed in gymnasiums, outside, in hallways and often simply in the classroom. The Ontario Ministry of Education released a series of publications that outline the DPA program as well as guide the delivery of the program including a guide for each of the three age groups kindergarten-grade 3, grade 4-6 and grade 7&8 (Ontario Education, 2005a,b,c) as well as for the school boards(Ontario Education, 2006b) and school principals (Ontario Education, 2006a).

Ontario followed Alberta's lead with a DPA program and they have now been joined by British Columbia (Alberta Education, 2008; British Columbia Ministry of Education, 2011). While the DPA program was implemented with the best of intentions, very little has been done to evaluate the effectiveness of the program. Recent data shows that less than half of the students were provided DPA sessions and not one student met the mandate for 20 minutes of MVPA (Stone et al. 2012). Furthermore, with such an unstructured program, it is possible that there will be a great deal of variation in program delivery from school to school, between different teachers and between grades. While this variation is important to enable implementation across Ontario's elementary schools, it may also impact the effectiveness of the program. It is thus important to identify and address the elements of the DPA program that impede delivery of the program or make it successful. Teachers are already overwhelmed with a demanding academic curriculum and the added responsibility of planning and delivering a DPA program could prove to be challenging. Evaluation of the program is

critical in identifying what can be done to make DPA delivery the most beneficial to the students and most rewarding to the teachers involved.

Purpose:

The primary purpose of this dissertation was to assess the effectiveness of the Ontario Daily Physical Activity program in elementary schools in the Thames Valley District School Board. Secondary purposes were to identify supports and barriers to optimal program delivery as well as attitudes of the teachers and students towards the program. In order to achieve these objectives, three projects were undertaken. While each project was succinct and individual in its nature, they were all closely connected thematically.

Study 1

The first project was designed to objectively determine the duration and intensity of DPA sessions and compare this information against the mandated guidelines set out for this program by the Ministry of Education. A secondary purpose was to assess whether the inclusion of DPA in the school day had a significant impact on the total school-day physical activity of the students.

Study 2

The second study targeted teachers' perspectives of the DPA program. A questionnaire given to teachers addressed three topics; a) how DPA is administered in their class, b)

the supports and barriers to DPA delivery in their class, and c) teachers' personal attitudes towards the DPA program.

Study 3

The third study investigated students' perspectives of the DPA program using the questionnaire from the first study adapted for children in grades 4-8. Students were asked about how DPA is run in their class, what they believe to be the barriers and supports to program delivery and their attitudes towards Daily Physical Activity.

The structure of this dissertation will be as follows. Chapter 1 is the Introduction to the research question and overall purpose of the studies. Chapter 2 will be a literature review of the topics of obesity in Canada, childhood obesity, physical activity, sedentary activity, and school-based physical activity programs. The literature review for the school-based physical activity includes a review paper published in the Physical and Health Education Journal titled: *Canada's Active Schools: A review of school-based physical activity interventions in Canada and their importance.* This paper will be accompanied by an update in the literature in this area. Chapter 3 contains the first project - objectively measuring DPA duration and intensity and its impact on total school day physical activity. This paper is in submission (Journal of Physical Activity and Health). Chapter 4 presents the second study - an investigation of the teacher's perspectives of the Daily Physical Activity program. This will include a paper also published in the Physical and Health Education Journal titled: *Teachers' Perspective of the Daily Physical Activity program in Ontario.* Chapter 5 presents the third study – an investigation of the

student's perspectives of the DPA program. This paper has been submitted for publication in Canadian Journal of Education titled: *How students view the Daily Physical Activity program in Ontario*. Chapter 6 contains a summary and discussion of the three studies, as well as limitations of the studies and recommendations for further research in this area including specific recommendations for the DPA program in the Ontario.

1.2 References

Active Healthy Kids Canada. (2009). Active kids are fit to learn: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, On. *Active Healthy Kids Canada.*

Active Healthy Kids Canada. (2010). Healthy habits start earlier than you think: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, ON. *Active Healthy Kids Canada*

Active Healthy Kids Canada (2011). Don't let this be the most physical activity our kids get after school. The Active Healthy Kids Canada 2011 report Card on physical activity for children and youth. Toronto, On. *Active Healthy Kids Canada.*

Alberta Education. (2008). Daily physical activity survey report. Alberta Education – Accountability and Reporting Division. http://education.alberta.ca/teachers/resources/dpa.aspx.

Ball, G. & McCargar, L. (2003). Childhood obesity in Canada: A review of prevalence estimates and risk factors for cardiovascular diseases and type 2 diabetes. *Canadian Journal of Applied Physiology*. 28(1), 117-140.

British Columbia Ministry of Education. Daily physical activity: Kindergarten to grade 12 program guide. (2011). *Ministry of Education.*

Colley, R., Garriguet, D., Janssen, I., Craig, C., Clark, J. & Tremblay, M. (2011). Physical activity of Canadian children and youth: Accelerometer results from the 2007-2009 Canadian Health Measures Survey. *Health Reports*. 22(1), 12-20.

Janssen, I. & Leblanc, A. (2010) Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity.* 7, 40.

Katzmarzyk, P. (2002). The Canadian obesity epidemic, 1985-1998. *Canadian Medical Association Journal.* 166(8), 1039-40.

Katzmarzyk, P. & Mason, C. (2006). Prevalence of class I, II and III obesity in Canada. *Canadian Medical Association Journal.* 174(2), 156-7.

Katzmarzyk, P. & Jannsen, I. (2004). The economic costs of physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology.* 29(1), 90-115.

Keays, J. & Allison, K. (1995). The effects of regular moderate to vigorous physical activity on student outcomes: A review. *Canadian Journal of Public Health*. 86(1), 62-5.

Ontario Education. (2005a). Daily Physical Activity in schools: a guide for grade 1-3. Ontario Ministry of Education.

Ontario Education. (2005b). Daily Physical Activity in Schools: A guide for grades 4-6. Ontario Ministry of Education.

Ontario Education. (2005c). Daily Physical Activity in Schools: A guide for grades 7&8. Ontario Ministry of Education.

Ontario Education. (2006a). Daily Physical Activity in Schools: A guide for school principals. Ontario Ministry of Education.

Ontario Education.(2006b). Daily physical activity in schools: a guide for school boards. *Ontario Ministry of Education*.

Raine, K. (2004). Overweight and obesity in Canada: A population health perspective. *Canada Institute for Health Information.*

Sheilds, M. & Tremblay, M. (2010). Canadian childhood obesity estimates based on WHO, IOTF and CDC cut-points. *International Journal of Pediatric Obesity*. 5(3), 265-273.

Shields M, Tremblay MS, Laviolette M, et al. Fitness of Canadian adults: Results from the 2007-2009 Canadian Health Measures Survey. Health Reports 2010; 21(1): 21-35

Stone, M. Faulkner, G. Zeglen-Hunt, L. Cowie Bonne, J. (2012). The Daily Physical Activity (DPA) Policy In Ontario: Is it working An examination using Accelerometry-measured physical activity data. Canadian Journal of Public Health.

Tremblay, M. & Willims, D. (2000). Secular trends in the body mass index of Canadian children. *Canadian Medical Association Journal*. 163(11), 1429-33.

Tremblay, M., Katzmarzyk, P. & Willims, D. (2002). Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity*. 26(4), 538-543.

Tremblay, M., Colley, R., Saunders, T., Healy, G. & Owen, N. (2010a). Physiological and health implications of a sedentary lifestyle. *Applied Physiology Nutrition and Metabolism.* 35(6), 725-740.

Tremblay, M. S., Shields, M., Laviolette, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010b). Fitness of Canadian children and youth: Results from the 2007-2009 Canadian Health Measures Survey. Health Reports, 21(1), 7-20.

Tremblay, M., Warburton, D., Janssen, I., Paterson, D., Latimer, A., Rhodes, R., Kho, M., Hicks, A., LeBlanc, A., Zher, L., Murumets, K. & Duggan, M. (2011a). New Canadian physical activity guidelines. *Applied Physiology Nutrition and Metabolism*. 36, 36-46.

Tremblay, M., LaBlanc, A., Janssen, I., Kho, M., Hicks, A., Murumets, K., Colley, R. & Duggan, M. (2011b). Canadian sedentary behaviour guidelines for children and youth. *Applied Physiology, Nutrition and Metabolism.* 36, 59-64.

Veugelers, P. & Fitzgerald, A. (2005). Effectiveness of school programs in preventing childhood obesity: A multilevel comparison. *American Journal of Public Health* 95(3), 432-5.

Willims, D., Tremblay, M. & Katzmarzyk, P. (2003). Geographic variation in the prevalence of overweight Canadian children. *Obesity Research*. 11(5), 668-673

Chapter 2

2.0 Literature Review

2.1 Obesity

According to the World Health Organization (WHO), the impact of the current trends in obesity will have significant effects on the health systems of the world especially in regards to non-communicable diseases such as type 2 diabetes, cardiovascular diseases and some forms of cancer (World Health Organization, 2000). Furthermore, it is estimated that obesity in Canada carries with it a massive economic burden (Katzmarzyk & Janssen, 2004). It is estimated that obesity costs Canada 4.3 billion dollars a year (1.6 billion in direct costs and 2.7 indirect). Body mass index (BMI) is the most common form of measurement of obesity and is described as an individual's weight in kg divided by the height of the individual in meters squared. The WHO identifies 4 categories of BMI for adults to describe health risks: underweight (BMI = < 18.5), normal weight (BMI = 18.5-24.9), overweight (BMI = 25.0-29.9), and obese (BMI >29.9) (World Health Organization, 2000). Health Canada adopted these guidelines however, a more recent updated framework for the weight categories of adults is now in use (Health Canada, 2003). In this framework an adult is considered overweight if their BMI is above 25 and obese if their BMI is 30 or greater. The obese category is further divided into three sub categories that relate to the increased health risks

associated with each class. Class 1 obesity is defined as a BMI in the 30-34.9 range while class 2 obesity covers the BMI range of 35-39.9 and finally the definition of a class 3 obesity is a BMI >40.

Katzmarzyk (2002) utilized a set of five national surveys in order to identify the prevalence of overweight and obesity in the Canadian Population. With self-reported data from the 1985 and 1990 Health Promotion Surveys and the 1994, 1996 and 1998 National Population Health Surveys. From this data it was identified that the prevalence of obesity across the Canadian population rose from 5.6% in 1985 to more than doubling in 1998 with a rate of 14.8%.

In a study conducted by Katzmarzyk and Mason (2006) the prevalence of class I, II, and III obesity was identified in Canada. The authors examined the results of several nationally representative samples conducted between 1985 and 2003. Included in the analysis were the 5 national surveys reported in his 2002 study with the addition of the Canadian Community Health Surveys of 2000 and 2003. Through analysis of self-reported height and weight, it was found that overweight and obesity has increased dramatically between 1985 and 2003. Overweight rose from 27.8% to 33.9% while obesity rose from a baseline of 5.6% in 1985 to 16% in 2003. The prevalence of class I obesity in Canada more than doubled over the 18 year period from 5.1% to 11.5%. Class II obesity more than tripled rising from a prevalence of 0.8% to 3.0%. Finally class III obesity saw the greatest increase, more than quadrupling from 0.3% to 1.3%. The key finding was the drastic increase in the severity of obesity (class II and class III). This

indicates that not only is the prevalence of obesity increasing but the severity of obesity is also increasing at alarming rates.

While the self-reported data suggests a significant issue with the health of Canadians, self-reported data tends to lend itself to significant underestimations of BMI due to individuals over-estimating their height and under reporting their actual weight. For example, data from the Canadian Community Health survey of 2005 indicated that self-reported obesity varied 7.6% from that of measured obesity indicating a significant misrepresentation in self-reported data (Elgar & Stewart, 2008). Therefore it is important to identify trends in overweight and obesity using objectively measured height and weight data in order to fully understand the severity of the obesity epidemic (Tjepkema, 2006). In an analysis of measured height and weight data from the 1978 Canada Health Survey, the 1986-1992 Canada Heart Health Surveys and the 2004 Canada Community Health Survey, overweight and obesity proved to have a larger prevalence than previously reported. In 2004, 23% of the Canadian adult population was obese (up significantly from 14% in 1978) while an additional 36% were overweight (Tjepkema, 2006). More current data from the Canadian Health Measures Survey (2007-2009) indicate that the rate of obesity in Canadian adults has risen to 24.3% (Shields et al., 2010).

2.2 Childhood Obesity

In the past childhood overweight was seen as an esthetic issue and not of significant health importance. This however is not the case and it is well accepted that

there are substantial physical and psychological consequences to excess weight in childhood (Ball & McCargar, 2003). The trend of increasing obesity rates is not limited to the adult population. Children are conditioned from a very young age in regards to the lifestyle they lead and they experience similar environmental pressures as their parents. Therefore it is not surprising that while the adult obesity saw dramatic increases, so too did the childhood population. While there has been different methods of measuring and reporting of obesity trends in children, all trends consistently show rapidly increasing obesity rates in Canadian children (Ball & McCargar, 2003). Overweight increased in boys from 10.6% to 32.6% between 1981 (Canada Fitness Survey, measured height and weight) and 1996 (National Longitudinal Survey of Children and Youth, NLSCY, parent reported height and weight). A similar increase was seen in girls as the prevalence of overweight rose from 13.1% to 26.6%. Across this same period of time obesity rates increased in children from 2.0% to 10.2% in boys and 1.7% to 8.9% in girls. For this data overweight and obesity were identified using international cut-offs for BMI for age and sex (Cole, Bellizzi, Flegal & Dietz, 2000). It is evident that childhood overweight and obesity is a significant concern for the health of Canada above and beyond the noted alarm regarding the adult obesity epidemic.

In a study using the same data from 1981 and 1996, using arbitrary cut-offs (85^{th} percentile for overweight and 95^{th} for obesity), Tremblay and colleagues (2002) identified troubling trends. Overweight in boys doubled from 15% to 35.4% and obesity tripled from 5% to 16.6%. Girls saw a similar increase with overweight rising from 15% to 29.2% and obesity growing from 5% to 14.6%. Furthermore, Tremblay and Willims

(2000), found that childhood BMI increased at a rate of 0.1kg/m2 per year between 1981 and 1996. They did so utilizing data from the above mentioned 1981 Canada Fitness Survey and the 1996 NLSCY as well as the 1988 Campbells Survey on the Well-being of Canadians. It is important to identify that the 1996 data was collected from parental reports and thus is likely a conservative number. Data from the 2000-2001 Canadian Community Health Survey indicates that overweight prevalence in boys was 20% while obesity was an additional 9% and for girls overweight prevalence was 17% with obesity being 10% (Canadian Population Health Initiative, 2004)

Further analysis of the 1981 Canada Fitness Survey and the 1996 NLSCY data shows significant geographic and demographic differences in the prevalence of obesity in Canadian children (Willims, Tremblay & Katzmarzyk, 2003). It was found that there was a general trend of increased obesity moving from west to east across Canada. Furthermore, socioeconomic status was inversely related to obesity regardless of the region. Other factors identified included father's education level and number of siblings, both of which had protective relationships with obesity. In a study of grade 5 students in Nova Scotia, the Children's Lifestyle and School-performance Study (CLASS), other important factors were shown to be related with childhood obesity (Veugelers & Fitzgerald, 2005). For example, children who bought lunch at school had an increased risk of obesity as were students living in low socioeconomic neighbourhoods while students who ate dinner together with their families at least 3 times a week saw a decreased risk of obesity. Also of note is the finding that students who received 2 or more physical education classes a week also saw a decreased risk of obesity. In another

study of the CLASS data from Nova Scotia, Wang and Veugelers (2008), found that overweight and obesity in children were significantly associated with a decrease in self-esteem.

When compared to other countries, Canada has not fared well in terms of childhood overweight and obesity (Janssen et al., 2005). In fact, Canada ranked 31st out of 34 developed countries with regards to overweight and obesity. This study identified decreasing physical activity levels, decreased consumption of fruits and vegetables as well as increased television viewing and soda consumption as important determinants of overweight and obesity.

Shields and Tremblay (2010) took measured height and weights from the 2004 Canadian Community Health Survey and analysed the obesity prevalence using three different sets of commonly used cut points for overweight and obesity. The first was the international cut-points identified by the World Health Organization. Also used were the cut-points used by the International Obesity Task Force (IOTF) and the US Center for Disease Control (CDC). This study identified the need to take note of the data collection methods as well as the specific cut-points used in analysis of prevalence rates. The WHO cut points produced a combined overweight/obesity rate of 36% and an obesity rate of 13%. The IOTF cut-points produced an overweight/obesity rate of 26% and an obesity rate of 8% while the CDC parameters created a combined rate of 28% and an obesity rate of 13%. With the dramatic increase in obesity in the Canadian population over the last few decades there is a need for public health policy to address the epidemic (Raine, 2004).

2.3 Physical Activity

In line with the epidemic of obesity, physical activity of Canadians has come under the microscope in recent years. Canadian physical activity levels have decreased drastically over the past several decades (Colley et al., 2011a, 2011b; Shields et al., 2010; Tremblay et al., 2010). Our communities tend to lend themselves to increased car use. Furthermore, advancements in technology have made the work and school atmosphere increasingly sedentary. Regular physical activity participation is a simple and effective preventative mechanism for a variety of health concerns (Janssen, 2007; Janssen and LeBlanc, 2010; World Health Organization, 2010). Of particular concern are the physical activity levels of children. In children, physical activity participation is an important part of healthy development physically, psychologically and socially (Active Healthy Kids, 2009).

It is important to acknowledge the complicated relationship that exists between physical activity and the health outcomes associated with it. It is a "chicken or egg" relationship in which children are inactive and develop negative outcomes or conversely they have the outcomes and therefore do not engage in physical activity (Active Healthy Kids, 2009). In the past the physical activity guidelines for children and youth indicated a need for a minimum of 30 minutes a day, every day, of moderate to vigorous physical activity in order to achieve healthy development. Furthermore, it was recommended that children gradually increase the amount of physical activity per day to an ideal level of 90 minutes a day (Health Canada, 2002). Upwards of 87% of Canadian children failed

to meet the recommended 90 minutes of physical activity a day in 2008 (Active Healthy Kids, 2009). New guidelines were recently published and based on more recent data and have now been adopted nationwide. The new recommendation is for an absolute minimum of 60 minutes of accumulated moderate to vigorous physical activity every day for the optimal development of Canadian children (Tremblay et al., 2011). The new guidelines also call for vigorous activities to be taken up at least 3 days a week and that activities to strengthen muscle and bone be done at least 3 times a week. Accelerometer data collected from the 2007-2009 Canadian Health Measures Survey indicate that only 7% of Canadian Children are achieving the recommended 60 minutes of physical activity every day (Colley et al., 2011). While the recommendation is a minimum of 60 minutes of moderate to vigorous physical activity a day, it is clear that more is better and it is troubling to see that only a meager 4% of Canadian children achieve 90 minutes of PA every day (Colley et al., 2011).

Janssen and LeBlanc (2010) conducted a systematic review of literature regarding the health benefits of physical activity in school-aged children. In this study they identified several key health benefits associated with increased physical activity; this included decreased cholesterol, decreased depression, increased bone density, decreased obesity, decreased blood pressure, decreased injury and metabolic syndrome. Their findings suggest that while even modest levels of physical activity in children can have health benefits, more is better when it comes to physical activity in children. It should also be noted that the recommended level of intensity be at least

moderate physical activity in order to achieve health benefits however, the more vigorous the intensity, the greater the benefits.

2.4 Sedentary Activity

While a significant amount of research has been conducted in the area of physical activity, up until recently sedentary behavior was grouped into this body of research as a secondary factor. However in the development of the new Canadian physical activity guidelines it became evident that sedentary behaviours are ever-present in the population and represent health risks that are independent of moderate to vigorous physical activity levels (Tremblay et al., 2010). In 2009 the steering committee of the new physical activity guidelines highlighted the need for sedentary behaviors to be addressed independently and as such warranted a separate set of guidelines (Canadian Society for Exercise Physiology and the Public Health Agency of Canada, 2009). The Canadian Sedentary Guidelines for children and youth are relevant for all healthy children regardless of their socioeconomic status, race, gender or ethnicity (Tremblay et al, 2011). The guidelines state that children need to limit their sedentary behaviors. This includes screen-time (TV, computers, video games), sitting time, time spent indoors, and motorized transportation. All of these topics need to be addressed in the context of the home life with family, school time and community based activity. Ideally, children and youth need to limit their screen-time sedentary activity to less than 2 hours a day and furthermore make efforts to reduce time spent indoors and in sedentary transportation. Following these guidelines can have significant health

benefits beyond that of increased physical activity including body composition, fitness, academic achievement and social behaviors (Tremblay et al., 2011b).

Tremblay and colleagues (2011c) conducted a systematic review of sedentary behaviors and heath indicators in children and youth. The review included 232 studies that met the inclusion criteria and represented 983,840 participants. In these studies the most common factor identified was television viewing while the most common outcome was BMI. They found that watching TV for a longer duration than 2 hours a day was commonly associated with negative health outcomes. Increased screen time was associated with increased body composition, decreased fitness levels, lower self-esteem reports, lower levels of positive social behaviors and a decreased academic achievement. The authors suggest that an effort to reduce sedentary time in children and youth, especially the reduction of screen-time to less than 2 hours a day could be an effective method to reduce BMI along with a variety of other health benefits. Canadian children have been found to be spending an average of 8.6 hours a day engaged in sedentary behavior (Colley et al, 2010). This represents roughly 62% of their waking hours and shows that there is significant room for improvement. It is suggested that interventions should not only target increasing physical activity levels but also separately aim to reduce sedentary activities.

Popular video games are so detailed and involved that they can consume a child for hours on end. Furthermore, computer advancements in social media have also become a well-established norm in the lives of children. This is why `screen time` has been a predominant theme in the literature for sedentary activity. In a study of the

perceptions of 508 student-parent pairs, it was found that children spend over 3 hours a day in screen-related activities every day. They also found that high screen users had less negative perceptions associated with screen-related activities and much more relaxed parental rules on screen use. It is important for interventions directed at screen-based activities to target both the parents as well as the children. Of particular importance is the role of the parent. Parental role-modeling can be a very powerful tool in changing the behaviors of our children and as such we should also strive to reduce the screen-time of Canadian adults in order to address the sedentary activity of children (He, Piche, Beynon & Harris, 2010). In the same sample of child-parent pairs, it was found that the presence of a television in the child`s room increased the level of screen-related activity. Ownership of a video-gaming console was also associated with higher levels of sedentary behaviors. Conversely, parent income level and after-school programing were negatively associated with screen-related activities (He, Piche & Beynon, 2009). In regards to screen-related behaviors, children identified entertainment, boredom, video gaming and family time as the key reasons they engage in the sedentary activity.

Teachers and principals also acknowledge the concerning levels of screen-time in their students however they failed to see how they could be of significant help (He, Piche, Beynon, Kurtz & Harris, 2011). Educators identified competing academic requirements, gym availability and a lack of resources as barriers to improving screen-related behaviors in children. They also identified a perception that parents were not good role-models with regards to screen-time. Educators acknowledge that

interventions should include daily physical education in the school, but focus on parents and their modeling behaviors and screen-time rules in the home atmosphere.

Tremblay and Willims (2003) found that family structure, socioeconomic status, and inactivity to all be overlapping risk factors for overweight and obesity in Canadian children. They identified that an increase in screen-time is associated with higher levels of obesity while higher levels of physical activity provide protection against obesity. It is suggested that an increase in non-organizational activities as well as increasing the physical activity levels as age increases are more important that an increase in organized physical activity. The study also noted that excessive television viewing and video game play were both associated with overeating behaviors. It seems that screen-time can be a factor in mindless eating leading to the consumption of excess calories.

2.5 Canada's Active Schools: A review of school-based physical activity interventions and their importance[1]

2.5.1 Introduction

[1] A version of this section has been published. Patton, I., McDougall, J. (2009) Canada's Active Schools: A review of school-based physical activity interventions and their importance. Physical and Health Education Journal. 75:3:16-22.

Childhood obesity is becoming an increasingly important topic in health research in Canada and in other developed countries. Obesity rates within North American are growing rapidly. Currently, 50% of Canadian adults are overweight and 15% are obese. One quarter of Canadian children are overweight or obese (Active Healthy Kids, 2007; Heart and Stroke Foundation, 2008). This increase in obesity brings with it an increased risk of developing many secondary health problems including diabetes, heart disease, and stroke (Lau, Douketis, Morrison, Hramiak, & Sharma 2007; Veugelers & Fitzgerald, 2005). The burden this places on Canadians and our health care system is large. Obesity costs Canadians $1.6 billion a year in direct healthcare costs as well as $2.7 billion in indirect costs such as lost productivity (Active Healthy Kids, 2007; Lau et al, 2007).

Rising obesity rates in North America have been associated with many factors including genetics, lack of exercise, increase in sedentary activities (video games, computers and television), high calorie, high fat diets, and an inactive lifestyle (Active Healthy Kids, 2007; Tremblay & Willms, 2003). This combination of factors is taking a toll on the health of Canadian children. Excess weight can affect the natural developmental process and complicate health status. It has been hypothesized that the current generation will be the first in known history to have a life expectancy less than that of their parents. Exercise and activity level is one factor that can be targeted for change. Many interventions have been developed in order to modify behaviours of children and increase their activity levels. It has been reported that up to 50% of children's waking hours are spent in school (Naylor, Macdonald, Reed, & McKay, 2006a.). Therefore, school is an important point of intervention that should be utilized fully for educating

children about healthy behaviours, including physical activity. Research suggests that the frequency of physical education classes in school should be increased rather than cut back (Thomas, Ciliska, Micucci, Wilson, Abra, & Dobbins, 2004). It is surprising that with the wealth of knowledge that Canadians have at their disposal about the benefits of a healthy active lifestyle, and the adverse effects of a sedentary lifestyle, that physical education has become such a low priority. Children who are physically active tend to be more focused in the classroom and perform better in mathematics, science, and other subjects than children who are not physically active (Active Healthy Kids, 2007; Naylor, Macdonald, Zebedee, Reed, & McKay, 2006b; Strong et al, 2005). Due to the known benefits of physical activity, several interventions have been developed very recently either by provincial governments, school boards, or individual schools to encourage a healthier more physically active lifestyle. The purpose of this paper is to review the interventions that have been specifically developed and implemented in Canadian schools to increase the physical activity of our children.

2.5.2 Review Process

As stated, the purpose of this review is to examine the physical activity interventions that have been developed and implemented in Canadian schools. A search for published journal articles on this topic was implemented using the journal databases PubMed and ERIC. In addition, a similar search was implemented using GOOGLE Scholar. The particular search sought to identify any article about a school- based physical activity intervention in Canada. The keywords used in this search included: Canadian,

school-based physical activity, obesity intervention, physical education, and exercise. The initial search identified 37 documents. A review of the abstracts determined if the full article was of enough relevance to be accessed. Of the seven full articles deemed to be appropriate, a secondary search of the reference lists of those articles was also conducted. From here one national magazine article was also found. Once the search was completed, the relevant articles were read in full, and it was determined which articles would be included. A total of eight articles were included in this review along with six online resources that were used to find supplementary information, these included web pages for the specific program or government ministries. The interventions that were identified in this review are presented by province in Table 1.

Table 1.

School-based Physical Activity Interventions in Canada by Province

Province	Intervention	Primary Elements	References and websites
Nova Scotia	**Active Kids Healthy Kids**	**Provides opportunities and education of physical activity including after school and weekend activities.**	**Active Healthy Kids, 2007** **Poirier & Mackinnon, 2003** **Government of Nova Scotia, 2008** **www.gov.ns.ca/ohp/physicalactivity/akhkstrategy.asp**
	Healthy Promoting Schools	**Grant of $100 000 to school boards that submit plans for health promotion including physical activity.**	**Active Healthy Kids, 2007**
Quebec	**Plaisirs d'Hiver**	**Schools encourage outdoor activities during winter like snowshoeing**	**Bourgon, 2008** **Kino-Quebec, 2005** **http://www.kino-quebec.qc.ca/**

		and skating as well as assign 'active' homework to include the family.	**Government of Quebec, 2008** **http://www.vasy.gouv.qc.ca/plaisirsdhiver**
Ontario	**Daily Physical Activity Ontario**	**Students must participate in a minimum of 30 minutes of physical activity everyday.**	**Active Healthy Kids, 2007** **Ontario ministry of Education, 2008** **http://www.edu.gov.on.ca/eng/teachers/dpa.html**
Manitoba	**Mandatory Physical Education**	**Physical Education is mandatory throughout high school.**	**Active Healthy Kids, 2007** **Healthy Schools Manitoba** **www.gov.mb.ca/healthyschools/**
	Shoal Lake School Dance Dance Revolution	**School encourages tournaments and participation in video game Dance Dance Revolution as well as older students teaching younger students.**	**Bourgon, 2008**
Saskatchewan	**In Motion**	**Students create physical activity task forces and leaders to organize physical activity opportunities within the school.**	**Active Healthy Kids, 2007** **Saskatchewan in Motion 2008** **www.Saskatchewaninmotion.ca**
Alberta	**Daily Physical Activity Alberta**	**Students must participate in a minimum of 30 minutes of physical activity everyday.**	**Active Healthy Kids, 2007** **Alberta Education 2008** **http://education.alberta.ca/teachers/resources/dpa.asp**
British Columbia	**Action Schools! BC**	**School provides increased opportunities and education about physical activity as well as improving the nutrition of food offered as well. Students are**	**Active Healthy Kids, 2007** **Naylor et al, 2006a** **Naylor et al 2006b** **Active Schools! BC, 2008** **www.actionschoolsbc.ca/**

		given the opportunity to make healthy life choices.	
	Healthy Buddies	**Older elementary students are taught a health and physical activity lesson and then are expected to teach the same lesson to younger students they are paired with.**	**Bourgon, 2008**
Northwest Territories	**Mackenzie River Youth Trip**	**Particular school and grade is chosen every year to go on an all expenses paid excursion into the wilderness.**	**Bourgon, 2008**

2.5.3 School-based Physical Activity Interventions

As mentioned, in recent past, physical education has been on a steady decline in schools across Canada. This is particularly the case in high school where physical education classes become an option; often it is only mandatory to enroll in a physical education course up to grade ten. Therefore, students in grade 11 and 12 are often not involved in physical education classes if they place a higher importance on 'academic' classes. The fact that physical education classes have become optional suggests that schools do not recognize and support the importance of physical activity to children's personal development and even academic success.

The Active Kids Healthy Kids intervention in Nova Scotia is a provincially-funded strategy to educate and support active lifestyles for children and youth. This program

does not have specific requirements, but encourages active lifestyles and informed choices by children. The goal of this program is to increase the number of students achieving 60 minutes of physical activity everyday. School based physical activity is a component of this program. However, the program is focused on overall lifestyle changes and thus includes aspects of home and community life as well. Participating in after-school and Sunday non-competitive sports is encouraged (Active Healthy Kids, 2007; Poirier & MacKinnon, 2003). Active Kids Healthy Kids is a partnership between the Nova Scotia Government, Nova Scotia Health Promotion and Protection, non-government partners and the residents of Nova Scotia. Nova Scotia also has the Healthy Promoting Schools program, where school boards can apply for ministry grants of $100,000 to fund interventions that promote health, including physical activity opportunities that are submitted to the ministries (Active Healthy Kids, 2007). The government of Nova Scotia has also followed Manitoba's lead by increasing the physical education credit requirements for high school students. The province is investing in a strong physical education program that is delivered by qualified teachers. This is significant because many schools across the country do not have qualified phys-ed teachers. In Nova Scotia, high school students are required to take physical education in grade nine only. The new requirements have the students taking at least one more physical education course between grade 10 and 12 in order to meet graduation requirements. This is another important step in encouraging knowledge of the importance of physical activity and a sign that the province is making improved health a priority.

In Quebec, the PUisirs d'Hiver intervention encourages schools to plan and operate outdoor physical activities, such as skating and snowshoeing during the cold winter months. The program is designed to create a supportive environment by establishing facilities that allow for easily accessible and affordable physical activity opportunities. Approximately 450 schools currently participate across the province. These activities can occur during physical education classes, lunch and after school. Students are also assigned 'active homework' where they are expected to engage in an activity with their families. These activities are often free and easily accessible. The website is a resource to all involved and gives easy access to ideas on how to organize physical activity opportunities. This program is organized by the Healthy Lifestyles Program, Kino-Quebec, municipalities, schools and community organizations (Bourgon, 2008, KinoQuebec, 2008). Kino-Quebec is a new online directory of links to physical activity opportunities compiled by the Quebec government (see table 1 for website).

Ontario has adopted a province-wide intervention similar to that of Alberta, implementing Daily Physical Activity Ontario. As in Alberta, every student is required to participate in a minimum of 20 minutes of physical activity everyday (Active Healthy Kids, 2007; Ontario Ministry of Education, 2008). The intention is to encourage students to become more active in and outside of school and to continue to be so as they grow up and move into adolescence and adulthood. This program is provided to children in kindergarten through grade eight. On days when a normal physical education class is not available, teachers are responsible for incorporating the 20 minutes of physical activity into regular class time. This is in addition to recess and lunch breaks, since not all

students participate actively during these times. Teachers and schools are given basic resources that offer ideas about how to conduct these physical activity sessions with the given resources of each school. Students are exposed to a variety of physical activity options such as games, dance, yoga, and outdoor pursuits. The guidelines state that activities must be of sufficient intensity to increase the heart rate of a student to a moderate to vigorous level.

While the province-wide intervention in Ontario is considered to be very worthwhile, little is known about their actual effectiveness and compliance among teachers. The responsibility is placed on the school administrators to ensure that the guidelines of the interventions are followed. Therefore, if a school's principal does not place high priority on physical activity and health, the program may not be fully implemented in that school. In some cases, this intervention is carried out as intended but in other schools it is not. Evaluation of these programs would help to ensure they are optimally effective and maximally utilized.

As stated earlier, physical education courses are becoming less of a priority across the country. Manitoba, however, has begun to take steps to address the lack of physical activity among school aged youth. Children living in this province are now required to take part in physical education up to grade 12 (Active Healthy Kids, 2007, Physical and Health Education Manitoba, 2008). This initiative for physically active and healthy lifestyles for all students has been supported by Manitoba Education and Citizenship and Youth. This province wide intervention extends the physical activities of youth throughout high school and reinforces the importance of active healthy lifestyles.

This recently implemented program has not yet been evaluated. However, an evaluation of youth outcomes would be beneficial and could assist ministry officials in other provinces when considering the adoption of a similar intervention.

Manitoba has also implemented the Healthy Schools Manitoba program which is a partnership between Manitoba Health, Manitoba Education, and Healthy Child Manitoba. This program consists of a series of online resources and ideas about how to become more physically active in school and at home. Most significantly this program suggests the importance of parents and teachers becoming positive role models in the attempt to improve physical activity and overall health. Bourgon (2008) describes how one elementary school in Manitoba is providing an additional initiative to help increase children's physical activity. Students at Shoal Lake School in Manitoba participate in physical activity using the video game Dance Dance Revolution. This game requires that participants step, stomp and dance on a mat in coordination to the characters on the screen. This is one of the few video games that require vigorous physical activity. Older students are encouraged to organize tournaments and teach younger students. Programs such as this are likely happening across the country and warrant more in-depth investigation into their effectiveness.

Saskatchewan has developed the In Motion strategy, a province-wide intervention aimed at changing the province's reputation of having one of the worst to one of the best records regarding school aged children's physical activity levels (Saskatchewan in Motion, 2008, Active Healthy Kids, 2007). This program is designed to provide adolescents and children with opportunities to increase their physical activity at

school. Student leaders and student task forces are created to promote physical activity initiatives and foster partnerships within the community and with other schools in order to support the intervention. Contests are held to encourage student physical activity and raise student awareness of ways to increase activity, such as walking instead of driving, and taking stairs rather than elevators. The In Motion Strategy is not only a resource for schools, but also communities, the workplace and home. The program encourages everyone to become physically active. The website gives activity ideas for all of these environments and also details how students can replace their physical activity they receive in school while on break during the summer months. Schools can sign up as "In Motion Schools" where they make efforts to make physical activity a visible priority. Each school commits to 30 minutes of physical activity everyday. This is achieved through gym class, activity breaks, intramurals, sports and special events. Another part of the In Motion Strategy is "Having a Ball". This program sees that every grade four student in an "In Motion School" is given a ball. The teachers of these classes are also given resources to implement simple traditional playground games throughout the day. This initiative is on a voluntary basis therefore it is likely being underused and there is a lack of information on the effectiveness of the program.

Alberta has taken a similar province-wide approach to increasing physical activity as Ontario. In 2005, this province implemented a Daily Physical Activity intervention that requires all students to participate in a minimum of 30 minutes of school-based physical activity everyday (Alberta Education, 2008). Regular physical education classes can meet this requirement. However, on days when students do not have physical education

classes, the teachers are encouraged to meet the required 30 minutes of physical activity through activities that vary in intensity, taking into account the individual student's abilities, and allowing for student choice. The encouragement of input from children is a key element to this program. The hope is that the sense of control and ownership that children experience when they have input, will increase student participation and foster an environment in which it will be easier for children to understand the importance of physical activity. A short video clip and a handbook are available for teachers, administrators and parents to download as a resource at http://education.alberta.ca/teachers/ resources/dpa.aspx. This handbook helps guide teachers to implement the program and to decide what types of activities are best suited to the school environment. Examples are available for classroom, hallway, gym and outdoor activities.

Action Schools! BC is another example of a province-wide intervention designed to increase school-aged children's physical activity levels. However, this intervention is unique in its structure and delivery. As it is described, Action Schools! BC recognizes that diverse and multiple factors contribute to obesity (Active Healthy Kids, 2007; Naylor et al, 2006a). This intervention takes a multidisciplinary approach, targeting not only the physical inactivity of BC youth, but also their eating behaviors. The program provides children with increased opportunity to make healthy life choices and participate in healthy activities. The key to the development of this program was the collaboration of multiple agencies, including the BC Ministry of Education, BC Ministry of Health, and 2010 Legacies Now. Legacies Now is a program developed in conjunction with the

upcoming Winter Olympics. Legacies Now is dedicated to fostering the best possible atmosphere for hosting the Olympics and Paralympics by developing community participation in arts, physical activity and volunteerism (Action Schools! BC, 2008; 2010 Legacies Now, 2008). This multidisciplinary approach gives Action Schools! BC a unique strength compared with other programs. The intention is that more points of view and interests make this intervention more inclusive and comprehensive, and more likely to carry over into other aspects of children's lives.

Action Schools! BC presents physical activity opportunities at monthly school assemblies in order to demonstrate and expose children to the possibilities available to them to stay healthy and active. In addition, professional development is available for teachers who want to increase their repertoire of physical activity opportunities in the classroom. It also encourages such initiatives as creating a 'healthy living' section in the library and the merging of classes for large-scale physical activity opportunities. Teachers are encouraged to teach older children active games to play during recess and lunch. The older children are then encouraged and given opportunities to teach these games to younger children. Also, teachers are encouraged to develop activity circuits that can be posted around the classroom to be used for activity breaks during class time.

Action Schools! BC also attempts to enhance the participation of children in community physical activity opportunities outside of school. After-school programs are introduced to children by inviting community groups to make presentations about their activity opportunities and healthy lifestyle ideas. The program also maintains and acquires playground equipment for children in local parks. Finally, Action Schools! BC

makes a point of targeting inactive children, or children who are hesitant to participate, by developing meaningful opportunities specifically for this group.

While this program is well conceived and appears very useful, it is not yet mandatory for all schools in the province. Schools are encouraged to sign up for participation, but, again, this leaves the responsibility in the hands of the administration that may or may not choose to encourage physical activity and healthy living. Currently, 1438 schools in BC are registered as Action Schools (80% of total elementary schools), which is a positive testament of the program's popularity. However, a significant number of schools remain uninvolved (Action Schools! BC, 2008).

British Columbia boasts another program titled Healthy Buddies. In this program, students in grades four through seven are taught a lesson on health and physical activity. These students are then paired with students in grades one through three and are expected to teach the younger students the same lesson. This is a powerful tool as it encourages leadership and ownership within students. The idea is that the peer tutoring will make the students more aware of health and more inclined to participate (Bourgon, 2008).

In the Northwest Territories, a unique program exists that gives students the opportunity to participate in the Mackenzie River Youth Trip (Bourgon 2008). This is an all-expenses paid trip for a group of secondary school students. Each year, a different school and grade is invited to participate. This program is organized by the Northwest Territories Recreation and Parks Association. While many programs such as this may

exist in Canada, this was the only one revealed in this study's search. It should be noted that this is a good example of another unique way to encourage physical activity and bring opportunities to students where they normally would not have the resources for such an excursion.

2.5.4 Conclusion

It is clear from this review that the importance of optimizing the physical activity of students is starting to grow in priority in schools across Canada. The school-based interventions discussed in this review include a wide variety of approaches for encouraging physical activity and healthy living. Many of these interventions are new and thus their effectiveness has not been evaluated. It is important for researchers to begin to evaluate these programs and examine their impact on children's health. This will allow for an assessment of which types of programs are most effective and most utilized. From this information, federal and provincial governments, along with commercial partners, could work together to create a national comprehensive school-based physical activity/obesity prevention program.

2.5.5 Where to Go From Here

Research conducted primarily in the United States, as well as in Europe and Australia, has shown that school-based interventions can be effective for increasing physical activity and physical fitness for children and youth (Canadian Cancer Society,

2005; Dobbins et al., 2001; Strong et al., 2005; Thomas et al., 2004; Veugelers & Fitzgerald, 2005). However, 30 minute classes provided three to five days a week appear to be insufficient for achieving long-term outcomes (Strong et al, 2005). The sedentary lifestyle adopted by many Canadians including physical inactivity has become embedded in the fabric of our society. Therefore, the implementation of comprehensive, multifaceted interventions may be more successful for achieving long-term positive changes in behavior. Comprehensive school programs (CSP) target an issue from multiple points. For example obesity is a multifactor issue with many causes; a CSP directed at obesity would target many if not all of these causes. Research suggests that coordinated and comprehensive programs tend to have the most significant effect on obesity outcomes and physical activity, as individual programs show little success in long-term maintenance (Spence & Lee, 2003; Veugelers & Fitzgerald, 2005). It should be noted that programs developed and evaluated in the United States, namely CATCH (i.e., Coordinated Approach to Child Health) and SPARK (i.e., Sports, Play, and Active Recreation for Kids), have been shown to increase weekly physical education class time spent in moderate to vigorous physical activity, and could be useful examples to consider when further developing Canadian interventions (Canadian Cancer Society, 2005).

It would be important for a national intervention to be: available to all children throughout elementary and high school, mandatory, and regulated. A national program might implement the daily physical activity of the Alberta and Ontario interventions, along with a more comprehensive, multi-faceted approach, like that taken by Action

Schools! BC. It would be important to include children and youth in the planning and delivery of activities (O'Brien, 2004). The involvement of parents should be encouraged in any school-based program. Although schools can play a major role, parent involvement in physical activity is indicated to be a primary factor related to children's physical activity levels (Dobbins et al, 2001; Heart and Stroke Foundation, 2008).

Evaluating the effectiveness of existing school-based interventions and then merging effective aspects into a national obesity intervention for schools would be a significant step forward in Canada and a clear statement by the government that physical activity is a necessary component of the health and development of our children that will no longer be overlooked. Such a national initiative could improve the health status of our nation's children and youth and provide a guideline for other countries to follow.

2.6 An Update on School-based physical activity in Canada

Children spend a large percentage of their day in the educational system. Therefore schools have the ability to play a vital role in the development of life-long healthy behaviors. Schools have been shown to be excellent points of intervention when it comes to physical activity and healthy nutrition. For example, in Nova Scotia it was shown that schools that implement a comprehensive intervention that targets physical activity and healthy eating had a variety of benefits (Veugelers & Fitzgerald,

2005). They found that students in these coordinated interventions had lower levels of overweight and obesity, had higher levels of overall physical activity and lower levels of sedentary behaviors. They note that while these comprehensive interventions have been shown to be successful, lesser programs that are not comprehensive in nature have not demonstrated positive results.

In another study schools were also identified as ideal places to implement population behavior interventions aimed at increasing physical activity (Thomas, Ciliska, Micucci, Wilson-Abara, & Dobbins, 2004). This is because almost all children are in school for a considerable period of time. These children can be reached in a relatively cost-effective manner and children from all risk groups can derive some benefit. Furthermore, targeting all children helps reduce stigmatization of children as well as the misclassification of students (Thomas et al., 2004). It was also suggested that it is an important priority to increase the frequency of physical education classes for children as well as implementing a higher number of credit requirements in physical education for high-school students. The authors also suggest that because physical education specialists are capable of engaging the students in higher levels of physical activity for longer periods of time, teacher preparation and professional development are important issues that need attention.

It is important to increase the availability of non-competitive physical activity opportunities within the school atmosphere as well as ensuring safe routes to school that allows for active transportation (Kumanyika, Jeffrey, Morabia, Ritenbaugh &

Antipatis, (2002). Furthermore, studies have shown that creating an educational system where students receive mandatory physical education on a daily basis is a viable option in the attempt to increase the physical activity levels of children (Task Force on Community Preventative Services, 2002).

Some initiatives previously mentioned in the above published article are no longer in use. For example, Action Schools! BC, did provide a valuable guide line in developing a successful comprehensive school-based program for physical activity, it is no longer being utilized by schools in British Columbia. BC however has adopted their own version of the Daily Physical Activity Program that is seen in Alberta and Ontario (British Columbia Ministry of Education, 2011). In this program BC mandates that children in Kindergarten to grade 7 receive a minimum of 30 minutes of physical activity everyday in school. Students in grade 10 to 12 are required to document a minimum of 150 minutes a week of moderate to vigorous physical activity from school activities, the home environment and community activities. Students in grade 8 and 9 are designated to either the same 30 minute requirements of the younger grades or to the 150 minute requirement of the older grades based on the decision of their specific school board.

Since the above review paper was written, the Saskatchewan In Motion strategy has taken off. The program is alive and well with province wide buy-in. The website has become an effective tool for advocacy for physical activity (Saskatchewan In Motion, 2012). They provide events and ideas with regards to physical activity in the schools, with families and with older adults. Since the program's inception, the physical activity

levels of children and youth have increased enough to reap significant health benefits (Fast Consulting, 2008). They also encourage schools, parents, children, and communities to make pledges to do their part to increase physical activity in Saskatchewan. Even more promising is the adoption of the ``In Motion`` program nation-wide. Many communities have become ``In Motion`` communities such as London-Middlesex, Sarnia, Guelph, Winnipeg, Manitoba and several others.

The Ontario Ministry of Education has recently implemented the Healthy Schools Recognition Program. In this program schools are encouraged to take up a healthy activity initiative within the school. Schools then report back to the ministry about their initiative and are rewarded with recognition of their healthy achievement from the government (Ontario Ministry of Education, 2012). In 2010 Ontario also implemented the new Health and Physical Education curriculum with a focus on increasing the health and physical literacy of children in elementary school. OPHEA has developed a variety of lesson plans and activity ideas in support of this goal (Ontario Physical and Health Education Association, 2012).

Active Healthy Kids Canada (2011) identified that there is still a significant number of Canadian students who only receive 1-2 physical education classes per week (44%). They recommend that daily physical education be adopted nation-wide and that there is a physical education specialist employed in every school. It is also noted that only a small portion of physical education class is spent being physically active and suggest possible curriculum changes to address this issue. With the ease of access to a

large percentage of Canadian children in a cost-effective manner, we need to focus our efforts of increasing physical activity and healthy lifestyles directly in the educational system. There is a variety of programs that have had some level of success and more still that have had very little evaluation (DPA Ontario). Research should focus on evaluating the effectiveness of these programs, identifying supports and barriers, and creating the best possible programs for our children to benefit from.

2.7 References

2010 Legacies Now. (2008). About us. Retrieved February 2008 from http://www.20101egaciesnow.com/about_us/.

Active Healthy Kids. (2007) Older but not wiser, Canada's future at risk: Canada's report card on physical activity for children and youth. Retrieved February, 2008 from http://www.activehealthykids.ca/ Ophea/ActiveHealthyKids_v2/upload/FuIl-EnglishReport-Card-2007.pdf.

Active Healthy Kids Canada. (2009). Active kids are fit to learn: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, On. *Active Healthy Kids Canada.*

Active Healthy Kids Canada. (2010). Healthy habits start earlier than you think: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, ON. *Active Healthy Kids Canada*

Active Healthy Kids Canada (2011). Don't let this be the most physical activity our kids get after school. The Active Healthy Kids Canada 2011 report Card on physical activity for children and youth. Toronto, On. *Active Healthy Kids Canada.*

Action Schools! BC. (2008). Retrieved February, 2008 from http://www.actionschoolsbc.ca/Content/ Home.asp.

Alberta Education. (2008a). Daily physical activity survey report. Alberta Education – Accountability and Reporting Division. http://education.alberta.ca/teachers/resources/dpa.aspx.

Alberta Education. (2008b). Daily physical activity initiative. Retrieved February 2008 from http:// education. al berta.ca/ teachers/ resources/dpa.aspx.

Ball, G. & McCargar, L. (2003). Childhood obesity in Canada: A review of prevalence estimates and risk factors for cardiovascular diseases and type 2 diabetes. *Canadian Journal of Applied Physiology.* 28(1), 117-140.

British Columbia Ministry of Education. Daily physical activity: Kindergarten to grade 12 program guide. (2011). *Ministry of Education.*

Bourgon, L. (2008). Class acts. *Canadian Living Magazine*. 77-79.

Canadian Cancer Society (Manitoba Division). (2005) Effective school-based interventions in physical activity. Knowledge Exchange Network.

Canadian Society for Exercise Physiology and the Public Health Agency of Canada. (2009). Consensus conference: Advancing the future of physical activity measurement and guidelines. Canadian Society for Exercise Physiology.

Canadian Population Health Initiative. (2004). Improving the health of Canadians. *CIHI*

Cole, T., Bellizzi, C., Flegal, K. & Dietz, W. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal*. 320:7244:1240-1243.

Colley, R., Garriguet, D., Janssen, I., Craig, C., Clark, J. & Tremblay, M. (2011a). Physical Activity of Canadian Adults: Accelerometer results from the 2007-2009 Canadian Health Measures Survey. *Health Reports*. 22(1), 4-11.

Colley, R., Garriguet, D., Janssen, I., Craig, C., Clark, J. & Tremblay, M. (2011b). Physical activity of Canadian children and youth: Accelerometer results from the 2007-2009 Canadian Health Measures Survey. *Health Reports*. 22(1), 12-20.

Dobbins, M., Lockett, D., Michel, I., Beyers, J., Feldman, L., Vohra, J. & Micucci, S. (2001). The effectiveness of school-based interventions in promoting physical activity and fitness among children and youth: a systematic review. Public Health Research, Education & Development Program. *Health Canada*.

Elgar, F. & Stewart, J. (2008). Validity of Self-report screening for overweight and obesity: Evidence from the Canadian Community Health Survey. *Canadian Journal of Public Health*. 99:5:423-427.

Fast Consulting. (2008). Saskatoon in motion physical activity survey. *Saskatoon In Motion*.

Government of Quebec. (2008). Plaisirs d' Hiver. Retrieved August 2008 from https://www.vasy.gouv.qc.ca/ plaisirsdhiver/

He, M., Piche, L. & Beynon, C. (2009). Understanding screen-related sedentary behavior and its contributing factors among school-aged children: a social-ecologic exploration. *American Journal of Health Promotion*. 23(5), 299-308.

He, M., Piche, L., Beynon, C. & Harris, S. (2010). Screen-related sedentary behaviors: childrens`and parents` attitudes, motivations and practices. *Journal of Nutrition, Education and Behavior*. 42(1), 17-25

He, M., Piche, L., Beynon, C., Kurtz, J. & Harris, S. (2011). Screen-related sedentary behaviours of school-aged children: Principals' and teachers' perspectives. *Health Education*. 70(1), 32-38.

Health Canada. (2002). Canada's Physical Activity Guidelines for Children. Population and Public Health Branch, *Health Canada*.

Health Canada. (2003). Canadian Guidelines for Body Weight Classification in Adults. *Health Canada*

Heart and Stroke Foundation. (2008). Schools and physical activity. Retrieved march 2008 from www.heartandstroke.ca.

Janssen, I. & Leblanc, A. (2010) Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity.* 7, 40.

Katzmarzyk, P. (2002). The Canadian obesity epidemic, 1985-1998. *Canadian Medical Association Journal.* 166(8), 1039-40.

Katzmarzyk, P. & Mason, C. (2006). Prevalence of class I, II and III obesity in Canada. *Canadian Medical Association Journal.* 174(2), 156-7.

Katzmarzyk, P. & Jannsen, I. (2004). The economic costs of physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology.* 29(1), 90-115.

Keays, J. & Allison, K. (1995). The effects of regular moderate to vigorous physical activity on student outcomes: A review. *Canadian Journal of Public Health*. 86(1), 62-5.

Kino-Quebec. (2005). Kino-Quebec. Retrieved August 2008 from http://www.kino-quebec.qc.ca/

Kumanyika, S., Jeffrey, R., Morabia, A., Ritenbaugh, C. & Antipatis, V. (2002). Obesity prevention: the case for action. *International Journal of Obesity*. 26(3), 425-436.

Lau, D., Douketis, J., Morrison, K, Hramiak, L, Sharma, A. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. Canadian Medical Association Journal, 176(8).

Naylor, P., Macdonald, H., Reed, K. & McKay, H. (2006a). Action schools! BC: A socioecological approach to modifying chronic disease risk factors in elementary school children. Preventing Chronic Disease, 3(2).

Naylor, P., Macdonald, H., Zebedee, J., Reed, K. & McKay, H. (2006b). Lessons learned from action schools! BC - an active school model to promote physical activity in elementary schools. Journal of Science and Medicine in Sport. 9(5), 413-423.

O'Brien, C. (2004). "Planning transportation for and with children: Good news for pedestrians and cyclists." National Center for Bicycling and Walking (NCBW) Forum, October, Bethesda, Maryland: NCBW Available from: http://www.bikewalk.org/.

Ontario Ministry of Education. (2012) Healthy School Challenge. Document retrieved February 2012 from: http://www.edu.gov.on.ca/eng/healthyschools/challenge.html.

Ontario Physical and Health Education Association. (2006). Daily physical activity in schools: a guide for school boards. *Ontario Ministry of Education*. Retrieved February 2008 from http://www.edu.gov.on.ca/eng/teachers/dpa_boards.pdf

Ontario Physical and Health Education Association. Document retrieved February 2012 from www.OPHEA.net

Orsini, A, & O'Brien, C. (2006). Fun, fast, and fit: Influences and motivators for teenagers who cycle to school. *Children, Youth, and Environments* 16(1), 121-133

Poirier, A., MacKinnon, M., (2003). Government of Nova Scotia - new releases. Office of Health Promotion/Education. Retrieved from http:// www.gov.ns. ca/news/details.asp?id=20030114002.

Raine, K. (2004). Overweight and obesity in Canada: A population health perspective. *Canada Institute for Health Information.*

Saskatchewan in Motion. (2006). Retrieved February 2008 from http://www.saskatchewaninmotion.ca/.

Saskatchewan In Motion. (2012). Document retrieved February 2012 from: http://www.saskatchewaninmotion.ca/

Sheilds, M. & Tremblay, M. (2010). Canadian childhood obesity estimates based on WHO, IOTF and CDC cut-points. *International Journal of Pediatric Obesity*. 5(3), 265-273.

Shields, M., Tremblay, M., Laviolette, M., Craig, C., Janssen, I. & Gorber, S. (2010). Fitness of Canadian adults: Results from the 2007-2009 Canadian Health Measures Survey. Statistics Canada. Catalogue no. 82-003-XPE. Health Reports. 21(1).

Spence, J., Lee, R. (2003). Toward a comprehensive model of physical activity. *Psychology of Sport and Exercise*. 4, 7-24.

Strong, W., Malina, R., Blimkie, C., Daniels, S., Dishman, R., Gutin, B., Hergenroeder, A., Must, A., Nixon, P., Pivarnik, J., Rowland, T., Trost, S. & Trudeau, F. (2005). Evidence based physical activity for school-age youth. *The Journal of Pediatrics*. June, 732-737.

Task Force on Community Preventative Services. (2002). Recommendation to increase physical activity in communities. *American Journal of Preventative Medicine*. 22(suppl. 4), 67-72.

Thomas, H., Ciliska, D., Micucci, S., Willson-Abara, J. & Dobbins, M. (2004). Effectiveness of physical activity enhancement and obesity prevention programs in children and youth. Public Health Research, Education & Development Program.

Tjepkema, M. (2006). Adult obesity. Health Reports. 17(3). Statistics Canada, Catalogue 82-003

Tremblay, M. & Willims, D. (2000). Secular trends in the body mass index of Canadian children. *Canadian Medical Association Journal*. 163(11), 1429-33.

Tremblay, M., Katzmarzyk, P. & Willims, D. (2002). Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity*. 26(4), 538-543.

Tremblay, M., Colley, R., Saunders, T., Healy, G. & Owen, N. (2010). Physiological and health implications of a sedentary lifestyle. *Applied Physiology Nutrition and Metabolism.* 35(6), 725-740.

Tremblay, M., Warburton, D., Janssen, I., Paterson, D., Latimer, A., Rhodes, R., Kho, M., Hicks, A., LeBlanc, A., Zher, L., Murumets, K. & Duggan, M. (2011a). New Canadian physical activity guidelines. *Applied Physiology Nutrition and Metabolism*. 36, 36-46.

Tremblay, M., LaBlanc, A., Janssen, I., Kho, M., Hicks, A., Murumets, K., Colley, R. & Duggan, M. (2011b). Canadian sedentary behaviour guidelines for children and youth. *Applied Physiology, Nutrition and Metabolism.* 36, 59-64.

Trembay, M., LeBlanc, A., Kho, M., Saunders, T., Larouche, R., Colley, R., Goldfield, G. & Gorber, S. (2011c). Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*. 8:98.

Tremblay, M. & Willms, J. (2003). Is the Canadian childhood obesity epidemic related to physical inactivity? *International Journal of Obesity*. 27, 100-105.

Veugelers, P. & Fitzgerald, A. (2005). Effectiveness of school programs in preventing childhood obesity: A multilevel comparison. *American Journal of Public Health* 95(3), 432-5.

Wang, F. & Veugelers, P. (2008). Self-esteem and cognitive development in the era of the obesity epidemic. *Obesity Reviews*. 9:6:615-623.

Willims, D., Tremblay, M. & Katzmarzyk, P. (2003). Geographic variation in the prevalence of overweight Canadian children. *Obesity Research*. 11(5), 668-673

World Health Organization. (2000). Obesity: preventing and managing the global epidemic. *The World Health Organization*. Technical report series no 894.

Chapter 3

3.0

The Daily Physical Activity Program in Ontario: Measuring school-based physical activity of elementary school students in the DPA program.[2]

3.1 Introduction

Fitness levels of Canadians have been on a decline in recent decades (Tremblay et al. 2010). The extreme lack of physical activity in Canadians is well documented (Colley et al. 2011a; Colley et al. 2011b; Janssen & Leblanc, 2010; Shields et al. 2010). The new physical activity guidelines for Canadian adults state that Canadians should be striving to achieve a minimum of 150 minutes of moderate to vigorous physical activity (MVPA) accumulated every week (Colley, 2011a; Tremblay et al. 2011a). In recent objectively measured data, it was shown that 15% of Canadian adults are meeting the recommendations (Colley, 2011b). This is troubling because it has been shown that physical inactivity places a massive burden on the Canadian health care system. Regular participation in physical activity can have positive effects on weight-status, depression, self-esteem, and disease risk for problems such as diabetes and cardiovascular disease (Health Canada, 2002; Janssen & Leblanc, 2010).

[2] A version of this chapter has been submitted for publication and is under review with the Journal of Physical Activity and Health. Patton, I., Overend, T., Mandich, A. & Miller, L. (2012). The Daily Physical Activity Program in Ontario: Measuring school-based physical activity of elementary school students in the DPA program.

Much like the physical activity levels of Canadian adults, Canadian children are failing to get enough physical activity for proper growth and development. Data from the 2007-2009 Canadian Health Measures Survey, which included directly measured physical activity levels of children, showed that Canadians are woefully inactive (Active Healthy Kids 2011; Active Healthy Kids 2009; Colley, 2011a; Tremblay & Willms, 2003). The new physical activity guidelines for children and youth call for a minimum of 60 minutes of MVPA every day (Tremblay et al., 2011a). Furthermore, they call for vigorous activity to be taken up a minimum of 3 days a week and that strengthening activities be done an additional 3 days a week. A meager 7% of Canadian children are meeting these recommendations (Colley, 2011b). It has also been noted that when it comes to physical activity in children, more is better (Active Healthy Kids, 2010; Spence & Lee, 2003; Strong et al. 2005). With that in mind, it is troubling that only 4% of Canadian children are getting 90 minutes of physical activity every day (Colley, 2011b).

While parents and families are responsible for a portion of this daily physical activity requirement, the school environment is another key factor in the PA levels of children (Dobbins et al, 2001; Keays & Allison, 1995). Children can spend upwards of 6-7 hours per day in school; a significant portion of their waking hours. The school system needs to be a champion for child health and development and, as such, should provide adequate opportunities for the students to be physically active. This, however, does not seem to be the current trend in Canadian schools. Many schools fail to employ physical education specialists (Active Healthy Kids, 2009). This leaves the heavy burden of a specialized physical activity program in the hands of teachers who may or may not be

capable of delivering such a class. Non-specialists tend to have lower levels of MVPA minutes in their physical education class compared to a teacher trained in physical education (Active Healthy Kids, 2009). Therefore, students instructed by these non-specialists do not reap the many benefits of a properly run class.

The benefits of school-based physical activity in children are far-reaching (Naylor & Mckay, 2009; Trudeau & Shepard, 2008). Children who are more active have consistently been shown to perform better in academic classes such as math, science and language (Janssen & Leblanc, 2010; Keays & Allison, 1995, Active Healthy Kids, 2010; Lindner, 2001). Active children not only perform better academically but they also behave better (Field, Diego, & Saunders, 2001). Students with higher levels of physical activity have better memory, problem-solving skills, enhanced decision making skills and are better socially adapted (Ahamed et al., 2007). Physical activity is an important area of childhood development and can improve self-esteem, weight-status and a host of medical health risks (Macdonald, Kontulainen, Khan, & McKay, 2007). Children need to be conditioned from a young age that physical activity is a vital component of a long healthy life. Children who are physically active are likely to carry that behaviour throughout their life-span (Tremblay et al, 2011c).

With all we know about the benefits of physical activity, it is astonishing that such little importance is placed on it. The majority of Canadian schools have moved away from a curriculum that contained daily physical education (Active Healthy Kids, 2010). Many schools operate on a system that schedules 1 or 2 gym classes a week. This is due to increasing class sizes, limited gym space, high academic demands and a

lack of specialists. Portraying physical education and physical activity with this lack of importance of could in turn influence life-long attitudes and behaviors that are detrimental to the children's health.

In order to address the decreasing levels of physical activity in our schools, the Ontario government implemented the Daily Physical Activity (DPA) program in 2005 (Ontario Physical Education and Health Association, 2006). This program mandates that all elementary school students (kindergarten to grade 8) receive a minimum of 20 minutes of quality physical activity every day. The program requirements are assumed to be met on school days that include a gym class, however on days without physical education teachers are required to get the students active at some point during the day (Patton & McDougall, 2009). The activity is to be of moderate to vigorous intensity and sufficient enough to raise the heart rate of the children for a sustained period of time. Teachers have the flexibility to implement this activity at any point during the school day and can use a variety of different venues including outdoors, gymnasiums and hallways; however due to space limitations, this program is routinely performed within the classroom.

The DPA program is an attempt to address a fundamental gap in the education of our children. Physical activity is an important part of the development of children and a vital component of education. Providing children with quality physical education creates a strong foundation on which children can grow academically. The DPA program acknowledges this importance and is aimed at providing children the best physical activity opportunities in a system that is deficient in space and specialists. Although the

program was well-intended, there are significant flaws that need to be addressed (Alberta Education, 2008; Robinson & Melnychuk, 2008). Teachers have acknowledged that they lack the time required to perform DPA as mandated (Patton, Overend, Mandich & Miller, 2012a). Many admit to only sometimes including it in their day. The program is often forgotten or ignored by the teachers with responsibility for implementing it. Furthermore, teachers admit that they often do not have the children active for a full 20 minutes. The students look favorably on the DPA program; however they also indicate that the program is not being run as mandated in regards to time being physically active, intensity of the activities as well as DPA not being delivered on all non-physical education days (Patton, Overend, Mandich & Miller, 2012b).

Very little research has been directed at the DPA program. Stone and colleagues (2012) used accelerometry data to show that less than half of the students were receiving DPA and when the program was implemented not a single child met the requirements of 20 minutes of sustained MVPA. The purpose of this study was to objectively measure the physical activity of students in a "best-case" scenario of DPA delivery. Specifically, the purpose of the study was to objectively measure physical activity in a class in which: a) the teacher reports to perform DPA as mandated in regard to time and intensity, b) the program is delivered by a specialist, and c) DPA is performed every day that there is not a gym class. The first objective was to assess the physical activity during the DPA classes, measuring the level of intensity and time spent being active. The second objective was to assess the impact of DPA inclusion on the entire school day physical activity levels of the children.

3.2 Method

A single Grade 5/6 class was identified with the assistance of the Health and Physical Education Coordinator of the Thames Valley District School Board. Recruitment of a teacher and class focused on specific inclusion criteria. The teacher needed to self-identify as a very positive DPA proponent. The teacher needed to self-identify as completing DPA requirements as mandated, every day that gym was not in the schedule. Furthermore, the teacher needed to report that DPA sessions in the class were perceived as being of sufficient time and intensity to meet provincial guidelines for the program. A teacher meeting these criteria volunteered her class to participate in the study. The class consisted of 23 students in a Grade 5 & 6 split class. Students ranged in age from 10-12 years. Height and weight data was collected in order to calibrate the accelerometers. Data were collected at 2 time points; the first data collection was in early February 2012 and the second collection took place in March 2012.

Ethics approval was obtained through the Non-Medical Research Ethics Board of Western University (NMREB 17977). Parents or guardians of the students provided informed consent in addition to written assent from the child. Participation was voluntary; students, parents, the teacher and the principal could opt out of the study at any time.

The school day (9:00AM-3:20PM) physical activity levels of the students were recorded using Actical Accelerometers (Phillips – Respironics, Oregon, USA). The devices were worn on the right hip of the children using an elasticized belt for the duration of

the school-day from 9:00 AM – 3:20 PM for 4 different school-days. The Actical (dimensions: 2.8 x 2.7 x 1.0 centimetres; weight: 17 grams) measures and records time-stamped acceleration in all directions, thereby indicating the intensity of physical activity. The digitized values are summed over a user specified interval of 15 seconds, resulting in a count value per minute (cpm). The Actical has been validated to measure physical activity in adults and children (Evenson et al., 2008; Heil, 2006; Puyau et al. 2004).

The accelerometers were handed out as the students arrived in the classroom before the beginning of class and collected at the end of the school day before the students left for home (380 minutes of collection). Data collection consisted of 3 days where the DPA class was scheduled into the day and there was no physical education class as well as 1 control day where the teacher abstained from DPA and there was no gym class for a total of 4 days of collection. The teacher provided a detailed schedule that indicated the exact times that DPA started and stopped.

After the initial data collection in February, a concern arose when the data were downloaded from the devices on to a computer. Initial screening of the data suggested that there might have been a problem with the sensors in the accelerometers. In response to this concern, a second collection was arranged for March. In the interim, it was discovered that the concern was due to the computer reader that had been used to download data from the accelerometers; it was the computer reader that was faulty and not the devices themselves. Therefore, the data from the initial collection in February were downloaded using a new reader and were found to be valid. The second collection

continued as had been scheduled; consequently two valid sets of data from the same class were collected. Sample sizes for the two separate data collections are indicated in Table 1. The second collection included 12 participants who also participated in the first data collection, allowing for a repeated measures analysis between the two time-points on the 12 participants.

3.2.1 Table 1: Daily Physical Activity measurement sample size

	Boys	**Girls**	**Total**
Collection #1	10	12	22
Collection #2	4	8	12

Time spent at various levels of movement intensity (sedentary, light, moderate, and vigorous) is based on cut-points corresponding to each intensity level (see Table 2). Attainment of the various physical activity intensities was examined across the entire school day as were specific target times throughout the day. These target times included the DPA classes as well as the recess time on each day. The time spent in each day's DPA session as well as the time blocks for the three recess opportunities were extracted for analysis.

3.2.2 Table 2: Physical activity cut-points (Puyau et al. 2004)

Intensity	Activity energy expenditure (kcal*kg^{-1}*min^{-1})	Physical Activity Ratio (EE/BMR)	Accelerometer count range (counts per minute)	Example
Sedentary	Less than 0.01	< 1.5	less than 100*	Sitting reclining, stationary standing
Light	0.01 - <0.04	1.5 - < 3.0	100 - < 1500	Walking less than 3.2 km/h, light play
Moderate	0.04 - <0.10	3.0 - < 6.0	1500 - < 6500	Walking more than 3.2 km/h, aerobics
Vigorous	0.10 +	6.0 +	6500 +	Jogging or running
EE= Energy expenditure; BMR= Basal metabolic rate				

3.2.3 Statistical Analysis

All statistical analysis was conducted using SPSS Version 20.0. Physical activity intensities were calculated by obtaining descriptive statistics (mean, standard deviation) for the minutes spent in each intensity category, for each of the specified time blocks as well as the entire school-day. Comparisons of physical activity among gender groupings were calculated using an independent-sample T-test for each of the specified intensities over each DPA session as well as all recess opportunities provided to the students. Identical analyses were conducted on the data from the second collection. Pulling out the 12 participants who were involved in both data collections allowed for a repeated measures analysis to be conducted between the two time points. Using a paired-sample T-test, the difference between physical activity intensities across the 4 days of collection, as well as during the DPA sessions for each collection, was analyzed. Differences between means were tested for a statistical significance at $p<0.05$.

3.3 Results

3.3.1 Minutes Sedentary

During the first data collection the total time spent being sedentary for grade 5 & 6 students was an average of 268 minutes (254 for males and 279 for females) or 71% of their school day. Furthermore, on average, another 87 minutes per day were spent in light intensity physical activity (Table 3). Students accumulated an average of 25 minutes of moderate to vigorous physical activity (MVPA) per day over the 4 days of collection. Not surprisingly, the quantity of MVPA was higher in the male participants (29 minutes) than in females (21 minutes). However, the vast majority of this MVPA time was spent in the moderate range of activity as students accumulated virtually no time in the vigorous intensity (average of 1.9 minutes).

3.3.3 Daily Physical Activity

During the specified Daily Physical Activity classes (20 minutes), students managed to accumulate an average of only 3.5 minutes of MVPA for each 20 minute session (17.5% of DPA time). Interestingly the difference between boys and girls in intensity of DPA sessions was not significant (3.89 minutes for boys and 3.24 minutes for females). Of particular note is that half of each DPA session is spent being sedentary. Students spent an average of 10 minutes being sedentary during their mandated physical activity intervention. Boys and girls showed very little difference in physical activity patterns during the DPA classes (Table 4).

3.3.5 Recess and Lunch Physical Activity

Students of this particular school are provided with two 15-minute recesses as well as 40 minutes of a lunch recess for a total opportunity of 70 minutes of free-play activity. Children averaged 27 minutes of sedentary activity during their total daily recess time (39% of recess) over all four days of collection. Girls averaged more sedentary minutes during recess (32 minutes) compared to the boys (20 minutes). The children accumulated 13 minutes of MVPA during their recess time (19% of recess time). As suspected, boys were more active than the girls with an average of 17 minutes of MVPA compared to 10 minutes (Table 5).

3.3.7 Second collection

During the second data collection students demonstrated significantly higher levels of total Light intensity physical activity (100 minutes), as well as MVPA (Table 6). This is particularly evident in the drastically lower amount of time spent being sedentary. Average sedentary time for the four days of collection was 247 minutes, more than 20 minutes less than that of the first collection period. The amount of MVPA accumulated throughout the school day also saw a noteworthy rise in the second collection with an average of 36 minutes. This second timeframe showed similar patterns in regard to the differences between males and females. The boys in the study collected 13 minutes more of MVPA than did the girls across the 4 days of collection (daily average of 45 minutes for boys and 32 minutes for females).

This second collection also saw a drastic increase in the physical activity profile of the DPA classes (Table 7). Notably, the amount of accumulated MVPA rose from 3 minutes in the first study to 7 minutes in the second collection (35% of DPA time). This is mirrored by a decrease in the time spent being sedentary during DPA with sedentary minutes dropping from 10 to 8 in the second study. However, differences between sexes during the DPA classes in the second study were not evident.

In the second collection, the recess of students also indicated a difference in physical activity levels of the children compared to the first study (Table 8). Children were sedentary for an average of 24 minutes (19 minutes for boys and 27 minutes for girls). This is 3 minutes less than that of the first study. Furthermore, students accumulated 5 more minutes of MVPA during the recess time in the second study with an average of 18 minutes (26% of recess time). Again boys showed higher levels of physical activity during recess than did the girls. Boys achieved an average of 24 minutes of MVPA during recess while the girls had 15 minutes.

3.3.11 Repeated Measures Analysis

Twelve students participated in both collection periods allowing for a repeated measures analysis to take place. All 5 variables, including average physical activity on all 4 days and average MVPA during DPA class, showed significant differences between the two collection periods. All measures of physical activity intensities were significantly higher in the second collection than in the first collection. Perhaps most telling is the average total physical activity (light + moderate + vigorous) with the second collection

averaging 170 minutes of PA while the first collection saw an average daily accumulation of physical activity of 107 minutes (Table 9).

3.4 Discussion

3.4.1 *Daily Physical Activity Intensity*

This study attempted to identify a classroom that would represent a ``best case`` scenario of DPA delivery. This starts with a teacher who has very positive perceptions of the DPA class and reports that DPA happens every day that the students do not receive a formal gym class. The teacher also has specific training in physical education, having a better than average knowledge base in physical activity instruction. However, even with these criteria, students spend the most substantial amount of time being sedentary during the DPA sessions (10 minutes in the first study and 8 minutes in the second). During a mandated intervention designed to increase physical activity of children, half of the time was spent not moving at all. This indicates that while teachers may feel they have sufficient knowledge about physical activity education, there is still room for improvement when it comes to efficient use of time. Time spent organizing games, activity instruction, picking teams if applicable, and waiting for turns needs to be minimized by effective choice of activity. DPA should be something that is fun and very simple to organize in order to get children moving for extended periods of time. Very little time in DPA should be sedentary.

The DPA mandate calls for an intensity of moderate to vigorous physical activity. This is in line with recommendations for physical activity for health and development as

the MVPA intensity is the level required to achieve health benefits (Colley 2011b; Tremblay 2011a). With this in mind, it is troublesome that in a program designed to deliver 20 minutes of MVPA, an average of only 3 minutes was achieved in the first collection and 7 minutes in the second (a success rate of 15% and 35%, respectively). This relates back to effective choice of activity. The vast majority of activity in the DPA classes is at a light intensity that is not sufficient to achieve health benefits, contribute to the recommended levels of activity for children or to meet the mandated requirements of this program. Perhaps teachers need more specific guidelines of appropriate activities and games that would achieve the desired intensities. With DPA being a class that is left to the discretion and imagination of the teacher, there is too much room for error. DPA needs to be scheduled into the school day and there needs to be an age appropriate curriculum for the students. The curriculum can have a variety of different activities that will expose children to the numerous ways to achieve higher levels of physical activity.

3.4.2 Total school-day physical activity

Students spend 320 minutes in the school setting every school-day. Ninety-three percent of the time students were either sedentary (sitting) or engaged in light activity (minimal movement, walking). In light of recent research on sedentary activity, it is important that we address the amount of sitting our children participate in (He, Piche & Beynon, 2009; He, Piche, Beynon & Harris, 2010; He, Piche, Beynon, Kurtz & Harris, 2011;Tremblay et al., 2010; Tremblay et al., 2011b; Tremblay et al. 2011c). Recent studies identified significant and measurable negative health effects associated with

extended periods of sitting (Dunstan et al., 2012; Nygaard, Tomten & Høstmark, 2009). In light of this research, it may be valuable to put more research and implementation into ``standing workstations``. A standing workstation may now be a far more important health initiative than previously thought. It has shown positive results in children and could be an effective way to encourage more movement and curb the negative health effects associated with sitting (Benden, Blake, Wendel & Huber, 2011). If we target the sedentary behaviors of children early on in the school setting perhaps we can improve the chances that the students will adopt more active, less sedentary lifestyles as they mature into adulthood.

3.4.3 Effect of DPA on school-based physical activity

With an average of only 3.24 minutes of MVPA during DPA sessions in the initial study, the effect of DPA seems to be negligent. The MVPA minutes accumulated in the DPA program only accounted for about 14% of the MVPA minutes of the entire school day. This means that even though this program was designed to provide students with this quality MVPA, they seem to be getting the majority of their activity elsewhere. Perhaps even more telling is that when compared to a control day where the students received no DPA instruction and did not participate in a gym class, there was not a significant difference in the students` physical activity levels. This suggests that rather than forcing DPA upon educators, perhaps a better solution to the physical activity levels of children would be to include more recess time. Perhaps lengthening the existing recess opportunities or providing another separate recess opportunity in place of the DPA would be time better spent. Students accumulated 25 minutes of MVPA on

average during the 3 DPA days and 22 minutes during the control day. Essentially the inclusion of this physical activity intervention has a minimal effect on the daily physical activity levels of students. A similar trend was seen during the second data collection where students accumulated an average of 37 minutes of MVPA during the DPA days compared to 33 minutes on the control day. If DPA is to be a component of the curriculum then significant changes need to be made in order to increase the effectiveness. A focus should be placed on increasing the intensity of the physical activity as well as the duration in which students are active through standardized activity guidelines developed by specialists.

The physical activity profile of students varies drastically between girls and boys with boys generally accumulating higher intensity and duration of physical activity. This is demonstrated by boys getting about 10 minutes more MVPA throughout the school day on average than girls in both studies. However, this trend is not seen during the 20 minute DPA classes. The physical activity profile is virtually identical between boys and girls during the structured activity of DPA. This suggests that boys and girls are equally affected by the structured nature of directed physical activity. If DPA was delivered in an effective manner, it could help not only with increasing the physical activity profile of the class as a whole, but perhaps encourage girls to match the physical activity of boys throughout the rest of the day. In the environment of a directed physical activity class, girls may feel more comfortable being active, and in time develop the habit of being more active overall.

3.4.4 Recess physical activity

Recess presents students with an excellent opportunity to accumulate a significant amount of physical activity. With 70 minutes available (2x15 minute and 40 minute lunch time recess) for free play, recess has the potential to play a vital role in the health and development of children. In this study, children spent on average 19% of recess time in the moderate to vigorous intensity. Conversely, 38% of the recess time of the students was spent being sedentary. This is more pronounced in girls as they spend 46% of their recess being sedentary while boys are sedentary 29% of the time.

With regard to MVPA intensity, on a per minute basis, students accumulate roughly the same amount of time in recess as they do in DPA. This suggests that in this case, the instructed physical activity is no better at increasing intensity or duration compared to the unstructured play. With this in mind, perhaps it would be beneficial to add another recess to the school day rather than invest that time into DPA and furthermore it is necessary to put effort into getting girls moving more during recess. The intervention efforts could then focus on maximizing recess activity by teaching students games and sports that will get them active. Teachers could assist in developing recess time intramural sports and lead various physical activity options during these recess times. It would be beneficial to expose children to a variety of different sports, games and dances in order to make recess as inclusive as possible. Rather than attempting to direct children in physical activity during DPA, we could simply focus on encouraging and maximizing children`s free time unstructured play. It is reasonable to think that this type of activity could have beneficial carry-over effects that may make

children more likely to decide to be physically active on their own outside of school. Specifically focusing on the girls' recess physical activity levels would help reduce the difference between the genders and in turn improve the overall average of school day physical activity.

3.4.5 Possible Effect of Weather

The first data collection took place between January 27th 2012 and February 3rd 2012. The weather was fairly nice for winter in the region. The snow had melted but the ground was still wet and the temperatures were above 0 degrees Celsius every day (Figure 1). The first day of data collection was the coldest with a temperature of 1 degree Celsius and 6 millimeters of precipitation. The average temperature across the 4 days was 4 degrees Celsius. The second collection took place between March 19th 2012 and March 23th 2012. This particular week saw the region break records for high temperatures on 3 days. It was sunny and warm all week with an average temperature of 24 degrees. This exceptionally warm weather was more conducive to outdoor activity during school hours.

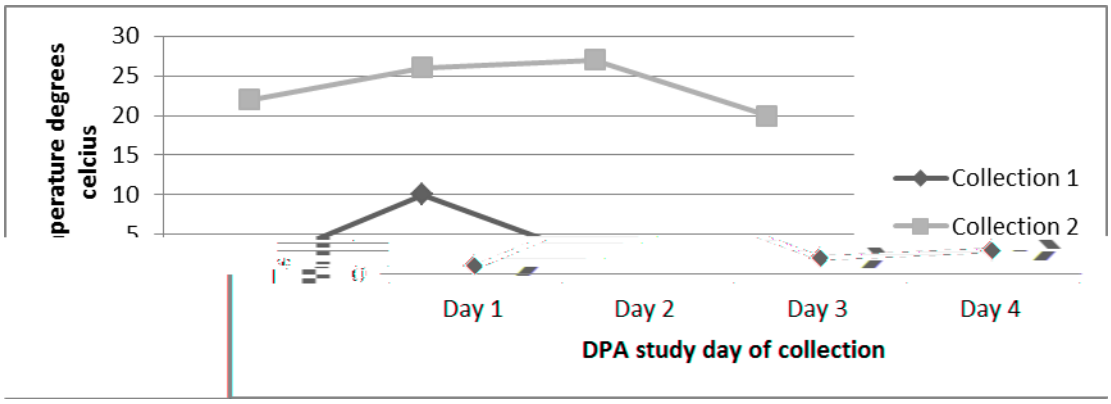
The physical activity profile of the entire school-day saw a significant increase during the second data collection compared to the first. Students spent more than an hour in extra activity during the second collection March. The average MVPA of students rose from 23 minutes to 36 minutes in conjunction with the nice weather. This may suggest that outdoor opportunities and weather play a major role in determine the amount and quality of physical activity children develop. In Canada, the months

between October and March, a significant portion of the school year, are prone to inclement weather and temperatures that may make outdoor activity less desirable. This identifies a major area of concern that needs to be addressed. Programs need to be developed to encourage children to be active in our colder Canadian climate, as well as methods to deal with “indoor recess” days where rain is an issue. Perhaps on these days, classes or grades could alternate recess times and utilize gym space to allow for some level of physical activity.

The nice weather may have played a role in increasing the physical activity of the DPA class itself and is a topic that should be further evaluated in future studies. The teacher took advantage of the warm temperatures and the available field space at the school to implement DPA outside. Average physical activity rose a full 5 minutes during the DPA classes while the average MVPA more than doubled. This could suggest that DPA is best suited for outdoor activity. It is not surprising that the children are more active in the vast space available outside when compared to DPA classes performed within the classroom. More focus needs to be placed on DPA moving outside. Teachers need to be armed with an arsenal of games and activities that can get children outside and active during most weather conditions.

3.4.6 Figure 1: Daily

Temperature



3.4.7 Limitations of the study

While this project attempted to capture a "best-case scenario" of DPA implementation, it does only represent a small sample. This class was not a representative sample and the results cannot be extrapolated to the greater population. They do, however, indicate a desperate need for further research into the DPA program and its effectiveness.

3.5 Conclusion

While the DPA program was developed and implemented with the well-being and healthy development of children in mind, there are some flaws in the program design that essentially negate any benefit of the program. It seems that the activities and games that teachers are utilizing are not of sufficient intensity to meet the mandated guidelines of the program or to effect positive influence on the health of the

children. Furthermore, as reported elsewhere, teachers and students alike acknowledge that DPA classes are often not even implemented (Stone et al., 2012; Patton et al. 2012; Patton et al., 2012 – in review).

The ideal situation for school day physical activity would see daily formal physical education classes instructed by specialized teachers. In the absence of this ideal, the DPA program needs significant revisions in order to have the desired effect. DPA needs to be formally scheduled into the school-day, eliminating the ability of the teacher to ignore or forget about it. DPA also needs a standardized curriculum of activities that are of sufficient intensity and easy to organize. Students need to be moving for the majority if not entirety of the DPA class, sedentary organizational time needs to be eliminated through effective activity choices. Furthermore, DPA needs to take advantage of outdoor space, children need to learn that they are able to be active and have fun in all varieties of weather we experience. It would be valuable to have a specific outdoor winter DPA handbook that teachers could use to encourage outdoor activity during the cold winter months. When weather is wet and outdoor activity is not an option, teachers need to have the ability to organize indoor activity that meets intensity requirements as well. Professional development for teachers in DPA instruction could benefit the level and duration of physical activity.

Noting that the physical activity of children did not vary between the school-days that included DPA and the days that did not, perhaps more benefit would be seen from encouraging free-play among children during their significant recess opportunities. Conceivably, rather than attempting to re-design the DPA program, children would see

equal benefit from simply increasing recess time or including another recess in replace of DPA. It is important for students to receive instruction in physical activity in order to develop gross and fine motor skills as well as self-efficacy in various activities. However, in its current form, DPA does not provide students with this benefit. Efforts aimed at boosting the free-play activity of children could go a long way in developing a desire of children to take up physical activity on their own outside of school. Children already get about 70 minutes of recess opportunity during the school-day If we could get children to better utilize that time it would make significant improvements in overall child health.

3.3.2 Table 3: Physical Activity profile collection 1 (all units in Minutes)

Subject	N	Male	Female	Age	Height	Weight	Days of Collection
Grades 5 & 6	22	10	12	10.77	146.75	40.29	4

Amount & intensity of physical activity	Day 1 (Min)	SD	Day 2 (Min)	SD	Day 3 (Min)	SD	Day 4 (Min)	SD	DPA days (1-3)	Daily Avg
Sedentary Minutes	275.46	(22.08)	250.78	(28.77)	263.59	(43.55)	282.50	(25.79)	263.28	268.08
Male	260.56	(12.16)	241.98	(34.72)	247.70	(48.76)	267.15	(17.05)	250.08	254.35
Female	286.65	(21.45)	258.13	(21.55)	276.83	(35.42)	295.29	(25.27)	273.87	279.23
Light Minutes	81.80	(17.96)	105.31	(23.01)	86.35	(29.64)	75.99	(17.84)	91.15	87.36
Male	92.53	(11.38)	113.15	(27.48)	93.60	(33.37)	85.60	(12.73)	99.76	96.22
Female	73.75	(18.09)	98.77	(17.05)	80.31	(26.05)	67.98	(17.92)	84.28	80.20
Moderate Minutes	21.15	(5.89)	22.26	(8.25)	27.25	(16.33)	20.02	(9.79)	23.55	22.67
Male	25.00	(2.58)	23.98	(8.02)	35.23	(18.24)	25.60	(8.81)	28.07	27.45
Female	18.27	(6.08)	20.83	(8.50)	20.60	(11.45)	15.38	(8.22)	19.90	18.77
Vigorous Minutes	1.58	(1.11)	1.65	(1.31)	2.81	(3.15)	1.49	(1.46)	2.01	1.88
Male	1.92	(1.13)	0.90	(1.00)	3.48	(4.16)	1.65	(1.45)	2.10	1.99
Female	1.33	(1.08)	2.27	(1.23)	2.25	(2.02)	1.35	(1.52)	1.95	1.80
MVPA minutes	22.74	(6.40)	23.91	(8.89)	30.06	(18.79)	21.51	(10.99)	25.57	24.56
Male	26.92	(2.94)	24.88	(8.80)	38.70	(21.57)	27.25	(10.02)	30.17	29.44
Female	19.60	(6.57)	23.10	(9.28)	22.85	(12.98)	16.93	(9.67)	21.85	20.62
Total Physical Activity	104.54	(22.08)	129.22	(28.77)	116.41	(43.55)	97.5	(25.79)	116.72	111.92
Male	119.44	(12.16)	138.03	(34.72)	132.3	(48.76)	112.85	(17.05)	129.92	125.66
Female	93.35	(21.45)	121.88	(21.55)	103.17	(35.42)	84.71	(25.27)	106.13	100.78

3.3.4 Table 4: Daily Physical Activity program: Activity profile collection 1 (All units in minutes)

Subject	N	Male	Female	Age	Height	Weight	Days of Collection
Grades 5 & 6	22	10	12	10.8	146.8	40.29	3

Amount & intensity of physical activity	Day 1 (Min)	SD	Day 2 (Min)	SD	Day 3 (Min)	SD	Daily Avg.
Sedentary DPA Minutes	7.88	(1.22)	9.38	(2.84)	12.03	(4.30)	9.76
Male	7.11	(1.26)	8.2	(3.03)	11.95	(4.79)	9.09
Female	8.46	(0.84)	10.35	(2.36)	12.10	(4.06)	10.30
Light DPA Minutes	6.74	(1.49)	6.14	(2.26)	4.56	(2.02)	5.81
Male	6.36	(1.61)	6.2	(2.79)	4.50	(2.17)	5.69
Female	7.02	(1.39)	6.08	(1.84)	4.60	(1.98)	5.90
Moderate DPA Minutes	4.68	(1.59)	2.81	(1.30)	1.44	(0.88)	2.98
Male	5.81	(1.44)	3.25	(1.62)	1.45	(1.12)	3.50
Female	3.83	(1.13)	2.44	(0.87)	1.43	(0.67)	2.57
Vigorous DPA Minutes	0.7	(0.50)	0.77	(0.85)	0.14	(0.20)	0.54
Male	0.72	(0.51)	0.35	(0.61)	0.10	(0.21)	0.39
Female	0.69	(0.52)	1.13	(0.88)	0.19	(0.19)	0.67
MVPA DPA Minutes	5.38	(1.90)	3.58	(1.68)	1.58	(0.98)	3.51
Male	6.53	(1.80)	3.6	(1.92)	1.55	(1.26)	3.89
Female	4.52	(1.52)	3.56	(1.54)	1.63	(0.73)	3.24
***Minutes (Standard Deviation)**							

3.3.6 Table 5: Recess and lunch (70 Minutes total) physical activity profile collection 1 (All units in minutes)

Subject	N	Male	Female	Age	Height	Weight	Days of Collection
Grades 5 & 6	22	10	12	10.77	146.75	40.29	4

Amount & intensity of physical activity	Day 1 (Min)	SD	Day 2 (Min)	SD	Day 3 (Min)	SD	Day 4 (Min)	SD	DPA days (1-3)	Daily Avg
Sedentary Minutes	32.67	(11.40)	21.4	(13.42)	23.07	(15.74)	30.05	(15.33)	25.71	26.7975
Male	25.58	(12.11)	15.7	(15.05)	14.85	(10.11)	24.1	(12.00)	18.71	20.0575
Female	37.98	(7.61)	26.15	(10.22)	29.92	(16.64)	35	(16.49)	31.35	32.2625
MVPA minutes	11.45	(4.93)	11.84	(6.62)	16.28	(12.92)	13.35	(8.57)	13.19	13.23
Male	14.89	(2.31)	12.13	(5.83)	22.03	(14.67)	17.78	(7.77)	16.35	16.7075
Female	8.88	(4.84)	11.6	(7.46)	11.5	(9.37)	9.67	(7.62)	10.66	10.4125

Minutes (Standard Deviation)

3.3.8 Table 6: Physical activity profile collection 2 (All units in minutes)

Subject	N	Male	Female	Age	Height	Weight	Days of Collection
Grades 5 & 6	12	4	8	10.42	145.43	41.59	4

Amount & intensity of physical activity	Day 1		Day 2		Day 3		Day 4		DPA days (1-3)	Daily Avg.
	Min.	SD	Min.	SD	Min.	SD	Min.	SD		
Sedentary Minutes	250.25	(45.49)	246.64	(21.27)	242.65	(14.55)	248.05	(19.88)	246.51	246.90
Male	218.88	(28.85)	237.19	(22.87)	234.19	(16.88)	245.75	(9.76)	230.09	234.00
Female	265.94	(45.29)	252.04	(19.98)	246.88	(12.22)	248.91	(23.11)	254.95	253.44
Light Minutes	102.75	(15.71)	99.25	(14.21)	97.31	(11.25)	99.25	(18.80)	99.77	99.64
Male	113.13	(18.56)	103.56	(14.58)	97.63	(14.13)	91.08	(7.29)	104.77	101.35
Female	96.82	(11.25)	96.79	(14.52)	97.16	(10.65)	102.31	(21.22)	96.92	98.27
Moderate Minutes	33.86	(15.71)	32.14	(12.11)	33.60	(9.40)	30.59	(12.36)	33.20	32.55
Male	44.38	(14.40)	37.31	(13.73)	39.06	(10.62)	40.67	(15.30)	40.25	40.36
Female	27.86	(13.86)	29.17	(11.06)	30.88	(8.07)	26.81	(9.58)	29.30	28.68
Vigorous Minutes	3.50	(3.24)	1.98	(1.83)	6.44	(4.04)	2.11	(1.42)	3.97	3.51
Male	3.63	(3.79)	1.94	(2.74)	9.13	(5.55)	2.50	(1.80)	4.90	4.30
Female	3.43	(3.20)	2.00	(1.34)	5.09	(2.49)	1.97	(1.36)	3.51	3.12
MVPA minutes	37.36	(18.32)	34.11	(13.24)	40.04	(12.22)	32.70	(13.60)	37.17	36.05
Male	48.00	(18.02)	39.25	(15.53)	48.19	(14.78)	43.17	(17.04)	45.15	44.65
Female	31.29	(16.68)	31.18	(12.00)	35.97	(9.17)	28.78	(10.80)	32.81	31.81
Total Physical Activity	140.11	(29.30)	133.36	(21.27)	137.35	(14.55)	131.95	(19.88)	136.94	135.69
Male	161.13	(28.85)	142.81	(22.87)	145.81	(16.88)	134.25	(9.76)	149.92	146.00
Female	128.11	(23.49)	127.96	(19.98)	133.13	(12.22)	131.09	(23.11)	129.73	130.07

3.3.9 Table 7: Daily Physical Activity class activity profile collection 2

Subject	N	Male	Female	Age	Height	Weight	Days of Collection
Grade 5 & 6	12	4	8	10.42	145.43	41.59	3

Amount & intensity of physical activity	Day 1		Day 2		Day 3		Daily
	Min.	SD	Min.	SD	Min.	SD	Avg
Sedentary DPA Minutes	7.25	(3.04)	9.16	(2.12)	8.71	(1.49)	8.37
Male	8.63	(4.80)	9.25	(1.20)	7.56	(1.48)	8.48
Female	6.46	(1.36)	9.11	(2.60)	9.28	(1.19)	8.28
Light DPA Minutes	9.39	(2.25)	5.68	(2.00)	7.38	(2.19)	7.48
Male	7.44	(1.25)	5.31	(2.66)	7.75	(2.84)	6.83
Female	10.50	(1.91)	5.89	(1.74)	7.19	(1.99)	7.86
Moderate DPA Minutes	6.73	(2.13)	4.48	(1.92)	6.56	(1.79)	5.92
Male	7.06	(3.10)	4.81	(2.44)	7.13	(2.14)	6.33
Female	6.54	(1.62)	4.29	(1.75)	6.28	(1.75)	5.70
Vigorous DPA Minutes	1.37	(1.15)	0.68	(0.73)	2.35	(1.04)	1.47
Male	1.63	(1.60)	0.63	(0.78)	2.56	(1.25)	1.61
Female	1.25	(0.94)	0.71	(0.77)	2.25	(1.00)	1.40
MVPA DPA Minutes	8.11	(3.06)	5.16	(2.00)	8.92	(1.76)	7.40
Male	8.89	(4.49)	5.44	(3.04)	9.69	(1.96)	8.01
Female	7.79	(2.28)	5	(1.41)	8.53	(1.65)	7.11
Minutes (Standard Deviation)							

3.3.10 Table 8: Recess and Lunch (70 minutes total) physical activity profile collection 2

Subject	N	Male	Female	Age	Height	Weight	Days of Collection
Grade 5 & 6	12	4	8	10.42	145.43	41.59	4

Amount & intensity of physical activity	Day 1		Day 2		Day 3		Day 4		DPA days (1-3)	Daily Avg.
	Min.	SD	Min.	SD	Min.	SD	Min.	SD		
Sedentary	23.98	(9.86)	19	(10.82)	18.33	(5.75)	34.89	(7.72)	17.42	24.05
Male	15.5	(5.12)	12.75	(10.62)	15.88	(5.75)	33.08	(11.02)	13.99	19.30
Female	28.82	(8.50)	22.57	(9.88)	19.56	(5.71)	35.56	(6.97)	18.96	26.63
MVPA	18.48	(11.18)	19.95	(10.83)	22.96	(8.71)	11.18	(8.50)	15.74	18.14
Male	25.19	(8.67)	25.31	(11.97)	28	(11.58)	18.17	(13.65)	20.09	24.17
Female	14.64	(11.11)	16.89	(9.68)	20.43	(6.32)	8.56	(4.64)	13.11	15.13

Minutes (Standard Deviation)

3.3.12 Table 9: Repeated measures analysis

Subject	N	Female	Height	Weight	Days of Collection
	Male	Age			
Grade 5 & 6	12 4	8 10.42	145.4	41.59	4

Variable	Collection period	Mean (Min)	Standard deviation	Significance (p<.05)
Average physical activity all days	Collection 1	107.59	19.56	0.000
	Collection 2	169.67	31.28	
Average physical activity DPA days	Collection 1	112.31	21.55	0.001
	Collection 2	137.00	18.38	
Average physical activity during DPA sessions	Collection 1	9.27	0.95	0.000
	Collection 2	14.09	1.71	
Average MVPA DPA days	Collection 1	22.64	*8.50*	0.000
	Collection 2	35.5	12.82	
Average MVPA during DPA sessions	Collection 1	3.43	0.66	0.000
	Collection 2	7.03	1.82	

3.6 References

Active Healthy Kids Canada. (2009). Active kids are fit to learn: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, On. *Active Healthy Kids Canada.*

Active Healthy Kids Canada. (2010). Healthy habits start earlier than you think: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, ON. Active Healthy Kids Canada

Active Healthy Kids Canada (2011). Don't let this be the most physical activity our kids get after school. The Active Healthy Kids Canada 2011 report Card on physical activity for children and youth. Toronto, On. *Active Healthy Kids Canada.*

Ahamed, Y, Macdonald, H, Reed, K, Naylor, P, Liu-Ambrose, T, McKay, H. (2007). School-based physical activity does not compromise children's academic performance. *Med Sci Sports Exerc*. 39:371-376.

Alberta Education. (2008). Daily Physical Activity Survey Report. *Alberta Education – Accountability and Reporting Division.* http://education.alberta.ca/teachers/resources/dpa.aspx.

Benden, M., Blake, J., Wendel, M., & Huber, J. (2011). The impact of stand-biased desks in classrooms on calorie expenditure in children. *American journal of public health, 101* (8), 1433-6.

Colley, R., Garriguet, D., Janssen, I., Craig, C., Clark, J. & Tremblay, M. (2011a). Physical activity of Canadian children and youth: Accelerometer results from the 2007-2009 Canadian Health Measures Survey. *Health Reports*. 22(1), 12-20.

Colley, R., Garriguet, D., Janssen, I., Craig, C., Clark, J. & Tremblay, M. (2011b). Physical activity of Canadian adults:Accelerometer results from the 2007-2009 Canadian Health Measures Survey. Health Reports. 22(1), 7-14.

Dobbins, M., Lockett, D., Michel, I., Beyers, J., Feldman, L., Vohra, J. & Micucci, S. (2001). The effectiveness of school-based interventions in promoting physical activity and fitness among children and youth: a systematic review. Public Health Research, Education & Development Program. *Health Canada*.

Dunstan, D., Kingwell, B., Larsen, R., Healy, G., Cerin, E., Hamilton, M., Shaw, J., Bertovic, D., Zimmet, P., Salmon, J., & Owen, N. (2012). Breaking Up Prolonged Sitting Reduces Postprandial Glucose and Insulin Responses *Diabetes Care*.

Evenson K., Catellier D., Gill K., et al. (2008). Calibration of two objective measures of physical activity for children. *Journal of Sports Sciences.* 26: 1557-65.

Field, T, Diego, M, Sanders, C. (2001). Exercise is positively related to adolescents' relationships and academics. *Adolescence*. 36:105-110.

He, M., Piche, L. & Beynon, C. (2009). Understanding screen-related sedentary behavior and its contributing factors among school-aged children: a social-ecologic exploration. *American Journal of Health Promotion*. 23(5), 299-308.

He, M., Piche, L., Beynon, C. & Harris, S. (2010). Screen-related sedentary behaviors: childrens` and parents` attitudes, motivations and practices. *Journal of Nutrition, Education and Behavior*. 42(1), 17-25

He, M., Piche, L., Beynon, C., Kurtz, J. & Harris, S. (2011). Screen-related sedentary behaviours of school-aged children: Principals' and teachers' perspectives. *Health Education*. 70(1), 32-38.

Health Canada. (2002). Canada's Physical Activity Guidelines for Children. Population and Public Health Branch, *Health Canada*.

Heil D. (2006). Predicting activity energy expenditure using the Actical activity monitor. *Research Quarterly for Exercise and Sport.* 77: 64-80.

Janssen, I. & Leblanc, A. (2010) Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity.* 7, 40.

Keays, J. & Allison, K. (1995). The effects of regular moderate to vigorous physical activity on student outcomes: A review. *Canadian Journal of Public Health*. 86(1), 62-5.

Lindner K. (2002). The physical activity participation-academic performance relationship revisited: perceived and actual performance and the effect of banding (academic tracking). *Ped Exerc Sci*. 14:1839-1850

Naylor, P, McKay, H. (2009). Prevention in the first place: Schools: a setting for action on physical inactivity. *Br J Sports Med*. 43:10-13.

Nygaard, H., Tomten, S., & Høstmark, A. (2009). Slow postmeal walking reduces postprandial glycemia in middle-aged women *Applied Physiology, Nutrition, and Metabolism, 34* (6), 1087-1092

Ontario Physical and Health Education Association. (2006). Daily physical activity in schools: a guide for school boards. *Ontario Ministry of Education*. Retrieved February 2008 from http://www.edu.gov.on.ca/eng/teachers/dpa_boards.pdf

Patton, I,. McDougall, J. (2009) Canada's Active Schools: A review of school-based physical activity interventions in Canada and their importance. PHE Journal. 75(3) 2009.

Patton, I, Overend, T, Miller, L, Mandich, A. (2012). Teachers' Perspectives of the Daily Physical Activity program in Ontario*. Physical and Health Education*. Spring issue, in press.

Patton, I., Overend, T., Mandich, A., Miller, L. (2012). The Daily Physical Activity program in Ontario Elementary Schools: Perceptions of students in grades 4-8. Canadian Journal of Education (In Review).

Puyau M., Adolph A., Vohra F., et al. (2004). Prediction of activity energy expenditure using accelerometers in children. *Medicine and Science in Sports and Exercise.* 36:1625-31.

Robinson, D, Melnychuk, N. (2008). Discourse, teacher identity, and the implementation of Daily Physical Activity. *The Alberta Journal of Educational Research* 54(3): 245-257.

Shields, M., Tremblay, M., Laviolette, M., Craig, C., Janssen, I. (2010). Fitness of Canadian adults: Results from the 2007-2009 Canadian Health Measures Survey. Health Reports. 21(1), 21-35.

Spence, J., Lee, R. (2003). Toward a comprehensive model of physical activity. *Psychology of Sport and Exercise*. 4, 7-24.

Strong, W., Malina, R., Blimkie, C., Daniels, S., Dishman, R., Gutin, B., Hergenroeder, A., Must, A., Nixon, P., Pivarnik, J., Rowland, T., Trost, S. & Trudeau, F. (2005). Evidence based physical activity for school-age youth. *The Journal of Pediatrics*. June, 732-737.

Tremblay, M. & Willms, J. (2003). Is the Canadian childhood obesity epidemic related to physical inactivity? *International Journal of Obesity*. 27, 100-105.

Tremblay, M., Colley, R., Saunders, T., Healy, G. & Owen, N. (2010). Physiological and health implications of a sedentary lifestyle. *Applied Physiology Nutrition and Metabolism.* 35(6), 725-740.

Tremblay, M., Warburton, D., Janssen, I., Paterson, D., Latimer, A., Rhodes, R., Kho, M., Hicks, A., LeBlanc, A., Zher, L., Murumets, K. & Duggan, M. (2011a). New

Canadian physical activity guidelines. *Applied Physiology Nutrition and Metabolism*. 36, 36-46.

Tremblay, M., LaBlanc, A., Janssen, I., Kho, M., Hicks, A., Murumets, K., Colley, R. & Duggan, M. (2011b). Canadian sedentary behaviour guidelines for children and youth. *Applied Physiology, Nutrition and Metabolism.* 36, 59-64.

Trembay, M., LeBlanc, A., Kho, M., Saunders, T., Larouche, R., Colley, R., Goldfield, G. & Gorber, S. (2011c). Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*. 8:98.

Trudeau, F, Shephard, R. (2008). Physical education, school physical activity, school sports and academic performance. *Int J Behav Nutr Phys Act*. 5:10.

Chapter 4

4.0

Teachers' Perspectives of the Daily Physical Activity program in Ontario[3]

4.1 Introduction

The Daily Physical Activity (DPA) program in Ontario was created to help students achieve optimal levels of physical activity each day. This paper addresses the teachers' perspectives on DPA in the Thames Valley District School Board. We investigated program implementation as well as their beliefs about the benefits and drawbacks of DPA. Teachers have the primary responsibility of DPA implementation and are the most knowledgeable about its realities in relation to the mandated guidelines. Thus, it is important to communicate with teachers and administrators to assess the effectiveness of the program and its delivery to identify factors related to program success.

Over one quarter of Canadian children are now overweight or obese (Tremblay, 2010). One of the major factors contributing to this childhood societal problem is the recent decrease in physical activity (Active Healthy Kids, 2010). In 2010 nearly 90% of Canadian children did not meet the guidelines of a minimum 90 minutes of daily physical

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activity for optimal health and development (Active Healthy Kids. 2010). The most current guidelines have been adapted to recommend a minimum of 60 minutes of physical activity (Tremblay, 2011). Only 7% of Canadian children are meeting the new recommendations (Colley et al., 2011). The responsibility for these recommended minutes of physical activity rests with parents in the context of the home environment, recreational settings, and schools. Ontario, Alberta and British Columbia provincial governments have adopted Daily Physical Activity programs into their school systems in an attempt to address the increasingly sedentary lifestyles of Canadian children.

Children should be educated from early childhood to understand that physical activity is vitally important for healthy growth and development. An effective delivery system for this education is the school system, where virtually every child can benefit in a cost-effective manner. The school environment is thus an ideal place to implement physical activity and lifestyle interventions (Naylor & McKay, 2009). Children absorb information through socialization with their peers and teachers. If physical activity is viewed as unimportant in the school by administration and teachers, children may adopt a similar perspective. In the majority of Canadian elementary schools, physical education is taught by teachers who are not physical education specialists (Active Healthy Kids, 2009). Such teachers may be less likely to effectively teach developmentally appropriate physical activity in an inclusive and meaningful environment.

The Ontario Daily Physical Activity (DPA) program was announced by the Premier in 2005, and mandated that all children in the province's elementary school system

receive at least 20 minutes of moderate to vigorous physical activity every day (Ontario Physical and Health Education Association, 2006). The DPA program requirements are met on days when physical education is taught; however on other days, homeroom teachers are required to engage their students in 20 minutes of physical activity. The DPA program mandates that activities be sufficient to raise the heart rate of the children to a moderate or vigorous level and that there is enough variety to ensure that the activities are enjoyable and motivating to the children.

Objections have been raised by policy makers and teachers of DPA and similar school-based physical activity programs (Dwyer et al., 2003; Robinson & Melnychuk, 2008). The most notable argument is that with the strict demands of "academic" subjects, the time required for DPA takes valuable time away from other content areas thereby detracting from academic success. Principals in British Columbia (BC) noted that competing curricular demands were a major barrier to DPA. Toronto teachers also noted that a significant barrier is the low priority placed on physical education in the school system (Dwyer et al., 2003). However the *Action Schools!* program in BC (*AS!BC*) showed that it was possible to improve the delivery of physical activity in schools (Naylor, Macdonald, Warburton, Reed & McKay, 2008) as well as increase the physical activity levels of students in the schools (Naylor, Macdonald, Zebedee, Reed & McKay, 2006). *AS!BC* was able to do this through the implementation of a comprehensive program that included activity opportunities, education and professional development for teachers. *AS!BC* also showed that the increased PA levels resulting from the program increased cardiovascular health and bone health (Reed, Warburton, Macdonald, Naylor & McKay,

2008; MacDonald, Kontulainen, Khan & McKay 2007). Other studies suggest that academic achievement does not suffer when time is allocated from "academic" classes and refocused on physical education (Ahamed et al., 2007; Lindner, 2002; Trudeau & Shephard, 2008). School-based PA programs may thus be effective in improving the health of children. Additionally, although there is evidence showing the positive relationship between physical activity and academic success along with improved health benefits (Lindner, 2002; Field, Diego & Sanders, 2001), there is no evidence to support that reduced focus on physical education improves academic success (Active Healthy Kids, 2009). Therefore the current trend in cutting the physical education in favor of increased time spent in academic classes is unfounded and does not serve to better the education of the children.

Robinson and Melnychuk (2008) noted that there is significant resistance to the implementation of DPA in Alberta. There are several issues that need to be addressed before this program can be accepted fully and run properly, most notably the severe time constraints, and the unrealistic assumption that any teacher is capable of delivering a highly specialized physical activity program. The Alberta Teachers' Association's Health and Physical Education Council suggested that the DPA program implementation should be put on hold until the many issues surrounding optimal program delivery were addressed (Health and Physical Education Council, 2005). The Council noted that many educators were "simplifying, ignoring and misinterpreting the implementation of DPA". While the theoretical application of the DPA program is a noble endeavor, the resistance seen is a clear indication that the program may not be properly designed.

The DPA program is relatively new in Canada and its effectiveness has yet to be formally evaluated. It is important to methodically assess how the programs are being operationalized (or actualized) in the schools to identify the critical factors that impact the realities of a successful program and the challenges of a less successful program. An initial approach to assessing the DPA program is to determine if it is being implemented in accordance with the original intentions. As teachers are the primary individuals charged with implementation of DPA, the purpose of this study was to investigate teachers' perspectives of the DPA program in a municipal school board.

4.2 Methods

A random sample was selected of 37 schools and each teacher in these schools (N=624) was provided with a questionnaire package. The questionnaire was administered to teachers in the Thames Valley District School Board (TVDSB) and consisted of 35 items in three sections. Section A consisted of 6 items addressing how the teachers conduct DPA in their class on a day-to-day basis (see Table 1). Section B included 9 items on the supports for and barriers to DPA delivery in the school setting (see Table 2). Section C comprised 11 items regarding the teachers' personal attitudes towards the DPA program (see Table 3). Questionnaire items were answered using one of three response scales: A) a 5-point scale consisting of 'never' (1) 'rarely' (2) 'sometimes' (3) 'often' (4) 'always' (5); B) a 5-point scale worded slightly differently; 'not at all' (1) 'minimally' (2) 'somewhat' (3) 'more than average' (4) 'to a great extent' (5); and C) "Yes" or "No" where yes = 1 and no = 2. Data were entered into a spreadsheet and all analyses were

conducted using the statistical program (SPSS v.17). Descriptive statistics, including means and frequencies were calculated for item responses.

4.3 Results

One hundred and forty-five questionnaires were returned for a return rate of 23%. Of the respondents, 67 (46%) were from the K-3 grade level, 38 (26%) were from the junior level (grades 4-6), 22 (15%) were from the senior level (grades 7-8), and 18 (12%) were not categorized into grades. The average teaching experience of the respondents was 13 years. Results for sections 'A', 'B', and 'C' are displayed in Tables 1, 2, and 3, respectively.

The most common frequency of performing DPA sessions was 'sometimes' (39% of respondents). An additional 16.3% reported 'never' or 'rarely' conducting DPA sessions suggesting that DPA is being viewed as optional, rather than important. Only 45% of respondents claimed to be 'somewhat' knowledgeable about the Ministry of Education guidelines for DPA, which is troublesome if many teachers are not aware what is required of them. If the program requirements are not fully understood by the teacher the program cannot be expected to be effective. One-third of teachers claimed to 'sometimes' include a warm-up or cool down in their DPA session; however an additional 38% reported 'never' (11%) or 'rarely' (27%) including these components. Teachers might feel that the warm up and cool down is too time consuming and limits the DPA time. However, paired with the fact that only half of the respondents (49%) reported 'often' using a wide variety of activities to keep the students engaged, this

indicates that the teachers do not understand the importance of these components thus detracting from the effectiveness of the program.

Eighty-five percent of the respondents stated that there were sufficient educational resources at their disposal. Furthermore, 89% claimed to have sufficient knowledge of physical activity to successfully conduct DPA. Therefore, it appears even though important components such as warm-up and activity variety are lacking, teachers view themselves as competent. This suggests that teachers downplay the expertise required to effectively conduct a program such as DPA and perhaps reflects a societal perception that physical activity is less important than other subjects in children's development.

One quarter of the respondents stated that they only 'sometimes' had enough time to plan a DPA session; an additional 45% claimed 'never' (22%) or 'rarely' (23%) to have adequate planning time. Similarly, 32% of teachers reported 'rarely' having enough time to conduct DPA sessions. It seems that teachers find it very difficult to fit the 20 minutes into the daily schedule. Thirty-nine percent of teachers claimed that DPA 'often' (28%) or 'always' (11%) diverted time away from other subjects. An additional 30% reported that DPA 'sometimes' takes time away from other subjects. Therefore it is clear that time constraints placed on teachers are a prevailing barrier to program delivery. Fifty-six percent reported only 'sometimes' (29%) or 'rarely' (27%) having enough space to conduct DPA highlighting the need for space for increased PA space in schools.

In response to whether DPA should be more structured, 46% indicated 'yes'. This suggests that teachers are split on the flexibility of the program. It is likely that teachers like the freedom to incorporate DPA into the day on their own terms; however increased structure would ease the burden of planning required in implementing the program. Thirty-six percent of the respondents claimed that DPA 'sometimes' created a better learning environment, with an additional 26% indicating 'often', thus highlighting one of the many benefits of increased PA. Sixty-five percent reported that their school administration 'rarely' (37%) or 'never' (28%) checked up on their DPA delivery. This clearly signifies a lack of importance placed on physical activity by school administrators. While other subjects have a degree of accountability and checks in place to ensure that the curriculum is being administered, DPA is the only `subject' that has no feedback loop. If a teacher were to ignore the program all together and not deliver it at all, there is no recourse or ability to identify these situations and rectify the problem.

4.4 Discussion

4.4.1 Time constraints:

The results of this survey indicate that teachers in Ontario view time constraints as the biggest barrier to the DPA program delivery. This is congruent with findings in other Canadian studies regarding school-based physical activity programs (Dwyer et al, 2003). The majority of teachers responded that they did not have enough time to *plan* DPA on a regular basis, with 45% reporting 'rarely' or 'never' having enough planning

time. Furthermore, over half the teachers reported that they 'rarely' or 'never' had adequate time to *conduct* the DPA program. Similar findings have been reported in Alberta where time constraints and space restrictions were identified as major barriers to their DPA program (Alberta Education, 2008; Health and Physical Education Council, 2005). One can imagine that the teachers may feel overwhelmed with the curricular demands (Active Healthy Kids, 2009; Ontario Physical and Health Education Association, 2006) and the added requirement of getting pupils active for 20 minutes daily may thus be seen as an unwelcome burden (Robinson, 2008). Support for this notion may be found in the moderate compliance reported with DPA requirements. Nearly 40% of teachers reported only 'sometimes' and 16% reported 'never' or 'rarely' in terms of performing these mandated DPA sessions.

4.4.2 Knowledge of the program

The program is meant to be delivered on days when there is no formal Physical Education class. The lack of reported program delivery in this survey is mirrored by the teachers' knowledge of the Ministry's DPA guidelines with over 45% reporting only 'some' knowledge. In order for a program to be effective, individuals responsible for implementation must be fully aware of what is required and expected. Perhaps more attention should be given to educating teachers regarding the DPA expectations and the underlying basis for the program, in addition to being given grade appropriate activity ideas. Given that many of these teachers lack formal health and physical education training it is noteworthy that they report having sufficient knowledge of physical activity

to conduct DPA (nearly 90% claimed to be adequately knowledgeable), suggesting that health knowledge and competency in teaching a physical activity program are not seen as barriers to DPA program delivery.

4.4.3 DPA competing with academic subjects for attention

The insufficient program delivery shows that the teachers are more focused on the core subjects that have clear curricular and assessment guidelines in place to identify students' academic success, such as math or language arts. It may also identify a significant misconception held by teachers. The elementary school curriculum in the Thames Valley District School Board is divided into minutes allotted to each subject per week. Health and Physical Education (HPE) is allotted 180 minutes per 6 day cycle (10% of educational time). Ideally, those 180 minutes should be separated into six 30-minute HPE classes. However, because of space restrictions and lack of physical education specialists employed in the TVDSB system, this is rarely, if ever, the case. The DPA program was designed to supplement the minutes from formal Physical Education and health classes in order to achieve the majority of the 180 minute time allotment. The DPA program thus does not take time away from other subjects because DPA has already been allotted the minutes in the curriculum. For example, on the high end, students might receive three 30-minute physical education classes leaving a total of 90 minutes still left in their allotment; If DPA is done on the other 3 days in the cycle as

mandated, the teacher would easily fall within the allotted time requirement and would not infringe on other class time. So, why do teachers find it so hard to find the time to conduct this program and why do so many teachers report that DPA takes valuable time away from other subjects (40% reported that DPA 'often' or 'always' takes time away from more academic subjects)? This misunderstanding of the impact of DPA must be addressed. Teachers need to comprehend that DPA is a component of their health and physical education curriculum, not an additional independent subject.

4.4.4 Support of school administration

The most common response of teachers in this study was that school principals and administration value the DPA program 'more than average' (45.8%). These statistics parallel the research on the Alberta DPA program where principals were more favorable of the program than teachers (Alberta Education, 2008). One would think that this high value placed on DPA could result in more vigorous follow-up to ensure the successful delivery of the program. However, this is not the case as nearly two-thirds of respondents (65%) reported that the administration 'rarely' or 'never' conducted follow-up on the DPA program. A lack of accountability may lead the teachers to believe that it is acceptable to regularly omit DPA sessions in favor of the other subjects, which also indicates a lack of importance attached to the DPA program. If school administrations place high importance on proper delivery of DPA and follow-up on its implementation, teachers will also see it as important; this value placed on physical activity may then pass on to the children and result in a more effective and more enjoyable program. Robinson

and Melnychuk (2008) address the lack of value placed on physical activity in Alberta's DPA program "The implementation of such an initiative ignores the legitimate subject-authority and professionalism of physical educators, devalues the work they do, and further undermines the value of physical education itself" (p.248). It is clear that physical education is vital to childhood development and it needs to be taken seriously. Physical education needs to be taught by qualified professionals on a daily basis. It is also important to note that students are graded on all subjects other than DPA. This lack of evaluation may contribute to the relative lack of importance teachers place on the DPA program.

While the DPA program was designed to be flexible in order to fit teachers' already demanding schedules, perhaps this should not be the case. In a demanding schedule, it does not make sense to have one 'floating' class left to be squeezed into the day at the teacher's discretion. DPA may be lost in the mix and easily forgotten in such a system. Ideally, the Canadian school system should move to a daily physical education class taught by physical education specialists for every student. However, in the absence of daily physical education it is recommended that school administrations formally schedule DPA into the weekly curriculum, thereby eliminating the possibility of the program being forgotten. This may enhance the likelihood that children receive the optimal program benefits.

Over 60% of teachers stated that they believe that DPA should be a permanent component of the curriculum. However, the teachers who elected to participate in this study may have a more favorable perspective of the DPA program than those who chose

not to participate. It is possible that teachers opposed to DPA would not want to participate in a DPA survey—perhaps explaining the low response rate (23%) in our survey. Furthermore, comments attached to the questionnaire suggested that DPA is necessary, but only in the absence of daily physical education which is viewed as the ideal.

3.5 Limitations of Study

While this study highlights some important facts regarding teachers' perceptions of the DPA program, it has limitations. The method of self-report has problems including verification of the data and respondents misrepresenting their results due to social desirability bias (Podsakoff & Organ, 1986). A second limitation is the relatively low response rate of 23%. Teachers may have chosen to decline participation due to curricular demands or their existing views of DPA. Furthermore, this population of teachers, being in close proximity to a large research institution with a teachers' college (The University of Western Ontario), has been saturated with research requests over the years. A third limitation was the unbalanced return when classified by grade level. Teachers in the senior grades had a lower response rate than those in the younger classes, perhaps due to perceived or real increased academic demands as the students progress through elementary school. Teachers in the older grades may place less value on the DPA program relative to academic demands and thus declined to participate.

4.6 Conclusion

It is one thing for provincial governments to mandate an intervention to promote healthy living such as increasing physical activity; however, it is significantly more difficult to ensure that the program is actually being done. School-based interventions require the full support of the school boards, administrators and teachers in order to operate effectively. Without this support, the programs do not have the opportunity to make a significant difference for the health of the students. The Daily Physical Activity intervention is a useful step towards encouraging healthier lifestyles of children and youth, it however, is underdeveloped and not fulfilling its potential.

There is a need to make significant changes in the quality and frequency of DPA delivery through program follow-up and accountability by teachers and administrators. Furthermore, increased professional development for teachers that targets DPA programming would improve the quality and variety of activities being used. Ideally, all children should be able to reap the benefits of a physical education specialist's knowledge, passion and mentoring for a healthier school community that embraces and celebrates physical education and daily physical activity.

4.7 Table 1

Teacher's questionnaire responses: How do you implement DPA on a day to day basis in your school setting?

Item	1 Never	2 Rarely	3 Sometimes	4 Often	5 Always	Mean	SD
I perform DPA everyday the student's do not have Gym	2.8%	13.5%	39%	29.1%	15.6%	3.4	1
Do you give your students the opportunity for feedback regarding DPA	9.8%	28%	35.7%	22.4%	4.2%	2.8	1
Do you give your students the opportunity for leadership in DPA	4.9%	9.9%	45.1%	33.1%	7%	3.3	0.91
Do you implement a wide variety of activities to keep students engaged	2.1%	4.9%	32.9%	49%	11.2%	3.6	0.83
Do you include warm-up and cool down during DPA	10.5%	27.3%	33.6%	18.9%	9.8%	2.9	1.13
Item	**1 Not at all**	**2 Minimally**	**3 Somewhat**	**4 More than average**	**5 To a great extent**	**Mean**	**SD**
Are you aware of the DPA guidelines established by the Government	0.7%	5.6%	46.1%	32.9%	14.7%	3.5	0.84

4.8 Table 2

Teacher`s questionnaire results: What are the supports and barriers that influence the delivery of DPA?

Item	1 Never	2 Rarely	3 Sometimes	4 Often	5 Always	Mean	SD
Do you feel that you are given adequate time to plan DPA	22.4%	22.4%	24.5%	20.3%	10.5%	2.7	1.3
Do you feel that you are given adequate time to conduct DPA	19%	31.7%	26.1%	12.6%	11.3%	2.6	1.24
Do you feel that DPA takes valuable time away from other subjects	13.3%	18.2%	30.1%	28%	10%	3.3	0.91
Do you feel you are given sufficient space to conduct DPA	18.1%	27.1%	29.2%	11.8%	10.5%	2.8	1.27
Do you feel you are given sufficient equipment to conduct DPA	6.3%	13.9%	33.3%	32.6%	13.9%	3.3	1.08
Item	**1 Not at all**	**2 Minimally**	**3 Somewhat**	**4 More than average**	**5 To a great extent**	**Mean**	**SD**
Do you feel your principal and administration value physical activity and health	2.1%	6.3%	26.4%	51.4%	13.9%	3.7	0.86
Do you feel your principal and administration support the DPA program	0.7%	6.9%	29.2%	45.8%	17.4%	3.7	0.86

Item	1 Yes	2 No	Mean	SD
Are there sufficient educational resources available to you regarding DPA	84.7%	15.3%	1.2%	0.36%
Do you feel that you have sufficient Knowledge of physical activity and health to effectively conduct DPA	88.9%	11.1%	1.1%	0..32%

4.9 Table 3

Teacher`s questionnaire results: What are your attitudes towards the DPA program and health in general?

Item	1 Never	2 Rarely	3 Sometimes	4 Often	5 Always	Mean	SD
Does your school administration check to ensure DPA is being conducted	27.8%	36.8%	27.8%	6.3%	1.4%	2.2	0.95
Do you actively engage in DPA along with your students	1.4%	4.9%	28.5%	34.7%	30.6%	3.9	0.96
Item	**1 Not at all**	**2 Minimally**	**3 Somewhat**	**4 More than average**	**5 To a great extent**	**Mean**	**SD**
In your opinion, is DPA effective in students developing healthy lifestyles	6.9%	24.3%	31.9%	20.8%	16%	3.1	1.2
In your opinion, does DPA create a better overall learning environment in your class	4.9%	16.1%	35.7%	25.9%	17.5%	3.3	1.1
In your opinion, do you feel students understand the link between physical activity and health	1.4%	7.6%	43.8%	36.1%	11.1%	3.5	0.84
In your opinion, are the activities of DPA enjoyable for your students	0.7%	0.7%	35%	46.9%	16.8%	3.8	0.74
Do you believe physical activity is important to academic success	2.1%	4.2%	20.8%	37.5%	35.4%	4	0.96
Do you believe physical activity is important	0%	0%	4.9%	26.4%	68.8%	4.6	0.57
Do you enjoy conducting DPA	4.2%	6.3%	42%	35%	12.6%	3.5	0.94
Item	**1 Yes**	**2 No**	**Mean**	**SD**			
Do you believe the DPA program should be a permanent component of the curriculum	60.9%	39.1%	1.4	0.5			
Do you feel you should be provided with more structured class outlines for DPA	46%	54%	1.5	0.5			

4.10 References

Active Healthy Kids Canada. (2009). Report card on physical activity for children and youth. Retrieved July, 2009 from http://www.activehealthykids.ca/ecms.ashx/ReportCard2009/AHKC-Longform_WEB_FINAL.pdf.

Active Healthy Kids Canada. (2010). Healthy Habits Start Earlier Than You Think: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, ON.

Ahamed, Y, Macdonald, H, Reed, K, Naylor, P, Liu-Ambrose, T, McKay, H. (2007). School-based physical activity does not compromise children's academic performance. *Med Sci Sports Exerc*. 39:371-376.

Alberta Education. (2008). Daily Physical Activity Survey Report. *Alberta Education – Accountability and Reporting Division.* http://education.alberta.ca/teachers/resources/dpa.aspx.

Dwyer, J, Allison, K, Barrera, M, Hansen, B, Goldenberg, E, Boutiller, M. (2003). Teachers' perspective on barriers to implementing physical activity curriculum guidelines for school children in Toronto. *Canadian Journal of Public Health*. 94:448-452.

Field, T, Diego, M, Sanders, C. (2001). Exercise is positively related to adolescents' relationships and academics. *Adolescence*. 36:105-110.

Health and Physical Education Council (2005). Reaction to daily physical activity initiative in Alberta schools: Creating a desire to participate. *Runner*, 41(3): 23-26.

Heart and Stroke Foundation. (2008). Schools and physical activity. Retrieved March 2008 from www.heartandstroke.ca.

Lindner K. (2002). The physical activity participation-academic performance relationship revisited: perceived and actual performance and the effect of banding (academic tracking). *Ped Exerc Sci*. 14:1839-1850.

Macdonald, H, Kontulainen, S, Khan, K, McKay, H. (2007). Is a school-based physical activity intervention effective for increasing tibial bone strength in boys and girls? *J Bone Miner Res*. 22:434-446.

Naylor, P, Macdonald, H, Warburton, D, Reed, K, McKay, H. (2008). An active school model to promote physical activity in elementary schools: Action schools! BC. *Br J Sports Med.* 42:338-343.

Naylor, P, Macdonald, H, Zebedee, J, Reed, K, McKay, H. (2006). Lessons learned from Action Schools! BC– an 'active school' model to promote physical activity in elementary schools. *J Sports Sci Med*. 9:413-423.

Naylor, P, McKay, H. (2009). Prevention in the first place: Schools: a setting for action on physical inactivity. *Br J Sports Med*. 43:10-13.

Ontario Physical and Health Education Association. (2006). Daily physical activity in schools: a guide for school boards. *Ontario Ministry of Education*. Retrieved February 2008 from http://www.edu.gov.on.ca/eng/teachers/dpa_boards.pdf.

Podsakoff, P, Organ, D. (1986). Self reports in organizational research: Problems and prospects. *Journal of Management*. 12(4); 531-544.

Reed, K, Warburton, D, Macdonald, H, Naylor, P, McKay, H. (2008). Action Schools! BC: a school-based physical activity intervention designed to decrease cardiovascular disease risk factors in children. *Prev Med*. 46:525-531.

Robinson, D, Melnychuk, N. (2008). Discourse, teacher identity, and the implementation of Daily Physical Activity. *The Alberta Journal of Educational Research* 54(3): 245-257.

Trudeau, F, Shephard, R. (2008). Physical education, school physical activity, school sports and academic performance. *Int J Behav Nutr Phys Act*. 5:10.

Chapter 5

5.0

The Daily Physical Activity program in Ontario Elementary Schools: Perceptions of students in grades 4-8[4]

5.1 Introduction

In light of the recent changes to the physical activity guidelines for children and youth as well as the new guidelines on sedentary behaviour, it is important to address the quality and frequency of the physical activity (PA) that Canadian children are receiving. The guidelines for physical activity recommend that children achieve a minimum of 60 minutes of moderate to vigorous PA every day in order to achieve optimal health and development (Tremblay et al., 2011a). Furthermore, the guidelines for sedentary activity recommend that children accumulate less than two hours of screen time each day, including television and computers (Tremblay et al., 2011b). Because children spend as much as 6-7 hours a day in school, schools should accept responsibility for a portion of this requirement for physical activity. However, the trend in elementary physical education (PE) over the last two decades has been to eliminate daily PE classes as well as physical and health education specialists within the elementary schools (Active Healthy

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Kids, 2009). This places the burden of physical education on the shoulders of the homeroom teachers who may or may not have any experience or knowledge for teaching this subject.

In a recent study (Leitch, 2007), Canadian children were ranked poorly relative to children in other developed countries. To a large extent, this can be attributed to the lack of physical activity and the increase in sedentary behaviors among young Canadian children (Tremblay, 2010). It is not uncommon for children to wake up, be driven to school, sit in school with no structured physical activity, be driven home, and then spend several hours in front of a screen (computer, games, television). While it is a parental responsibility to ensure adequate PA during non-school hours, schools need to take responsibility for their contribution to the amount and quality of total daily PA.

Using body mass index as an indicator of the state of health, one quarter of Canadian children are considered to be overweight or obese (Active Healthy Kids, 2010). These conditions are associated with a variety of co-morbidities, including diabetes, depression and heart disease. In part, the high rate of overweight and obesity can be attributed to sedentary lifestyles and poor nutritional habits. Through the health and physical education component of the curriculum, schools play a significant role in the development of healthy behaviors in children. Children should be taught at a young age to recognize that being active is very important to their health. The school system is an ideal environment for the implementation of interventions designed to improve the amount and quality of children's PA (Naylor & McKay, 2009) and to nurture an understanding of the importance of physical activity in maintaining health. Physical

activity has been shown to improve student performance in memory, observation, decision making, problem solving as well as improved behavior and creativity (Keays & Allison, 1995). A properly designed PA intervention could reach every school child in a cost effective manner (Veugelers & Fitzgerald, 2005).

Children develop their health behaviors though exposure to their peers, teachers and families. It is reasonable to hypothesize that if children are exposed to an environment in the school setting where physical education and PA are not seen as important, they may grow up adopting similar attitudes. When physical education is not a daily subject, and is taught by non-specialists, students are not exposed to the benefits of a properly run physical education class. Physical education taught by a non-specialist is likely to be less effective in delivering developmentally appropriate PA in an inclusive and meaningful environment (Active Healthy Kids, 2009). Furthermore, research has indicated that school-based physical activity interventions are capable of improving the delivery of PA in schools as well as increasing the PA levels of the students (Naylor, Macdonald, Warburton, Reed & McKay, 2008; Naylor, Macdonald, Zebedee, Reed & McKay, 2006). Specifically, Action Schools! BC was a successful school-based PA program that was successful at increasing the PA levels of students, improving cardiovascular health and increasing bone strength in students (Reed, Warburton, Macdonald, Naylor & McKay, 2008; Macdonald, Kontulainen, Khan & McKay 2007). This program demonstrates that school-based interventions are a worthy endeavor and should be utilized across the country.

The Ontario Daily Physical Activity (DPA) program was announced by the Premier in 2005. It mandated that all children in the province's elementary school system receive at least 20 minutes of moderate to vigorous physical activity every day (Ontario Physical and Health Education Association, 2006). The DPA program requirements are met on days when physical education is taught; however on other days, homeroom teachers are required to engage their students in 20 minutes of PA in order to fulfill the requirement. The DPA program mandates that activities be sufficient to raise heart rate to a moderate or vigorous level and that there is enough variety to ensure that the activities are enjoyable and motivating. The Ministry of Education suggest activities such as sports like soccer, jogging, dance and active games such as "skip to it" and a variety of tag games.

Daily Physical Activity programs have been adopted by Alberta, Ontario and, recently, British Columbia (Ontario Physical and Health Association, 2006; Alberta Education, 2008; British Columbia Ministry of Education, 2011). The DPA program and similar school-based PA interventions have come under scrutiny regarding their design and effectiveness. The most noted barrier to DPA delivery and success is the competing demands of the academic curricula and the lack of time to fit DPA into the school day (Patton, Overend, Miller & Mandich, 2012). Principals in British Columbia identified the strict curriculum and the academic demands of the other school subjects as the major barrier to physical activity program delivery (Naylor, Macdonald, Zebedee, Reed & McKay, 2006). Another significant barrier to proper PE delivery was noted by Toronto teachers who stated that it was the low priority placed on physical education in the

school system that hindered programs directed at PA (Dwyer et al., 2003). In Alberta there is significant resistance to the implementation of the DPA program specifically. This resistance is due to the many issues that need to be addressed in the design and requirements of DPA before it is delivered with full cooperation and optimal efforts (Health and Physical Education Council, 2005). Of particular note is the unrealistic assumption that any teacher is capable of delivering a physical activity program (Robinson & Melnychuk, 2008). This, along with the competing demands on time, caused the Alberta Teachers' Association to recommend that DPA implementation be halted until the current flaws have been addressed. They noted that many educators were ignoring, misinterpreting, or simplifying the implementation of the DPA program (Health and Physical Education Council, 2005). While DPA has been mandated with the right intentions, the clear resistance to this program and similar interventions is an indication that the program design might be flawed and in need of some attention.

The effectiveness of the DPA program has yet to be formally evaluated. In order to fully understand the factors associated with the success of the program, or lack thereof, a controlled approach to assessment needs to be utilized. Patton et al. (2012) assessed the Ontario DPA program from the teachers' perspective. Teachers reported that time was the most important barrier to implementing the DPA program optimally. They felt that DPA interfered with the more academic curricular demands. Although the teachers felt that they were competent in their abilities to administer a PA program, many lacked specific knowledge of what was expected of the DPA program. Furthermore, a large portion (65%) of teachers noted that school administrators paid

little attention to DPA program delivery and that there were minimal feedback checks in place to ensure that the program was actually being delivered as mandated.

In any intervention it is important for program success to include the target population in the design and delivery of the intervention. This is especially true for children; they know what they enjoy and are capable of expressing this. The input of children, in addition to the input of teachers, could be valuable in evaluating the DPA program and also be useful in prescribing recommendations to improve the program delivery. To date, students have not been involved in program evaluation of DPA. Consequently, the purpose of this study was to investigate the student's perspectives of Ontario's DPA program in a municipal school board, the Thames Valley District School Board (TVDSB).

5.2 Methods

A random sample of 25 schools was selected from within the TVDSB with the aid of the Board's Research Officer. From each of the 25 schools, a grade was selected in a random format until the sample included five representative schools for each grade from 4 through 8. From that list, a single class from that grade was randomly selected from each school (if there was more than one class for that grade in the school). Each student in the selected classes was sent home with a questionnaire package to be completed with the assistance of his or her parent(s). Questionnaires were filled out and returned to the teacher in a sealed envelope and then picked up at the school by the researcher. The questionnaires consisted of 32 items about a variety of topics including

how DPA was performed in class (Table 1) and the student's attitudes toward the program (Table 2). Responses were made using a 5-point scale: "Yes, I strongly agree" (1), "I agree" (2), "I do not know" (3), "I disagree" (4) and "No, I strongly disagree" (5). The questionnaires were distributed by the class teacher and sent home with the students to complete with the assistance of their parents.

Data were entered into a spreadsheet and all analyses were conducted using the statistical program (SPSS v.19). Descriptive statistics, including means and frequencies were calculated for item responses. Student responses were divided into the two grade groupings used by the school board, intermediate (grades 4-6) and senior, (grades 7&8), allowing for comparison between groups. This study was approved by the Non-Medical Research Ethics Board at Western University (ref. 17093S). Each participant and his or her parent provided informed consent.

5.3 Results

The questionnaire was sent to 513 students; 146 were returned for a response rate of 28%. Of the 146 responses, 31.5% (n=46) came from grade 4 students, 19.9% (n=29) were from grade 5 students, 34.9 % (n=51) were grade 6 students, 11 % (n=16) were grade 7 students, and 2.7 % (n=4) were from grade 8 students. Female students comprised 53% (n=78) of the total respondents. A majority (56%) of students responded that they received 2.5 gym classes a week (or 5 in a 10 day cycle); however some students reported as little as 2 gym classes per week (24%). Based on the frequency of gym classes, DPA is required 2-3 days of each school week.

When questioned about how the DPA sessions are run in their own class (Table 1), 46% of the students responded that they received DPA every day that there was not a gym class, while 37% said they did not. A majority (55%) reported that their teacher participated in DPA activities with them, while 34% stated the teacher did not participate. Similarly, over half of the respondents reported that they believe their teacher enjoys DPA (56%).

When questioned about the intensity of the physical activity in their DPA sessions, more than half of the students felt that DPA activities were sufficient to meet the mandated provincial requirements. For example, when asked if they felt they "work hard" during DPA, 54% of the respondents reported that they did in fact work hard, while 30% disagreed. Furthermore, 63% of the participants claimed that DPA was active enough to get the heart pumping, while only 22% did not. Finally, 64% of the students felt that they "burned off some energy" during DPA, while 19% disagreed.

In regard to barriers to DPA delivery in their classroom, the students identified some key obstacles. For example, 69% of the students reported that they had disruptive peers in their class who made it difficult for the teacher to perform DPA, while only 17% did not view this as a barrier. Furthermore, 62% of the participants claimed that if students were acting up in class, the teacher would punish the class by not performing the DPA requirements. Students did not identify equipment or space restrictions as barriers; 68% claimed that they had enough space to perform DPA on a daily basis and 66% reported having enough equipment.

When the survey shifted focus onto the attitudes of the students towards the DPA program (Table 2), several key findings were identified. The respondents of the survey seemed to be moderately health conscious as 76% of the students reported that DPA has helped them become healthier and 79% believe that living an active lifestyle is important to their success in the classroom. A large majority of the students (74%) disagreed when asked if they felt DPA took valuable time away from other important subjects. Moreover, 67% of the participants believe that there is enough time in the school day to have a DPA class every day.

In regard to the general student perceptions of the program, it seems that the participants of this survey tended to have a favorable outlook on the DPA program in their class environment. When asked if they get 'bored' with their DPA classes, 64% of the students disagreed. Additionally, 70% of the respondents reported that they enjoy DPA and that DPA has lots of activities that are fun to do. Finally, 72% of the students felt that their peers also enjoyed DPA.

While the response rate was heavily weighted toward the intermediate age group (grades 4-6), with 86% of responses representing this population and only 14% of total responses coming from the senior grades (7&8), there are some noticeable differences in group answers to the questionnaire (see Table 3). For example, how the students perceive their teachers' involvement in DPA varies between groups. Only 30% of senior students think their teacher enjoys DPA, compared to 60% of the intermediate students. Additionally, 90% of senior students claimed that teachers would withhold DPA sessions if the class was acting up, compared to 58% in the intermediate group.

Furthermore, almost 70% of the intermediate students believe that DPA is important in their school, while only 45% of the seniors were in agreement.

The comparison of the age groups also highlights a key difference in the perception of intensity and usefulness of the DPA program. When asked if they felt like they worked hard during DPA, 60% of the intermediates said that they did, while only 20% of the seniors agreed. Moreover, only 40% of seniors reported burning off energy during DPA, compared to 68% of intermediates and 45% of seniors claimed that DPA got their heart pumping compared to 65% of intermediates.

There seems to be a difference in the attitudes towards the DPA program between the intermediate and senior age groups. When asked if the DPA program had a variety of activities that were fun to do, 75% of the intermediates said that it did, while only 45% of the seniors were in agreement. In addition, 35% of the senior students claimed that they get bored with DPA, compared to 22% of intermediates. Of particular note is that nearly 60% of intermediate students claim that their participation in DPA has helped increase their PA outside of school while only 20% of seniors responded in the same manner.

5.4 Discussion

The results of the survey reveal several positive and encouraging findings, as well as several findings that raise concerns. Overall, it is encouraging that intermediate and senior students tend to enjoy DPA and feel that the activity level is substantial enough to

get the heart pumping and to burn off energy. Students value the DPA and do not see it as distracting from the academic curriculum. They also tend to feel that there is adequate space and equipment to support DPA. Although overall students look favorably upon the DPA program, intermediate students tend to view it somewhat more favorably than senior students. This is perhaps due to the activities and space not being appropriate for older children. It would be difficult to get a class of 30 grade 8's moving vigorously inside a classroom with desks. The apparent difference between intermediate and senior children may be a reflection of the attitudes of their teachers. If teachers devalue the program, it is possible that the students will adopt a similar outlook.

Despite students' positive perceptions there is reason for concern with respect to some aspects the delivery of DPA. There is a tendency for DPA to be under-delivered; DPA is not provided as frequently as it should be. Students report that the teacher often does not participate in DPA and frequently does not appear to enjoy DPA. It is also a concern that students report that delivery of DPA is often negatively impacted by disruptive students and that teachers sometimes withhold DPA as "punishment" for inappropriate behavior in the classroom.

There appear to be some gaps in the delivery of DPA. Roughly half (46%) of the students indicated that they receive DPA sessions every day that they do not get a gym class. This identifies a substantial lack of program participation on the part of the teachers. Furthermore, only 55% of the students indicated that their teacher participated in the activities with them. Children are more likely to participate if they

have a good model to follow. If a higher percentage of teachers were willing to be positive role-models and get active with the children, it is likely that there would be increased buy-in and participation on the students' part. If we are going to condition students into believing that physical activity is an integral component of a healthy lifestyle, we need the teachers to be champions, leading the way by being active and making sure the students believe that physical activity is an important part of school. Just over half of the students (56%) believed that their teacher enjoys DPA. This could indicate that a many of the teachers do not enjoy the program and have broadcast those attitudes onto the students. Children are very receptive and we should take every opportunity to press upon them the importance of physical activity and how enjoyable it can be.

One concern with the DPA program being delivered on an individualized classroom basis that varies greatly from one teacher to another is that the activities introduced to the children may not meet the provincial mandates for intensity. For example, 63% of the students reported that they worked hard enough in DPA to get the heart pumping and 64% reported that they burned off some energy in DPA. This indicates that, while a good portion of the children are moving at an appropriate intensity, there is still a large group of children who are not meeting the expected level of activity. This variance in program intensity needs to be addressed. Perhaps it would be appropriate to create a more formalized curriculum of activities that would meet the requirements. It is also vital to address the age appropriateness of the activities. As indicated by the respondents, the intermediate grade students reported significantly

higher levels of perceived intensity than did the senior grade students. In such a broad scale program that encompasses all elementary school children, it is imperative to ensure that the activities are going to provide the required intensity across all grades. This means that DPA activities need to be specially designed for each grade or, at minimum, each of the 3 grade divisions (junior, intermediate and senior). The PA needs of a grade 7 or 8 student vary greatly from those of a grade 2 student and identifying these needs on a grade by grade basis would allow for increased effectiveness of the program.

One of the main barriers identified by the teachers involved in the program is the time required for DPA (Patton et al., 2012). Teachers felt that DPA took away valuable time from other academic classes and that there often was not enough time in the day to fit DPA in. Students, however, see this differently. In fact, 74% of the students disagreed when asked if DPA took away time from other classes. A majority of students also acknowledged that there is sufficient time in the school day to accommodate DPA daily. It is no surprise that students would be in favour of these activity breaks; it is, however, noteworthy that the student perceptions are congruent with the reality of the time allotment in the curriculum. Health and physical education is allotted 10% of education time. If students were to receive 2 or even 3 thirty minute gym classes per week, they would fall far short of the time allotment for health and physical education. The DPA program helps make up this short-fall and does not encroach on other academic subjects in terms of the expected allocation of time in the school curriculum. Furthermore, research indicates that increasing physical activity by redirecting a larger

amount of educational time to PE did not negatively affect the academic performance of the students (Ahamed et al., 2007). In fact studies suggest the opposite, that an increase in PA will in fact benefit academic performance (Field, Diego, Sanders, 2001; Lindner, 2002; Trudeau, Shephard, 2008).

The barrier that students identified the most was the presence of disruptive behavior in the class either as a whole or by individual peers. Sixty-two percent of students indicated that their teacher would not provide DPA if the class had been acting up. This is accentuated in the senior grades, as 90% of the respondents in this category indicated that DPA was withheld as a punishment for poor behavior. This finding indicates that teachers may need assistance in dealing with behavior issues. Participation in PA is associated with fewer behavior issues, thus one would think that withholding such a beneficial program would not be the answer. Furthermore, DPA was mandated by the provincial government. The program is not a privilege that can be taken away; rather it is an expectation of every student. Teachers would not eliminate other subjects in a school day as a punishment for student behavior; it is worth considering why is DPA is viewed differently by teachers. It is apparent that professional development for educators should focus on providing teachers with appropriate methods of dealing with unwanted behavior while still delivering the mandated curriculum in its entirety.

5.5 Limitations of the study

Although this study does identify some important findings, there are some limitations to take into consideration. The method of self-report itself has an inherent limitation due to the possibility for responses to be influenced by social desirability bias (Podsakoff, Organ, 1986). Also of note is the relatively low response rate (28%), especially in the senior grades, with only 14% of responses coming from grades 7 and 8. Students may have declined to participate due to their existing views on the DPA program. It is possible that senior students look much less favorably on the DPA program than their younger peers and thus were not interested in a questionnaire about DPA. Furthermore, the particular school board is in close proximity to a major research facility (Western University), and tends to receive frequent requests for research participation. The development of this study included a design that would be minimally invasive for the schools and teachers, thereby reducing the chances that the questionnaire would not reach the students because a school or teacher did not want to be disrupted. However, completion of the survey at home, rather than in-class, increased the likelihood that forgotten and lost questionnaire packages would not make it back to the teacher. Additionally, some students may not be aware of what DPA is because their teacher may not perform it, or the teacher may not call it DPA in class.

5.6 Conclusion

Implementation of the DPA program is a well-intentioned step in the right direction when it comes to improving and addressing the long term health of our children. However, there is opportunity to improve the DPA program. Both the students and the teachers involved in the program have acknowledged that DPA is not being run across

the school board according to the mandated guidelines (Patton et al., 2012). Many students are not active enough for a long enough period of time to gain the optimal benefits. Many teachers are simplifying or even ignoring the program altogether. It is important to address these issues in order for the children to benefit properly from such a program.

While the school is an optimal location to deliver a wide-spread physical activity intervention, the DPA program specifically has some issues that need attention in order to ensure success of the program. Educators need to be equipped with the tools that would allow them to appropriately deal with student behavior while still performing all of the educational tasks of the day. This starts with a shift in view of DPA as privilege to a daily requirement of every student. Educators need to place equal value on the physical development of their students as they do the academic development.

In the absence of a daily physical education class instructed by a qualified professional, the use of the DPA program needs to be improved across the school board in order to provide the students with the foundation for healthy development. Educators need to be taught a variety of activity ideas that would be age appropriate and would meet the provincial mandates for intensity. Furthermore, having DPA scheduled into the school day, rather than being left to the discretion of the teacher to fit in, would go a long way in reinforcing the importance of the program and increase participation.

The children tend to be positive and supportive of the program. It would be valuable to include the feedback of children in the development of any changes to DPA or the development of any new interventions directed at physical activity. Perhaps a method to increase the participation and buy-in from the senior grade students would be to allow for increased leadership opportunities in DPA. Creating a peer-to-peer mentorship program within DPA where the senior students are taught activities and are then paired with students in the younger grades where they lead and mentor the young students through the activities could prove to be beneficial.

5.7 Table 1: Student questionnaire results: How DPA is run in the classroom grades 4-8 (N=146)

Question	Yes, I Strongly Agree (1)	I agree (2)	I do not know (3)	I disagree (4)	No, I strongly disagree (5)
My class does DPA every day when I do not have gym	17%	29%	17%	26%	11%
My teacher does DPA exercises with us	39%	17%	10%	25%	9%
My teacher enjoys DPA	38%	18%	19%	9%	16%
When we do DPA I feel like we work hard	27%	27%	16%	16%	14%
I feel like I burn off some energy when we do DPA	29%	35%	17%	14%	5%
In DPA we exercise enough to get the heart pumping	39%	24%	15%	16%	6%
In our DPA class we are active for at least 20 minutes	27%	32%	21%	10%	10%

My teacher is good at introducing new games and activities	42%	24%	12%	10%	12%
My teacher makes sure that everyone is able to do the DPA activities	40%	26%	26%	5%	3%
DPA has taught me new games and activities I can play with my friends	40%	31%	11%	11%	7%
In our class DPA changes activities on a regular basis	13%	28%	33%	18%	8%
We have students who make it hard for the teacher to do DPA because they are disruptive	34%	35%	14%	7%	10%
We have enough equipment to do DPA everyday	40%	26%	20%	8%	6%
If we are acting up as a class our teacher will not do DPA	35%	27%	21%	10%	7%
We only do DPA in our classroom	10%	3%	13%	13%	61%
I feel we have enough space to do DPA	39%	29%	12%	10%	10%

5.8 Table 2: Student questionnaire responses: Student attitudes towards the DPA program grades 4-8 (N=146)

Question	*Yes, I strongly agree (1)*	*I agree (2)*	*I do not know (3)*	*I disagree (4)*	*No, I strongly disagree (5)*
I get bored with DPA class	12%	12%	12%	16%	48%
I think DPA gets in the way of other important subjects	7%	7%	12%	30%	44%
I believe being active and exercising is important to learning in the classroom	47%	32%	15%	3%	3%
My participation in DPA has helped me be more active outside of school	31%	22%	25%	16%	6%
I enjoy activities we do in DPA	45%	25%	12%	13%	5%
I think DPA has lots of activities that are fun to do	48%	23%	9%	14%	6%

I think we need DPA everyday	50%	17%	10%	16%	7%
I think if we did DPA every day I would do better in other classes	26%	19%	19%	25%	11%
I make sure that I am active as much as possible	48%	38%	9%	4%	1%
My teacher makes us feel like physical activity is an important part of school	40%	29%	9%	16%	6%
In our school DPA is important	36%	30%	11%	16%	7%
I feel safe doing DPA	45%	21%	18%	8%	8%
I think DPA class helps me be more healthy	60%	16%	16%	3%	5%
I think most of the students in the class like DPA	38%	34%	21%	3%	4%
I think there is enough time in the school day to have DPA everyday	42%	25%	14%	12%	7%
I think that DPA is a good break during the school Day	49%	33%	9%	3%	6%

5.9 Table 3: Student questionnaire responses: Differences between the Intermediate (grade 4-6, N=126) and Senior (grade 7&8, N=20) students

Question	*Yes, I strongly agree (1) or I agree (2)*		*I do not know (3)*		*I disagree (4) or No, I strongly disagree (5)*	
	I	S	I	S	I	S
My teacher does DPA exercises with us	48%	40%	11%	5%	31%	55%
I think my teacher enjoys DPA	60%	30%	21%	10%	19%	60%
I get bored with DPA	22%	35%	12%	15%	66%	50%
My participation in DPA has helped me be more active outside of school	58%	20%	26%	15%	16%	56%
I enjoy the activities we do in DPA	73%	50%	14%	0%	13%	50%
I think DPA has lots of activities	75%	45%	7%	20%	18%	35%

that are fun to do						
When we do DPA I feel like we work hard	60%	20%	15%	20%	25%	60%
I feel like we burn off some energy when we do DPA	68%	40%	20%	0%	12%	60%
I think we need DPA every day	71%	40%	9%	15%	20%	45%
In DPA we exercise enough to get the heart pumping	65%	45%	16%	10%	19%	45%
In our school DPA is important	69%	45%	11%	10%	20%	45%
I feel we have enough space to do DPA	74%	35%	13%	5%	13%	60%
I think DPA helps me be more healthy	80%	45%	17%	15%	3%	40%
If we act up as a class our teacher will not do DPA	58%	90%	24%	5%	18%	5%
My class does DPA every day that I do not have Gym class	45%	55%	19%	5%	36%	45%
I think DPA gets in the way of	14%	15%	14%	5%	72%	80%

other important subjects						
I believe being active and exercising is important to my learning in the classroom	78%	80%	16%	10%	6%	10%
I think if we did DPA every day I would do better in other classes	47%	35%	20%	10%	33%	55%
In our DPA class we are active for at least 20 minutes	62%	45%	20%	20%	18%	35%
My teacher is good at introducing new games and activities	68%	55%	10%	25%	22%	20%
My teacher makes sure that everyone is able to do the activities in DPA	65%	75%	27%	20%	8%	5%
I make sure that I am as active as possible	86%	90%	9%	5%	5%	5%
My teacher makes us feel like physical activity is an important part of school	71%	55%	9%	10%	20%	35%

DPA has taught me new games and activities that I can play with my friends	73%	60%	12%	5%	15%	35%
In our class DPA changes activities on a regular basis	44%	45%	34%	0%	22%	55%
I feel safe doing DPA activities	65%	70%	17%	25%	18%	5%
I think most of the students in my class like DPA	74%	60%	18%	35%	8%	5%
We have students in our class who make it difficult to do DPA because they are disruptive	67%	80%	16%	5%	17%	15%
We have enough equipment to do DPA	66%	70%	21%	20%	13%	10%
If we are acting up as a class our teacher will not do DPA	68%	55%	16%	5%	16%	40%
I think DPA is a good break during the day	81%	90%	10%	0%	9%	10%
We only do DPA in our classroom	14%	5%	11%	25%	75%	70%

I = Intermediate (grades 4-6); S = Senior (grades 7&8)

5.10 References

Active Healthy Kids Canada. (2009). Report card on physical activity for children and youth. Retrieved July, 2009 from http://www.activehealthykids.ca/ecms.ashx/ReportCard2009/AHKC-Longform_WEB_FINAL.pdf.

Active Healthy Kids Canada. (2010). Healthy Habits Start Earlier Than You Think: The Active Healthy Kids Canada report card on physical activity for children and youth. Toronto, ON.

Ahamed, Y, Macdonald, H, Reed, K, Naylor, P, Liu-Ambrose, T, McKay, H. (2007). School-based physical activity does not compromise children's academic performance. *Med Sci Sports Exerc*. 39:371-376.

Alberta Education. (2008). Daily Physical Activity Survey Report. *Alberta Education – Accountability and Reporting Division.* http://education.alberta.ca/teachers/resources/dpa.aspx.

Dwyer, J, Allison, K, Barrera, M, Hansen, B, Goldenberg, E, Boutiller, M. (2003). Teachers' perspective on barriers to implementing physical activity curriculum guidelines for school children in Toronto. *Canadian Journal of Public Health*. 94:448-452.

Field, T, Diego, M, Sanders, C. (2001). Exercise is positively related to adolescents' relationships and academics. *Adolescence*. 36:105-110.

Health and Physical Education Council (2005). Reaction to daily physical activity initiative in Alberta schools: Creating a desire to participate. *Runner*, 41(3): 23-26.

Keays, J, Allison, K. (1995). The Effects of Regular Moderate to Vigorous Physical Activity on Student Outcomes: A Review. *Canadian Journal of Public Health* 86(1):62-5

Leich, K. (2007). Reaching For The Top. A report by the advisor on healthy children and youth. Health Canada.

Lindner K. (2002). The physical activity participation-academic performance relationship revisited: perceived and actual performance and the effect of banding (academic tracking). *Ped Exerc Sci*. 14:1839-1850.

Macdonald, H, Kontulainen, S, Khan, K, McKay, H. (2007). Is a school-based physical activity intervention effective for increasing tibial bone strength in boys and girls? *J Bone Miner Res*. 22:434-446.

Naylor, P, Macdonald, H, Warburton, D, Reed, K, McKay, H. (2008). An active school model to promote physical activity in elementary schools: Action schools! BC. *Br J Sports Med.* 42:338-343.

Naylor, P, Macdonald, H, Zebedee, J, Reed, K, McKay, H. (2006). Lessons learned from Action Schools! BC– an 'active school' model to promote physical activity in elementary schools. *J Sports Sci Med*. 9:413-423.

Naylor, P, McKay, H. (2009). Prevention in the first place: Schools: a setting for action on physical inactivity. *Br J Sports Med*. 43:10-13.

Ontario Physical and Health Education Association. (2006). Daily physical activity in schools: a guide for school boards. *Ontario Ministry of Education*. Retrieved February 2008 from http://www.edu.gov.on.ca/eng/teachers/dpa_boards.pdf.

Patton, I, Overend, T, Miller, L, Mandich, A. (2012). Teachers' Perspectives of the Daily Physical Activity program in Ontario. *Physical and Health Education*. Spring issue, in press

Podsakoff, P, Organ, D. (1986). Self reports in organizational research: Problems and prospects. *Journal of Management*. 12(4); 531-544.

Reed, K, Warburton, D, Macdonald, H, Naylor, P, McKay, H. (2008). Action Schools! BC: a school-based physical activity intervention designed to decrease cardiovascular disease risk factors in children. *Prev Med*. 46:525-531.

Robinson, D, Melnychuk, N. (2008). Discourse, teacher identity, and the

implementation of Daily Physical Activity. *The Alberta Journal of Educational Research* 54(3): 245-257.

Tremblay, M. S., Shields, M., Laviolette, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010b). Fitness of Canadian children and youth: Results from the 2007-2009 Canadian Health Measures Survey. Health Reports, 21(1), 7-20.

Trudeau, F, Shephard, R. (2008). Physical education, school physical activity, school sports and academic performance. *Int J Behav Nutr Phys Act*. 5:10.

Veugelers, P, Fitzgerald, A. (2005). Effectiveness of School Programs in Preventing Childhood Obesity: A Multilevel Comparison. *American Journal of Public Health* 95(3):432-5.

Chapter 6

6. Summary, Implications and Future Directions

6.1 Summary

This dissertation has presented three interrelated studies that have addressed the need for an evaluation for the Daily Physical Activity (DPA) program currently in use in Ontario elementary schools. The first and study was designed to objectively measure the physical activity of children involved in the DPA program. School-day physical activity was measured using Actical Accelerometers on four school days. During three of the school days sampled, students were provided with their normal DPA class; on the fourth day sampled, there was no gym class and the teacher abstained from delivering the DPA class in order to provide a control day for comparison. Two collections of the same Grade 5&6 class took place allowing for a repeated measures analysis. The first collection period had 23 participants and took place at the beginning of February. The second collection took place in March and there were 12 participants who were also involved in the first collection.

The results of Study 3 showed that students involved in DPA classes were not receiving anywhere near the mandated levels of physical activity during the program. Students averaged only three minutes of moderate to vigorous physical activity in the 20 minute DPA classes during the first collection. In fact, more than ten minutes of the DPA sessions were spent in sedentary activity. This means that the activities used during the DPA class are not sufficient to reach the desired level of activity. Furthermore, when

compared to the control day with no gym class and no DPA, there was no significant difference in the total daily physical activity of the children. Therefore, in its current form, Daily Physical Activity has minimal benefit to children in regard to physical activity levels.

The second collection provided further evidence that DPA sessions have very little effect on the total daily physical activity levels of the children. However, when comparing the two time periods against each other, the second collection provided evidence of a significant effect of weather on the physical activity levels of students. The week in March that the second collection took place was unusually warm and had record breaking temperatures. The students were able to utilize the outdoor space for all recess and DPA sessions. The number of moderate to vigorous physical activity minutes during the DPA class rose to seven. Furthermore the recess physical activity minutes increased significantly. The effect of the weather and the ability to utilize outdoor space had a significant effect on children's physical activity behaviors. This suggests that there needs to be effort placed on maximizing the usage of outdoor space. Teachers should be provided with instruction on activities that can be done outside in a variety of weather conditions. Furthermore, teachers need to be able to provide sufficient activity opportunities when weather does not permit going outside.

Study 2 consisted of a self-report questionnaire directed at the teachers involved in program delivery (Patton, Overend, Mandich & Miller, 2012). Teachers from Kindergarten to Grade 8 in the Thames Valley District School Board in South-Western Ontario were invited to complete a questionnaire that covered three topic areas. The

first section addressed the DPA delivery in each teacher's specific class. The second section identified supports and barriers to DPA delivery, and the third section was directed at the teacher's attitudes and perceptions of the DPA program. One hundred and forty-five questionnaires were returned (response rate 23%). Teacher's identified time as the single most important barrier to DPA delivery in their class. Teachers reported often not having enough time to plan or implement the DPA requirements.

While teachers felt they had a sufficient amount of base knowledge of physical activity to be comfortable delivering a specialized physical activity program for children, few reported having specific knowledge of what the provincial mandates are for the DPA program and, consequently, were unaware of what is required of them. Furthermore, many teachers felt that to include DPA into their schedule resulted in valuable time being taken away from other subjects, such as math, science, and language. This represents an important misconception as DPA time allotment falls under the Health and Physical Education share of educational time. Therefore, when teachers fail to deliver the DPA program, as they often do, they are in fact taking time away from Health and Physical Education and directing it towards other subjects.

Study 3 consisted of an investigation of the perceptions of the students and how they view the DPA program (Patton, Overend, Mandich & Miller, 2012b – in review). Students were asked how DPA is performed in their class. They were also asked about what they felt were the supports and barriers of program delivery, as well as how they felt about the DPA program. Students within the Thames Valley District School Board from Grades 4-8 were provided with questionnaire packages and instructed to complete

with the assistance of their parents. One hundred and forty-eight participants returned questionnaires. Students confirmed that many teachers failed to perform DPA on all days that gym was not in the schedule. However, students tended to look more favorably on DPA than did the teachers in Study 1.

The children feel that time is not a barrier to program delivery and they believe that participation in DPA does not take valuable time away from other subjects. The students did not feel that lack of space and equipment were significant barriers to the delivery of DPA. Overall, students enjoy DPA and report that they believe it should be a permanent component of the school curriculum. It is clear, however, that there is a lack of variety and a significant lack of perceived intensity in regard to the activities performed. This suggests that the activity choices of the teachers are not sufficient to meet the program mandates and that the teachers are unable to create fun new activities on a regular basis to keep the children engaged.

6.2 Implications

Each of the studies has some limitations in regard to the sample size and the generalizability of the results; however, as a whole, this body of work has some significant implications worth noting. There is an abundance of research that has addressed the severe lack of physical activity in the Canadian population and specifically in Canadian children. This project confirms that this lack of physical activity is also evident within the school systems. With all the known physical, social and academic benefits of increased physical activity, it is surprising that more is not being done to

remedy this problem. The school system provides an excellent point of intervention in which virtually every student can be reached in a relatively cost effective manner.

The first and perhaps most significant implication of this body of work is that the Daily Physical Activity program is not being run as mandated by the provincial government. Both teachers and students confirm that DPA is treated as an optional component of the school-day. Teachers often ignore or forget to include DPA in the daily schedule. This lack of compliance needs to be addressed, perhaps through scheduling DPA into the school schedule rather than leaving it to the discretion of the teacher to deliver the program when they see fit. DPA should have its own time slot just like any other gym, math, or language class. This would eliminate the ability for the teacher to use the DPA time discretionally.

Secondly, the results indicate that both teachers and students report that when DPA is included in the school-day, the activities performed do not provide students with adequate time being physically active or at a sufficient level of intensity. This is confirmed by the accelerometer data of the third study. During the DPA sessions, students are spending much of the time being sedentary. Students are only achieving a few minutes of moderate to vigorous level physical activity during DPA. This indicates that even when DPA is performed, the time is being poorly utilized. Teachers seem to have difficulty keeping the class actively engaged in physical activity for a sustained period of time. This could suggest that most teachers are not adequately equipped to deliver a specialized physical activity program. It may be beneficial to develop an age appropriate curriculum of activities that would meet the program mandates.

A third implication of this body of work is the significant effect that weather plays in determining the level of physical activity of students during the school day. When it was warm and students were able to utilize outdoor space, physical activity levels were significantly higher than when the weather was not as conducive to outdoor activity. This indicates that programs need to be in place that would help teachers get students outdoors to be active as much as possible. Activity instructions that would allow teachers to get children outside in a variety of weather conditions, including the cold winter weather, could go a long way to increase activity levels.

A fourth implication of this project is the clear evidence that boys are more active than girls. The total school day physical activity levels of boys were significantly higher than those of girls. It is, however, interesting to note that the physical activity levels were equal between the sexes during the 20 minute DPA sessions. This indicates that DPA activities have the same effect on both boys and girls. This could simply be due to the fact that there was very little intensity seen throughout the DPA class and therefore not enough to allow the differences to emerge. This indicates that the physical activity differences between boys and girls emerge during recess time when the children have control over their activity levels. It would be beneficial to introduce programs to increase the physical activity of the girls during their recess time, thereby reducing the difference between the sexes. Introducing games or activities that are appealing to the girls or organizing games that would increase inclusion and promote participation should be a focal point of any school-based physical activity intervention.

Finally, the results of this project indicate that the inclusion of DPA has very little effect on the school day physical activity levels of children. If teachers are not comfortable or capable of delivering DPA as intended, it may be more beneficial to simply include another recess period for the students. During the school-day, the most significant physical activity came from free play during the recess periods. Providing students with increased opportunity to be involved in free play would provide the same benefit of the DPA without the stress on teachers. Efforts could then be targeted toward optimizing free-play activity. Assisting students in organizing games or sporting opportunities or leading the students in a new physical activity opportunity during recess would increase the chances of children accumulating valuable physical activity minutes. By focusing on free play of children, and encouraging them to organize activities on their own, it could be more likely that children would feel more comfortable being physically active outside of the school environment.

6.3 Conclusion

When taken together, these studies provide some valuable contextual information about the realities of the Daily Physical Activity program. It is clear that DPA is not being run in classrooms as it was intended and children are not being provided with the benefits of a properly run physical activity program. There are many areas of the DPA program that require significant revisions to make the program beneficial. First and foremost, teachers need to be accountable for their responsibilities in delivering the DPA program. There need to be feedback mechanisms in place so that teachers are not

simply able to re-allocate the DPA time to other purposes. This program was mandated for all students in the province and it should be delivered as such.

Secondly, teachers are clearly not uniformly equipped with the knowledge of physical activity to ensure that the students are active for the majority of the time during DPA at an appropriate intensity. Ideally, the DPA program would be delivered by physical activity specialists trained in getting children active while providing age appropriate activities. In the absence of these specialists, significant effort needs to be placed on enabling the teachers to acquire the skills needed for such a program. Mandatory professional development for teachers involved in DPA delivery that would provide them with the knowledge to optimize the physical activity of their students would make significant improvements in the DPA program. Furthermore, teachers currently enrolled in teacher education or prospective student teachers should be provided with sufficient training in DPA delivery prior to graduation. The teacher education curriculum needs to include a specific component on the DPA program and the importance of physical activity.

This research clearly shows that the physical activity intensity during the DPA program is sorely insufficient. It is obvious that teachers are unaware of what is expected of them and are utilizing activities that do not meet the requirements. Teachers need to be made aware of what qualifies as moderate to vigorous physical activity and trained how to ensure their students reach that intensity for an extended period of time during DPA. This could be remedied if there was a grade specific curriculum developed for the DPA program. A very clear and specific program of

activities designed for the DPA program would be beneficial. This would ensure that teachers without physical activity backgrounds would be clear on the requirements and not forced to develop activities themselves. This would also allow for students to be exposed to a variety of different activities such as sports, games, dance, or yoga which could encourage children to seek out these opportunities outside of the school.

Ideally every student in elementary school would be provided with a proper physical education class instructed by a qualified specialist every day. When this is not possible, the inclusion of DPA as a substitute is a well-intentioned intervention. The Daily Physical Activity program was developed to address the lack of physical activity in Canadian children. In its current form however, the DPA program has little to no benefit in regard to physical activity levels. Many teachers have displayed distain for the program and view it as a significant and unnecessary burden. In fact, Alberta teachers who are faced with an identical program have recommended that DPA delivery be suspended until the many flaws are addressed. With such non-compliance and ineffective program delivery displayed in this study, it may be beneficial to remove DPA from Ontario Schools. Students could get similar benefit from simply increasing recess time or adding another recess. This would remove the burden from teachers and also eliminate the possibility of teachers ignoring program requirements. With the focus removed from DPA, future interventions could focus on optimizing recess time physical activity. At the very least, this project highlights the need for the DPA program to be further evaluated and remodeled in order to provide students with the best possible program.

Appendix A

Ethical Approval

Study 1

Office of Research Ethics

The University of Western Ontario
Room 4180 Support Services Building, London, ON, Canada N6A 5C1
Telephone: [redacted]
Website: www.uwo.ca/research/ethics

Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. T. Overend
Review Number: 15437E
Revision Number: 1
Review Date: February 04, 2009
Review Level: Expedited
Protocol Title: Keeping Active in School: An Inquiry into the Teacher's Perspective of the Daily Physical Activity Program in Ontario
Department and Institution: Physical Therapy, University of Western Ontario
Sponsor:
Ethics Approval Date: February 04, 2009
Expiry Date: August 31, 2009
Documents Reviewed and Approved: Letter of Information, Additional Co-Investigator
Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the HSREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the HSREB:

a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

[redacted]

Chair of HSREB: Dr. Joseph Gilbert

Ethics Officer to Contact for Further Information			
☐ Janice Sutherland (jsutherl@uwo.ca)	☐ Elizabeth Wambolt (ewambolt@uwo.ca)	☐ Grace Kelly (grace.kelly@uwo.ca)	☑ Denise Grafton (dgrafton@uwo.ca)

cc: ORE File

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

Appendix B

Letter of Information

Study 1

LETTER OF INFORMATION

You are being invited to participate in a survey of the teacher's perspective of the Daily Physical Activity (DPA) Program. A random sample of elementary teachers in the Thames Valley District School Board (TVDSB) is being invited to participate. This form gives you important information about the study. It describes the purpose of the study, and the risks and possible benefits of participating in the study.

Please take time to review the information in this form carefully. After you have finished, please feel free to contact the researchers about the study and ask them any questions you have.

1. GENERAL INFORMATION ABOUT THIS STUDY AND THE RESEARCHERS

Study Title: Keeping Active in School: An inquiry into the teacher's perspective of the Daily Physical Activity Program in Ontario

Principal Investigator:

Tom Overend: Associate Professor, School of Physical Therapy, The University of Western Ontario

Co-Investigators:

Angela Mandich: Associate Professor, School of Occupational Therapy, The University of Western Ontario
Linda Miller: Associate Professor, School of Occupational Therapy, The University of Western Ontario
Ian Patton: Doctoral Student, School of Kinesiology, The University of Western Ontario

2. PURPOSES OF THE STUDY

The Daily Physical Activity program in Ontario was created to increase the physical activity levels of children inside and outside of school as well as allow children to better understand the benefits of a healthy active lifestyle. The

program has not yet had any measures of effectiveness taken. It is important to fully understand how the DPA program is being implemented to further enhance knowledge in the area and create programs that are optimally effective.

The purposes of this study are to:

1. Determine teachers' perceptions about the DPA program
2. Determine variations in delivery of DPA in the TVDSB

3. INFORMATION ABOUT STUDY PROCEDURES

This study involves completion of a pen and paper survey. The survey will take about 15-20 minutes to complete. All surveys are anonymous; no answers will be linked to individual teachers or schools in any way. Completed surveys should be returned in the self-addressed, stamped envelope.

4. INFORMATION ABOUT RISKS AND BENEFITS

There are no known risks or harms associated with your participation in this study. There may be some inconvenience associated with completing the survey. There are no direct personal benefits resulting from your participation in this study. However, the results of this study may help to improve the DPA program and initiate change that is mutually beneficial for teachers and students alike.

5. PARTICIPATION

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time. There is no consent form attached to this Letter of Information because there is no requirement for signed consent. Completing and returning the survey will serve as your consent to participate. You may keep this Letter of Information for your records.

6. CONFIDENTIALITY AND THE COLLECTION, USE AND DISCLOSURE OF YOUR PERSONAL INFORMATION

All information collected for the study will be kept confidential. Your personal survey will be identified only by a unique study number. The surveys are coded so that they contain no personal identifiers. The completed surveys will be stored in a locked cabinet. Once the survey has been returned to the research team and the data entered, the code will be removed. This makes your data de-identified and thus withdrawal of your data after this point is not possible. Your survey data

will be entered on database in a computer with a firewall and appropriate security software. There will be no personal identifiers kept on the computer data.

Your research data will not identify you by name. The results of the study may be used in presentations or published in scientific reports but your name or identity will not be collected and hence can not be disclosed. Representatives from the University of Western Ontario Health Sciences Research Ethics Board may contact you or require access to your study-related records in order to monitor the conduct of the research. All personnel involved in the study are committed to respecting your privacy.

7. CONTACTS

If you have any questions about this project, please contact the following investigator: Tom Overend.

If you have any questions about your rights as a research participant or the conduct of the study you may contact The Office of Research Ethics at The University of Western Ontario,.

Appendix C

Questionnaire

Project 1

Quality Daily Physical Activity Survey

What grade(s) are you teaching**?** _____How many years have you taught**?**____

A. How do you implement the Quality Daily Physical Activity (QDPA) program on a day-to-day basis in your school setting?

1. Do you conduct QDPA for a full 20 minutes on days your students do not receive a physical education class?

Circle the appropriate number

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

---

1. What types of activities do you use for QDPA?

Please check all that apply:

Games	□	Sports	□
Walks	□	Races	□
Running	□	Yoga	□
Dance	□	Other (list):	_____

---

2. Where do you conduct your QDPA program?

Please check all that apply:

Classroom	□	Sports Fields	□
Gymnasium	□	Outdoors	□
Hallways	□	Other (list)	_____

---

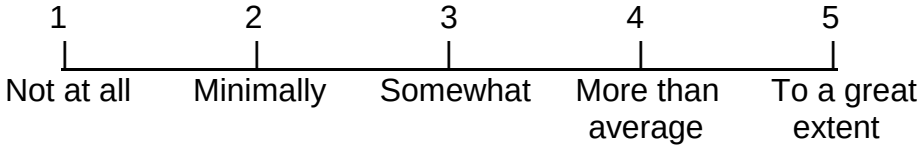
3. On average, how much time (in minutes) for each session would you spend on preparation for your QDPA?

_____Minutes

---

4. Are you aware of the QDPA guidelines established by the Ministry of Education?

Please circle the appropriate number



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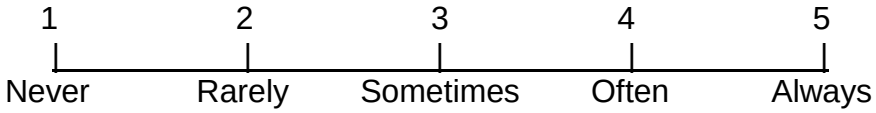
5. Do you give your students the opportunity for feedback about QDPA?

Please circle the appropriate number



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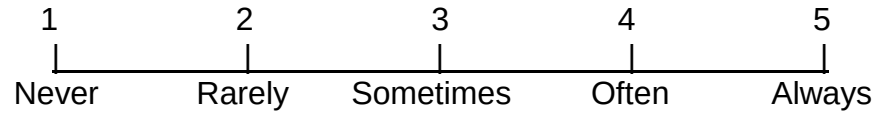
6. Do you give your students the opportunity for leadership during QDPA?

Please circle the appropriate number



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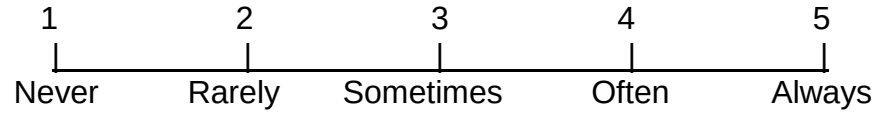
7. Do you implement a wide variety of activities to keep the students engaged?

Please circle the appropriate number



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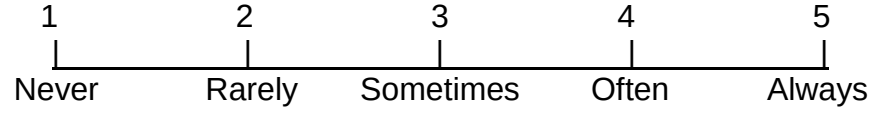
8. Do you include a warm-up and cool down during QDPA sessions?

Please circle the appropriate number



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9. On average during a typical QDPA session, for how long (in minutes) are the children ***actively engaged*** in physical activity.

Minutes

B. What are the supports and barriers that influence the delivery of QDPA?

1. Are there sufficient educational resources available to you to support the delivery of QDPA?
   Please check one
   Yes_____ No_____

2. Do you feel that you have sufficient knowledge about physical activity and health to effectively conduct QDPA?
   Please check one
   Yes_____ No_____

3. Do you feel you are given adequate time ***to plan QDPA sessions*** for your class?
   Please circle the appropriate number

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

4. Do you feel you are given adequate time ***to conduct QDPA sessions*** for your class?
   Please circle the appropriate number

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

5. Do you feel QDPA takes valuable time away from other subjects?
   Please circle the appropriate number

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

6. Do you feel you are given sufficient space to conduct QDPA?
Please circle the appropriate number

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

7. Do you feel you are given sufficient equipment to conduct QDPA?
Please circle the appropriate number

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

8. Do any of these factors present barriers to conducting QDPA in your classroom?
Please check all that apply:
Large class size: □
Uncooperative children: □
Limited interest from children: □
Ability to create new activities on a regular basis: □
Time constraints: □
Other (please list):_____

9. Do you have children with special needs in your class?
Please check one:
Yes_____ No____
If you checked "Yes", is the approach to QDPA adapted in any way to accommodate for special needs?
Yes_____ No____

10. Do you feel your principal and school administration value physical health and activity?

1 2 3 4 5

Not at all Minimally Somewhat More than average To a great extent

---

11. Do you feel your principal and school administration support the QDPA program?

Please circle the appropriate number

1 2 3 4 5

Not at all Minimally Somewhat More than average To a great extent

---

C. What are your attitudes towards the QDPA program and health in general?

1. Do you feel you should be provided with be more structured class outlines for QDPA?

Please check one:

Yes_____ No_____

---

2. In your opinion, is QDPA effective in helping your students to develop overall healthy lifestyles?

Please circle the appropriate number

1 2 3 4 5

Not at all Minimally Somewhat More than average To a great extent

---

3. In your opinion, does QDPA help create a better overall learning environment in your class?

Please circle the appropriate number

1 2 3 4 5

Not at all Minimally Somewhat More than To a great

average extent

4. In your opinion, do you feel your students understand the link between physical activity and health?

Please circle the appropriate number

1 2 3 4 5

Not at all Minimally Somewhat More than average To a great extent

5. In your opinion, are the QDPA activities enjoyable for your students?

Please circle the appropriate number

1 2 3 4 5

Not at all Minimally Somewhat More than average To a great extent

6. Do you enjoy conducting QDPA?

Please circle the appropriate number

1 2 3 4 5

Not at all Minimally Somewhat More than average To a great extent

7. Does your school administration check to ensure QDPA is being conducted?

Please circle the appropriate number

1 2 3 4 5

Never Rarely Sometimes Often Always

8. Do you believe that the QDPA program should be a permanent component of the curriculum?

Please check one:

Yes_____ No_____

9. Do you believe physical activity is important to academic success?

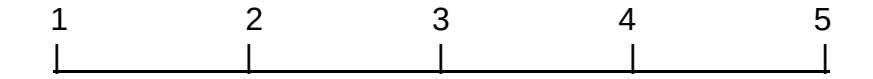
Please circle the appropriate number

1 2 3 4 5

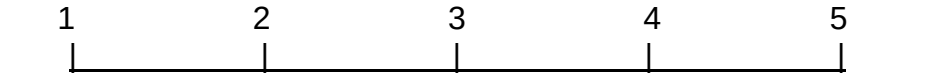
Not at all Minimally Somewhat More than To a great

average extent

10. Do you actively engage in QDPA along with your students?
Please circle the appropriate number



11. Do you believe physical activity is important?
Please circle the appropriate number



12. What do you like about the program?

13. What do you dislike about the program?

14. If you could change the QDPA program what would you do to make it more effective?

Thank you very much for your participation in this survey!

Appendix D

Ethical Approval

Project 2

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Office of Research Ethics
The University of Western Ontario
Room 4180 Support Services Building, London, ON, Canada N6A 5C1
Telephone: [redacted]
Website: www.uwo.ca/research/ethics

Western

Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. T. Overend
Review Number: 17093S **Review Level:** Full Board
Review Date: May 07, 2010 **Approved Local # of Participants:** 625
Protocol Title: Evaluating Daily Physical Activity: Investigating the Children's Perspectives of the DPA Program in Ontario
Department and Institution: Physical Therapy, University of Western Ontario
Sponsor:
Ethics Approval Date: October 20, 2010 **Expiry Date:** June 30, 2011
Documents Reviewed and Approved: UWO Protocol, Letter of Information and Consent, Student Assent Letter, Principal Letter, Teacher Letter.
Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the study or consent form may be initiated without prior written approval from the NMREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the NMREB:

a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the NMREB.

[redacted]

Chair of NMREB: Dr. Riley Hinson
FDA Ref. #: IRB 00000941

Ethics Officer to Contact for Further Information		
☐ Grace Kelly [redacted]	☐ Janice Sutherland [redacted]	☐ Elizabeth Wambolt [redacted]

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

cc: ORE File

Appendix E

Letter of Information

Project 2

LETTER OF INFORMATION

Your child is being invited to participate in a survey of the students' perspective of the Daily Physical Activity (DPA) program. A random sample of grade 4-8 classes in elementary schools across the Thames Valley District School Board (TVDSB) is being invited to participate. This form gives you important information about the study. It describes the purpose of the study, and the risks and possible benefits of taking part in the study.

Please take time to review the information in this form carefully. After you have finished, please feel free to contact the researchers about the study and ask them any questions you have.

1. GENERAL INFORMATION ABOUT THIS STUDY AND THE RESEARCHERS

Study Title: Daily Physical Activity: An investigation into the students' perception of Ontario's DPA program

Principal Investigator:

Tom Overend: Associate Professor and Director, School of Physical Therapy, The University of Western Ontario

Co-Investigators:

Angela Mandich: Associate Professor and Director, School of Occupational Therapy, The University of Western Ontario

Linda Miller: Associate Professor, School of Occupational Therapy and Vice-Provost, School of Graduate and Postdoctoral Studies, The University of Western Ontario

Ian Patton: Doctoral Student, School of Kinesiology, The University of Western Ontario

2. PURPOSES OF THE STUDY

The Daily Physical Activity program in Ontario was created to increase the physical activity levels of children inside and outside of school as well as allow

children to better understand the benefits of a healthy active lifestyle. The effectiveness of the program has not yet been determined. It is important to better understand how the DPA program is being implemented in elementary schools to increase understanding and perhaps the effectiveness of the DPA program.

The purpose of this study is to identify, from the perspective of the children participating in the DPA program:
1. how the DPA program is being implemented in elementary school classrooms,
2. the factors of the DPA program that make it effective
3. any barriers to program delivery.

3. INFORMATION ABOUT STUDY PROCEDURES

This study involves completion of a pen and paper survey. The survey will be handed out in class for students to take home. The survey will take about 10-15 minutes to complete and parents are free to help if required. All surveys are anonymous; no answers will be linked to individual students, teachers, or schools in any way. The surveys should be completed as soon as possible after the student brings them home. Completed surveys should then be sealed in the envelope provided with the questionnaire package, and returned to the student's teacher.

4. INFORMATION ABOUT RISKS AND BENEFITS

There are no known risks or harms associated with participation in this study. There are no direct personal benefits resulting from participation in this study. However, the results of this study may help to improve the DPA program and the way in which it is implemented in elementary schools in the Thames Valley School Board.

5. PARTICIPATION

Participation in this study is voluntary. Participants may refuse to take part, refuse to answer any questions, or withdraw from the study at any time. Students must have parental consent to participate. The Consent Form is attached for a parent/guardian to sign. Completing and returning the survey will serve as the student's consent to participate. You may keep this Letter of Information for your records.

6. CONFIDENTIALITY AND THE COLLECTION, USE AND DISCLOSURE OF YOUR PERSONAL INFORMATION

All information collected for the study will be kept anonymous. Each survey will be identified only by a unique study number. The surveys are coded and contain no personal identifiers. The completed surveys will be stored in a locked cabinet. Once the survey has been returned to the research team and the data entered on a computer database, the code will be removed. This “de-identifies” your data and thus withdrawal of your data after this point is not possible. Your survey data will be kept on a database in a computer with a firewall and appropriate security software. There will be no personal identifiers kept on the computer data.

Research data will not identify participants by name. The results of the study may be used in presentations or published in scientific reports but since name or identities will not be collected, they cannot be disclosed. Representatives from the University of Western Ontario Health Sciences Research Ethics Board may contact you or require access to your study-related records in order to monitor the conduct of the research. All personnel involved in the study are committed to respecting your privacy.

7. CONTACTS

If you have any questions about this project, please contact the following investigator: Tom Overend,

If you have any questions about your rights as a research participant or the conduct of the study you may contact The Office of Research Ethics at The University of Western Ontario,

Appendix F

Consent Form

Project 2

CONSENT FORM

Study Title: **Evaluating Daily Physical Activity: Investigating the Children's Perspectives of the DPA Program in Ontario**

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

Participant Name (please print) _____

Parent Name (please print) _____

Parent Signature _____ Date: _____

Person Responsible for Obtaining Informed Consent (please print)

_____

Signature _____ Date: _____

Participant copy

Appendix G

Child Assent Form

Project 2

Evaluating Daily Physical Activity: Investigating the Children's Perspectives of the DPA Program in Ontario

Investigators

Why you are here.
The researchers want to tell you about a study about Daily Physical Activity class. They want to see if you would like to be in this study. Dr. Tom Overend and some other researchers are doing this study.

Why are they doing this study?
They want to see if certain things, more than others, make you like Daily Physical Activity.

What will happen to you?
If you want to be in the study you will be asked to answer some questions about daily physical activity

Will there be any tests?
No there will not be any tests or marks on the report card.

Will the study help you?
No, this study will not help you directly but in the future it might help children Who participate in Daily Physical Activity.

What if you have any questions?
You can ask questions any time, now or later. You can talk to the teachers, your family or someone else.

Do you have to be in the study?
You do not have to be in the study. No one will be mad at you if you don't want to do this. If you don't want to be in this study, just say so. It's up to you.

I want to participate in this study

_____
Print name of Child

_____
Signature of Child

_____ _____
Age Date

_____ _____
Signature of Person Obtaining Assent Date

Appendix H

Questionnaire

Project 2

Quality Daily Physical Activity (DPA) Survey for Students

1. What grade are you in? _____

2. Check one: Are you a boy? _____ Or a girl? _____

3. Do you do any physical activity outside school? (for example, hockey, karate, dance, gymnastics)
   Please list your activities and how often you do them every week
   For example: A hockey player who has two 1 hour practices a week and one 1 hour game would be 180 minutes per week.

Activity	Frequency (minutes per week)

4. What activities do you do for DPA?

Please check all that apply:

Games	☐	Sports	☐
Walks	☐	Races	☐
Running	☐	Stretching	☐
Dance	☐	Other (list):	_____

5. Where do you do your DPA program?

Please check all that apply:

Classroom	☐	Sports Fields	☐
Gym	☐	Outdoors	☐
Hallways	☐	Other (list)	_____

6. In a normal week how many Gym classes do you have? _____

Using these choices, please answer the following questions by marking the box that best represents your answer.

1 = “Yes, I strongly agree”
2 = “I agree”

3 = “I do not know`
4 = “I disagree”
5 = “no, I strongly disagree”

Question	1 Yes, I strongly Agree	2 I Agree	3 I Don’t Know	4 I Disagree	5 No, I strongly Disagree
My class does DPA everyday when I do not have gym class	□	□	□	□	□
My teacher does the DPA exercises with us	□	□	□	□	□
I think my teacher enjoys DPA class	□	□	□	□	□
I get bored with my DPA class	□	□	□	□	□
I think DPA gets in the way of other important subjects	□	□	□	□	□
I believe being active and exercising is important to my learning in the classroom	□	□	□	□	□
My participation in DPA has helped me be more active outside of school	□	□	□	□	□
I enjoy the activities we do in DPA class	□	□	□	□	□
I think DPA has lots of activities that are fun to do	□	□	□	□	□
When we do DPA I feel like we work hard	□	□	□	□	□
I feel like I burn off some energy when we do DPA	□	□	□	□	□
I think we need DPA everyday	□	□	□	□	□
I think if we did DPA everyday, I would do better in other classes	□	□	□	□	□
In DPA class we exercise enough to get the heart pumping	□	□	□	□	□
In our DPA class, we are active for at least 20 minutes	□	□	□	□	□
My teacher is good at introducing new games and activities	□	□	□	□	□
My teacher makes sure that everyone is able to do the DPA activities	□	□	□	□	□
I make sure that I am active as much as possible	□	□	□	□	□
My teacher makes us feel like physical activity is an important part of school	□	□	□	□	□
DPA has taught me new games and activities I can play with my friends	□	□	□	□	□

In our school DPA is important	□	□	□	□	□
In our class, DPA changes activities on a regular basis	□	□	□	□	□
I feel safe doing the DPA activities	□	□	□	□	□
I feel we have enough space to do DPA activities	□	□	□	□	□
I think DPA class helps me be more healthy	□	□	□	□	□
I think most of the students in my class like DPA	□	□	□	□	□
We have students that make it hard for the teacher to do DPA because they are disruptive	□	□	□	□	□
We have enough equipment to do DPA everyday	□	□	□	□	□
If we are acting up as a class, our teacher will not do DPA	□	□	□	□	□
I think there is enough time in the school-day to have DPA everyday	□	□	□	□	□
I think that DPA is a good break during the school day	□	□	□	□	□
We only do DPA in our classroom	□	□	□	□	□

7. What do you like about DPA? Feel free to write whatever you want

_____

_____

_____

_____

8. What do you not like about DPA? Feel free to write whatever you want

_____

_____

_____

_____

9. If you could change DPA, what would you do to make it better?

_____

_____

_____

_____

Appendix I

Ethical Approval

Project 3

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Research Western

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Tom Overend
Review Number: 17977S
Review Level: Delegated
Approved Local Adult Participants: 0
Approved Local Minor Participants: 31
Protocol Title: Daily Physical Activity: An investigation into the school-based physical activity of students in Ontario's DPA program
Department & Institution: Health Sciences\Physical Therapy, University of Western Ontario
Sponsor:
Ethics Approval Date: February 24, 2012 **Expiry Date:** June 30, 2012

Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised UWO Protocol	Due to a mechanical error with the accelerometers the data collected are invalid and data collection needs to be replicated.	
Revised Letter of Information & Consent		

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the NMREB.

The Chair of the NMREB is Dr. Riley Hinson. The UWO NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Signature

Ethics Officer to Contact for Further Information

[redacted]	[redacted]

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

The **University** *of* **Western Ontario**
Office of Research Ethics
Support Services Building Room 5150 • London, Ontario • CANADA - N6G 1G9
[redacted] • www.uwo.ca/research/ethics

Appendix J

Letter of Information

Project 3

LETTER OF INFORMATION

Your child is being invited to participate in a survey of the Daily Physical Activity (DPA) program. A grade 5 class from an elementary school in the Thames Valley District School Board (TVDSB) is being invited to participate. This form gives you important information about the study. It describes the purpose of the study, and the risks and possible benefits of taking part in the study.

Please take time to review the information in this form carefully. After you have finished, please feel free to contact the researchers about the study and ask them any questions you have.

1. GENERAL INFORMATION ABOUT THIS STUDY AND THE RESEARCHERS

Study Title: Daily Physical Activity: An investigation into the school-based physical activity of students in Ontario's DPA program

Principal Investigator:

Tom Overend:	Associate Professor and Director, School of Physical Therapy, The University of Western Ontario

Co-Investigators:

Angela Mandich:	Associate Professor and Director, School of Occupational Therapy, The University of Western Ontario
Linda Miller:	Associate Professor, School of Occupational Therapy and Vice-Provost, School of Graduate and Postdoctoral Studies, The University of Western Ontario
Ian Patton:	Doctoral Student, School of Kinesiology, The University of Western Ontario

2. PURPOSES OF THE STUDY

The Daily Physical Activity program in Ontario was created to increase the physical activity levels of children inside and outside of school as well as allow children to better understand the benefits of a healthy active lifestyle. The

effectiveness of the program has not yet been determined. It is important to better understand how the DPA program is being implemented in elementary schools and its effectiveness. This knowledge may increase the usefulness of the DPA program.

The purpose of this study is to measure the physical activity of the students during the school day in order to identify any effect on activity attributable to the DPA program.

3. INFORMATION ABOUT STUDY PROCEDURES

The students will be asked to wear accelerometers (small measurement devices on an elastic belt, about the size of an iPod Nano). A researcher will come to the class and hand out the devices at the beginning of the school day and come back to collect them at the end of the school day for a period of 4 days. Students are asked to go about their day as they normally would. This study also involves completion of a pen and paper survey. The survey will be handed out and completed in class. The survey will take about 10 minutes to complete. All surveys are anonymous; no answers will be linked to individual students, teachers, or schools in any way.
The height and weight of each student is required in order to properly calibrate the accelerometer. This information will be provided on a separate form by the parents, folded and stapled, and given to the teacher. The information will not be retained once the accelerometers have been calibrated.

4. INFORMATION ABOUT RISKS AND BENEFITS

There are no known risks or harms associated with participation in this study. There are no direct personal benefits resulting from participation in this study. However, the results of this study may help to improve the DPA program and the way in which it is implemented in elementary schools in the Thames Valley District School Board.

5. PARTICIPATION

Participation in this study is voluntary. Participants may refuse to take part, refuse to answer any questions, or withdraw from the study at any time prior to data collection. Due to the fact that no identifiers will be collected, participants will be unable to withdraw after the questionnaires are complete and the accelerometer data is collected. Students must have parental consent to participate. A Consent Form is attached for a parent/guardian to sign. You may keep this Letter of Information for your records.

6. CONFIDENTIALITY AND THE COLLECTION, USE AND DISCLOSURE OF YOUR PERSONAL INFORMATION

All information collected for the study will be kept anonymous. Each survey will contain no personal identifiers. The completed surveys will be stored in a locked cabinet. This “de-identifies” your data and thus withdrawal of your data after this point is not possible. Your survey data will be kept on a database in a computer with a firewall and appropriate security software. There will be no personal identifiers kept on the computer data.

Research data will not identify participants by name. The results of the study may be used in presentations or published in scientific reports but since name or identities will not be collected, they cannot be disclosed. Representatives from The University of Western Ontario Health Sciences Research Ethics Board may contact you or require access to your study-related records in order to monitor the conduct of the research. All personnel involved in the study are committed to respecting your privacy.

7. CONTACTS

If you have any questions about this project, please contact the following investigator: Tom Overend,

If you have any questions about your rights as a research participant or the conduct of the study you may contact The Office of Research Ethics at The University of Western Ontario,

Appendix K

Parental Consent

Project 3

Western
Health Sciences

CONSENT FORM

Study Title: **Daily Physical Activity: An investigation into the school-based physical activity of students in Ontario's DPA Program**

I have read the Letter of Information and I agree to give my child consent to participate. All questions have been answered to my satisfaction.

Parent's Name (please print) _____

Parent's Signature _____ Date: _____

In order to calibrate the measurement devices (accelerometers) we require some information about your child. This information will only be used for the purpose of calibration and your child will only be identified by means of subject number. The information will be destroyed as soon as the accelerometers are calibrated.

Height:_____
Weight:_____
Age:_____

Participant copy

Appendix L

Child Assent

Project 3

Evaluating Daily Physical Activity: Investigating the Children's School-based Physical Activity Levels

Investigators: Dr Tom Overend, Dr Linda Miller, Dr Angie Mandich, Ian Patton

Why am I getting this letter?

The investigators want to tell you about a study about Daily Physical Activity class. They want to see if you would like to be in this study. Dr. Tom Overend and some other researchers are doing this study.

Why are they doing this study?

They want to see how much physical activity you do while in school.

What will happen to you?

If you want to be in the study, you will be asked to answer some questions about your Daily Physical Activity class and you will wear a small device on a belt that will measure your level of physical activity for 4 school days.

Will there be any tests?

No. There will not be any tests or marks on your report card.

Will the study help you?

No, this study will not help you directly, but in the future it might help children who participate in Daily Physical Activity.

What if you have any questions?

You can ask questions any time, now or later. You can talk to the teachers, your family, the investigators, or someone else.

Do you have to be in the study?

You do not have to be in the study. No one will be upset with you if you don't want to do this. If you don't want to be in this study, just say so. It's up to you. Whether or not you decide to take part in the study will have no effect on your school grades.

I want to participate in this study

_____
Print name of Child

_____
Signature of Child

_____ _____
Age Date

_____ _____
Signature of Person Obtaining Assent Date

Daily Physical Activity (DPA) is when your teacher gets you up to exercise and play games during your school day but DPA does not include gym class. Your teacher may call it DPA class or they might just get you up to play a game at some point in the day. Your answers will be useful in telling us how good the program is and how it can be made better.

During the 4 days of the study a researcher will come to your class in the morning and give you an elastic belt with a small device on it (about the size of an iPod Nano). At the end of the school day the same researcher will come back to your class and collect the belt. All you have to do is act the same way you normally do during school.

Thank you very much.

Appendix M

Physical and Health Education Journal

Permission Letter

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PHE Canada
Physical & Health Education Canada

EPS Canada
Éducation physique et santé Canada

8 May 2012

Dear Mr. Patton,

This letter serves as permission for you to use material published in the *PHE Journal* as part of your dissertation. Specifically, permission is granted to use the following articles exclusively for the purpose of producing and defending your dissertation:

Patton, I. and J. McDougall. (2009). Canada's Active Schools: A review of school-based physical activity interventions and their importance. *Physical and Health Education Journal* 75:3. 16-22

Patton, I. (2012). Teachers' Perspectives of the Daily Physical Activity Program in Ontario. *Physical and Health Education Journal* 78:1. 18-21

Regards,

John Maker, PhD
Editor-in-Chief, PHE Journal
Email: phejournal@phecanada.ca

Ian Thomas Patton

Education

Doctor of Philosophy, Kinesiology, Western University, London, Ontario 2008-2012

- **Thesis title**:

"School-based physical activity in children: An evaluation of the Daily Physical Activity program in Ontario elementary schools."

- ***Supervisor*:**

Tom Overend PhD, PT, Associate Professor and Director, School of Physical Therapy, Western University.

- ***Committee*:**

1. Angela Mandich PhD, OT, Associate Professor and Director, School of Occupational Therapy, Western University.
2. Linda Miller PhD, Vice Provost, School of Graduate and Postdoctoral Studies, Western University.

Master of Science Candidate, Kinesiology, Western University. London, Ontario 2007-2008. Successfully fast-tracked into the PhD program

Bachelor of Arts, Kinesiology, Western University, London, Ontario, 2003-2007

- Honors Specialization in Kinesiology with a Minor in Health Science

Research Interests:

- Obesity, physical activity, nutrition, health promotion, education, body mass index, mixed methods, and the built environment.

I am interested in the relationship between physical activity and nutrition with rising obesity rates in society. More specifically I have an interest in school-based interventions for the prevention of obesity, food addiction and the use of exercise as a behavior modification method as well as how the built environment affects the obesity rates and how we can manipulate the environment to create positive change. I also have an interest in mixed methodology, using both quantitative and qualitative methodologies in order to achieve a "fuller" understanding of the research question. Recently I have developed an interest in the notion of "growing healthy bodies" rather than focusing on weight as a primary heath outcome. The focus on weight is limiting in that it ignores the fact that there are individuals who are normal weight but unhealthy, and overweight but healthy. Furthermore, the focus of our society is clearly on the overweight population and thus ignoring the underweight population which is also of concern. I believe that taking the focus away from weight and redirecting it to the

behavioral and environmental factors that affect children's health allows for greater change.

Publications, Abstracts and Presentations:

Refereed journal articles:

- Patton I, McDougall J. Canada's Active Schools: A review of school-based physical activity interventions in Canada and their importance. PHE Journal. 75(3) 2009.
- Patton I, Mandich A, Miller L, Overend TJ. "Teachers' Perspective of the Daily Physical Activity program in Ontario. Physical and Health Education Journal (PHE). 78(1): 18-21.

Submitted/under review refereed journal articles:

- Patton, I., Overend, T., Mandich, A., Miller, L. (2012). The Daily Physical Activity program in Ontario Elementary Schools: Measuring school-day physical activity of students..
- Patton, I., Overend, T., Mandich, A., Miller, L. (2012). The Daily Physical Activity program in Ontario elementary schools: Perceptions of students in grades 4-8. Canadian Journal of Education.

Refereed abstracts:

- Patton I. Keeping active in school: An investigation into the teacher's perceptions of the Daily Physical Activity program in Ontario. Appl Physiol. Nutr Metab 34:292, 2009.
- Patton I. Canada's active schools: A review of school-based physical activity interventions in Canada and their importance." Appl Physiol Nutr Metab 34:239, 2009.

Presentations:

- Patton, I., Overend, T., Mandich, A., Miller, L. The Daily Physical Activity Program In Ontario Elementary Schools: Supports and barriers to optimal program delivery identified by teachers and students. International Society of Behavioral Nutrition and Physical Activity. May 2012. Poster Presentation
- Patton, I. The Healthy Body Scorecard. The Sandbox Project annual conference. January 2012. Invited podium presentation.
- Patton I, Overend T, Miller L, Mandich A. How students' view daily physical activity in elementary school: An investigation of the children's perspective of the DPA program in Ontario. National Obesity Summit. The Canadian Obesity Network. Montreal, April 2011. Poster presentation.
- Patton I, Overend T, Miller L, Mandich A. Daily Physical Activity in schools: An investigation into the teachers' perspective of the DPA program in Ontario.

International Congress on Physical Activity and Public Health. Toronto, May 2010. Poster presentation

- Patton I. Keeping active in school: an investigation into the teacher's perceptions of the Daily Physical Activity program in Ontario. National Obesity Summit, The Canadian Obesity Network. Kananaskis, May 2009. Poster presentation
- Patton I. Canada's active schools: A review of school-based physical activity interventions in Canada and their importance. National Obesity Summit, The Canadian Obesity Network. Kananaskis, May 2009. Podium presentation
- Patton I. Daily Physical Activity in Ontario elementary schools. Canadian Obesity Network Student Meeting. Quebec City, June 2008. Poster presentation
- Patton I. School-based physical activity interventions in Canada. Graduate Research Conference, University of Toronto, Toronto, May 2008. Podium presentation
- Patton I. School-based physical activity interventions in Canada. Western Graduate Research Forum, The University of Western Ontario. London, March 2008. Poster presentation

Academic Awards

- 2012-2013 Mitacs Accelerate Internship University of Toronto

Award value = $45000

- 2012 Mitacs Accelerate Internship Western University

Award value = $15000

- 2011 Ontario Graduate Scholarship.

Award value = $15000

- 2010 Ontario Graduate Scholarship.

Award value = $15000

- 2008-2011 Graduate Thesis Research Award – The University of Western Ontario

Award value =$600 (2011), $800 (2010), $500 (2009), $400 (2008)

- 2008-2010 Kinesiology Graduate Research Travel Award

Award value = $700 (2010), $500 (2009, 2008)

- *2008-2010 Health Science Travel Award*

Award value = $500 (2010), $400 (2009), $400 (2008)

- *2008 Canadian Obesity Network – 3rd Annual Obesity Summer Boot-camp Award*

Award value = $2500

Administrative Experience

- 2011 – Present, Executive member of the "Growing Healthy Bodies" working group of the Sandbox Project, a not-for-profit organization created to help

elevate the health of Canadian children and make Canada one of the healthiest places for a child to grow up in.

- 2011, Representative for the "Growing Healthy Bodies" working group for the planning committee for the Sandbox Project's annual conference.
- 2010-2011, President and founder of the Canadian Obesity Network chapter at The University of Western Ontario
- 2009-2010, Central and Eastern Representative for the Canadian Obesity Network Student and New Professional national executive.
- 2009-2010, Chair and founder of the Canadian Obesity Network chapter at The University of Western Ontario
- Planning and organizing committee member for the 2010 Canadian Obesity Student Meeting in Ottawa
- Organized and successfully ran several events on campus including a series of obesity related documentary movie nights, a series of "lunch and learn" lectures that highlight influential faculty and researchers in the area of obesity research.

Teaching Experience

Teaching Assistant:

1. Introductory Exercise Physiology, Kin 2230, Kinesiology, Western University. 2008 - 2010
- Responsible for the delivery of lab-based course material and assisted 300+ students, contributing to their theoretical and practical knowledge of exercise physiology principles.
- Responsible for marking lab assignments, exams and quizzes.
- Offered "extra help" sessions and review lectures for students interested prior to major examinations.

2. Physiology of Fitness Appraisal, Kin 3337, Kinesiology, Western University. 2010
- Responsible for the delivery of lab based course material on exercise physiology principles. Aided in fostering a greater understanding of practical applications and theory from the course material.
- Responsible for marking lab assignments, exams and quizzes.
- Offered "extra help" sessions and review lectures for students interested prior to major examinations.

3. Cognitive Ergonomics, Kin 3457, Kinesiology, Western University. 2009
- Provided students with editing and consultation on major term papers.

Teaching Development

Western Certificate in University Teaching and Learning, 2008 to present.
Competed an in-depth professional development program which included:

- Successful completion of the TA Training Program (TATP) a 2 day professional development seminar on teaching strategies.
- 14 (2 hours each) workshops in the Future Professor Series including “fostering active learning in the classroom”, “teaching principles for different learning styles”, “successful group projects” and “conflict management when working with undergraduate students”
- Successful completion of the Teaching Mentor program
- Development of a teaching portfolio

Written project: The development of a novel course outline and syllabus

Community Involvement

- 2012 Student volunteer at the International Society for Behavioral Nutrition and Physical Activity conference in Austin Texas.
- 2010 - Present volunteer as a Graduate Student Mentor for incoming students into the Kinesiology program or upper year undergraduates who have an interest in graduate studies.
- Volunteered as a student representative, co-chair and technical assistant for presentations during the 2009 Canadian Obesity Summit.
- Participated as an activity assistant and data collection assistant on the Children’s Health and Activity Modification Program (CHAMP), a lifestyle intervention for obese children at risk for Type 2 diabetes during “booster sessions”.
- 2003-2009 Member of the University of Western Ontario Varsity Wrestling team. Served as Captain of the team for 3 years.
- Instructed and coached high school students in community outreach wrestling programs as well as with the local club team.
- 2003-present involved in various community and charitable events including wrestling coach, Run for Retina Research, London Hospice Road Race and the Kidney Foundation.

References

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