Supporting Durham Catholic School District Teachers in Implementing Movement Integration: Understanding and Addressing the Barriers Through Teacher Coaching

by

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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies.

ABSTRACT

Movement integration (MI) is shorts bursts of physical activity (PA) within classrooms during school hours. Despite cited benefits of MI, it is not well utilized by teachers. MI barriers include lack of time and confidence, safety concerns, and classroom disarray. Teacher coaching may help mitigate these issues. Teacher participants (n=12) at seven elementary schools were interviewed on their perceived barriers to MI. An MI specialist visited each teacher three times for five to ten minutes over three weeks to coach the teacher and class through MI activities. Results indicated a statistically significant increase in self-reported MI by teachers from pre to post-implementation (Z = -2.138, p = 0.0165, r = 0.6), improved teacher confidence (p = 0.048), and a strong, positive correlation ($\tau_b = 0.627$, p = 0.018) between confidence and competence. Findings indicate that teacher coaching may be an effective strategy to supporting teachers in overcoming barriers to MI.

Keywords: movement integration; physical activity; teacher coaching

AUTHOR'S DECLARATION

I hereby declare that this thesis consists of original work of which I have authored. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Kristina Sobolewski

STATEMENT OF CONTRIBUTIONS

Dr. Serene Kerpan contributed to the design and methodology of this study, applied for ethics approval and established a partnership with the Durham Catholic District School Board.

As first author, my contribution was recruitment of participants, collection and analysis of the data, and writing of the thesis.

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LIST OF ABBREVIATIONS

- DPA Daily Physical activity
- PE Physical Education
- MVPA Moderate to Vigorous Physical Activity
- MI Movement Integration
- PA Physical Activity
- QDPE Quality Daily Physical Education

KEY TERMS

Academic Performance: A term used to describe academic-related outcomes during regular instructional time such as reading, writing, spelling, mathematics, language skills, standardized testing, as well as general and comprehensive understanding of curriculum concepts.

Daily Physical Activity (DPA): A mandated policy in Ontario requiring publicly-funded school boards to ensure all elementary students from grades 1 to 8, including students with disabilities, engage in a minimum of twenty minutes of sustained moderate-to-vigorous physical activity each school day during instructional time (Allison et al., 2018; Ontario Ministry of Education, 2017).

Physical Education (**PE**): An inclusive curriculum that helps students learn the skills and knowledge they need to lead healthy, active lives and make healthy and safe choices (Ontario Ministry of Education, 2019).

Learning Behaviour Outcomes: A term used to describe student learning behaviours including time-on-task, selective attention, and academic motivation during class time (Watson et al., 2017; Webster et al., 2015).

Moderate-to-Vigorous Physical Activity (MVPA): Requires a moderate to a large amount of effort in which heart rate noticeably accelerates or maintains a sustained increase resulting in rapid breathing (World Health Organization, 2020).

Movement Integration (**MI**): Involves infusing physical activity, at any intensity, within general education classrooms, during regular classroom time for one to fifteen minutes (Institute of Medicine, 2013; Webster et al., 2015).

Physical Activity (PA): Any bodily movement produced by skeletal muscles that requires energy expenditure and consists of activities while working, playing, carrying items, traveling, and recreational interests (World Health Organization, 2018).

Physical Activity Outcomes: A term used to describe the impact physical activity has on daily physical activity levels and / or on physical activity intensity.

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Quality Daily Physical Education (QDPE): Well-organized, physical education lessons for a minimum of 30 minutes each day that students in kindergarten to grade 12 experience throughout the school year (Physical Health and Education Canada, 2019). Quality daily physical education includes daily curricular instructions and encourages high levels of participation with an emphasis on fun, fair-play, achievement, self-fulfillment, and physical well-being (Physical Health and Education Canada, 2019).

Teacher Coaching: When coaches, peer teachers, or specialists observe teachers' within their classroom environment during instructional time, provide feedback for improvement and help them develop their practice in real teaching scenarios (Kraft et al., 2018). The terms Embedded Professional Development and Instructional Coaching are often used synonymously with teacher coaching.

Chapter 1. Introduction

Physical activity (PA) is associated with many health and behavioural benefits (Janssen & Leblanc, 2010; Poitras et al., 2016). There is evidence that PA performed at a moderate or higher intensity improves muscular strength, bone density, and reduces risk of chronic diseases such as high blood pressure, metabolic syndrome, diabetes, and obesity levels in children and youth (Poitras et al., 2016). Not only does PA improve physical aspects of well-being but it is also associated with significant improvements in mental health (Poitras et al., 2016). Children and youth have better self-esteem, lower levels of anxiety, and depression while presenting better cognitive and behavioural control when they engage in PA (Hillman, 2014; Poitras et al., 2016).

Despite these benefits, participation in physical activities is declining as children and youth (five to 17-year-olds) are adopting more sedentary lifestyles (Bidzan-Bluma & Lipowska, 2018; ParticipACTION, 2018). On average, 76 percent of Canadian children three to four-year-olds and 51 percent of five to 17-year-olds are engaging in more screen time than recommended by the Canadian 24-Hour Movement Guidelines for leisure screen-based sedentary behaviours (ParticipACTION, 2018). In the 2018 ParticipACTION report card, young Canadian children ages five to 11 and youth ages 12 to 17 spend 2.3 hours and 4.1 hours per day, respectively, on screen-based activities such as television, video games, and computer games after school. This increased sedentary time results in less PA and decreased health outcomes (Carson et al., 2016; Chaput et al., 2016; Poitras et al., 2016; Saunders et al., 2016).

Children and youth (five to 17-year-olds) spend the majority of their time at school, which makes it an ideal environment to promote increased PA. Currently, there are PA opportunities at schools including physical education (PE) and recess breaks.

Across Canada, some governments and school boards have set goals to achieve a certain amount of daily physical activity; this is often called Daily Physical Activity (DPA) (Alberta Education, 2008; British Columbia Ministry of Education, 2011; Ontario Ministry of Education, 2017; World Health Organization, 2010). Although specific DPA requirements vary across provinces, in Ontario, school boards must ensure that all elementary school students reach a minimum of 20 minutes of moderate-to-vigorous physical activity (MVPA) per day (Ontario Ministry of Education, 2017). Research has shown that children who are provided DPA every day, especially during non-PE classes, were more active than those who did not receive DPA (Olstad et al., 2015; Stone et al., 2012; Weatherson et al., 2019). However, these policies do not specify how schools or teachers must implement DPA during the day, consequently leading to variation in duration, intensity, and frequency which leads to different effects on students' PA levels (British Columbia Ministry of Education, 2011; Mâsse et al., 2013; Weatherson et al., 2019).

Due to variability in quantity and quality of DPA, many now advocate for quality daily physical education (QDPE). Quality daily physical education is well-organized PE lessons for a minimum of 30 minutes each day that students in kindergarten to grade 12 experience throughout the school year (Physical Health and Education Canada, 2019). QDPE provides daily curricular instructions and encourages high levels of participation from all students with an emphasis on fun, fair-play, achievement, self-fulfillment, and physical well-being (Physical Health and Education Canada, 2019). QDPE programs challenge cardiovascular systems, muscular strength, aerobic capacity, and flexibility while being appropriate for each age and stage of development (Physical Health and

Education Canada, 2019). Schools that focus on QDPE work to ensure all children and youth develop the knowledge, skills, and habits to create healthy active lifestyles (Physical Health and Education Canada, 2019). PE teachers are taking an interest in QDPE and adopting a variety of activities that are developmentally appropriate, enjoyable, and meaningful for students (Chen et al., 2014; Sterdt et al., 2015). Benefits of QDPE include higher daily PA levels during and outside of school, improved social behaviour, greater participation, and increased enjoyment during sport activities (Chen et al., 2014; Sterdt et al., 2015). However, barriers associated with QDPE include lack of knowledge or training amongst general classroom teachers, financial restrictions, and limited equipment or use of facilities (Sterdt et al., 2015). General classroom teachers or generalist teachers are elementary school teachers that are responsible for instructing all subjects; research indicates most generalist teachers are not adequately trained to teach PE curriculum (Decorby et al., 2005; Stoddart & Humbert, 2017).

Within the last few years, there has been more pressure placed on academic performance and curricular outcomes in elementary schools, consequently leading to reduced time for PA despite DPA and QDPE guidelines (Webster et al., 2015). While teachers are often aware of the benefits of PA, they are challenged in providing it due to real or perceived time constraints, lack of skills and knowledge, and access to equipment and facilities (Webster et al., 2015). In response to this issue, researchers and educators have collaborated to develop movement integration (MI) programs in order to bring PA into the classroom in an attempt to mitigate some school PA barriers that inhibit the achievement of DPA and inclusion of QDPE.

MI is short bursts of PA for one to 15 minutes at any intensity within general education classrooms during regular school time (Alcaraz et al., 1997; Dinkel et al., 2017; Webster et al., 2015; Webster et al., 2017). MI is not meant to replace PE or recesses, but to act as a compliment in providing students with more opportunities to be physically active (Webster et al., 2015). Benefits of MI are that it can be adaptable to academic lessons, it can be done in the classroom, or transitioning between classes, and requires limited or no equipment, and it is shown to increase PA levels (Webster et al., 2015). MI aligns with the principles of QDPE and can help in achieving DPA.

Many organizations, particularly American organizations such as the Institute of Medicine, Centers for Disease Control and Prevention, and National Association for Sports and Physical Education, have recommended the use of MI in academic classrooms as research has shown it improves students' PA levels, academic achievements, coping skills, and behaviour while being adaptable to comprehensive school programs (Martin & Murtagh, 2017a; Naylor et al., 2006; Rasberry et al., 2010; Webster et al., 2015). However, MI is not always used by teachers despite professional development opportunities. Teacher cited barriers to MI include lack of time, lack of confidence and experience, safety concerns, poor adaptability to lessons, low perceptions of PA, and potential classroom disarray (Webster et al., 2015; Webster et al., 2017). Thus, the barriers to school-based PA are often similar to those for MI, an innovation designed to address the barriers to school-based PA.

Teacher coaching, also known as embedded professional development or instructional coaching may help mitigate the barriers associated with MI (Kerpan, Humbert, & Abonyi, 2018). Teacher coaching is when coaches or peers observe teachers'

within their classroom environment, especially during instructional time, and provide feedback for improvement and help them develop their practice in real teaching scenarios (Darling-Hammond et al., 2017; Desimone, 2009; Desimone & Pak, 2017; Kraft et al., 2018). This type of coaching is intended to be personalized for each teacher, is often time-intensive and context-specific while focusing on discrete skills (Desimone & Pak, 2017; Kraft et al., 2018). Individuals who coach teachers are usually specialists in their field who demonstrate research-based practices and collaborate with teachers to integrate these practices directly in their classrooms (Desimone & Pak, 2017; Sailors & Shanklin, 2010).

Research has shown that teacher coaching can improve pedagogy for teachers' classroom instruction and translating knowledge into novel classroom practices (Kraft et al., 2018; Kretlow & Bartholomew, 2010; Kretlow, Wood, & Cooke, 2012). Teacher coaches do this by engaging in professional dialogue with teachers and focus on expanding specific skills to enhance their teaching (Lofthouse et al., 2010). Coaching is usually not implemented on its own but is combined with various training sessions or courses where teachers are taught new skills or curricular content (Kretlow & Baratholomew, 2010). By using various coaching strategies, this can help grow teachers' abilities to implement new curricular material and instructional resources (Kraft et al., 2018).

In a recent study by Kerpan and colleagues (2019) teacher coaching was cited as a potential way to address some of the barriers to implementing MI in the classroom. It is possible that by coaching teachers through the delivery of MI, it will increase the

teachers' ability to translate the knowledge and skills learned directly into their classroom, providing more MI opportunities to students (Joyce & Showers, 2002).

1.1 Statement of Purpose & Research Question

Having individualized training may aid teachers to overcome common barriers to implementing MI. Although several studies have investigated MI, including the barriers teachers face in implementing MI, there is no research to my knowledge on teacher coaching and MI. Moreover, there is limited research on teacher coaching studies published examining its effect on PE or PA levels; the large majority of teacher coaching research has been conducted on literacy and mathematics (Kraft et al., 2018).

Based on the need to support teachers in implementing MI programs, this study's objective will investigate the impact of teacher coaching on addressing MI barriers for Durham Catholic District School teachers in elementary schools.

The questions to support this research are:

1. What barriers are preventing teachers from implementing MI in their classroom?

Hypothesis: Barriers preventing teachers from implementing MI in their classroom include lack of time, lack of confidence, limited space, and classroom management.

2. Does teacher coaching increase the quantity of MI provided to students postintervention?

Hypothesis: The quantity of MI provided to students will increase after the teacher coaching intervention.

3. Does teacher coaching improve teacher confidence in providing MI to students?

Hypothesis: Teacher confidence in providing MI to students will improve after teacher coaching.

4. Does teacher coaching improve teacher competence in providing MI to students?

Hypothesis: Teacher competence in providing MI to students will improve after teacher coaching.

5. Do teachers perceive teacher coaching as a beneficial way to deliver MI professional development?

Hypothesis: Teachers will perceive teacher coaching as a beneficial way to deliver MI professional development.

Chapter 2. Literature Review

2.1 School-Based Physical Activity Promotion

Schools hold great potential for delivering PA opportunities, especially where public education is universally available and compulsory for most young children ages five to 11 and youth ages 12 to 17 (Hatfield & Chomitz, 2015). In Canada, there were five million children and youth enrolled in public elementary and secondary school programs from 2015 to 2016 which has remained fairly consistent in recent years (Statistics Canada, 2017). Children and youth are required to attend school from the age of five until the age of eighteen but this varies throughout different provinces in Canada (Statistics Canada, 2017).

There are multiple opportunities for children and youth to be physically active during a regular school week, including recess breaks, PE classes, intramural school sports, and active transportation to and from school (Watson et al., 2017). Studies have shown interventions that target these specific periods of time where children and youth can engage in PA may be effective in increasing overall PA levels (Alcaraz et al., 1997; D'Haese et al., 2013; Ridgers et al., 2007; Stratton & Mullan, 2005). However, with limited time available during some of these activities and some students not participating in all of these activities, additional strategies may be required for students to achieve the recommended PA guidelines (Mâsse et al., 2013; Watson et al., 2017).

2.2 Daily Physical Activity

In 2005, the Ontario Ministry of Education released a policy requiring that all students in grades one to eight including students with disabilities are provided with the opportunities to engage in a minimum of 20 minutes of continuous MVPA (Ontario Ministry of Education, 2017). Full implementation of policy No.138 "Daily Physical Activity in Elementary Schools, Grades 1-8" was to take place by the end of 2005 (Ontario Ministry of Education, 2017; Stone et al., 2012). Studies have shown that school-based initiatives aimed at increasing child and youth PA levels have a positive impact on academic performance, cognitive function, on-task behaviour, and attention without compromising curricular demands (Alcaraz et al., 1997; Donnelly et al., 2016; Esteban-Cornejo et al., 2014; Poitras et al., 2016; Rasberry et al., 2010). In response to these benefits and data indicating that the majority of children and youth are failing to meet recommended PA guidelines, governments and public health organizations have implemented DPA policies (Olstad et al., 2015; Weatherson et al., 2019).

These types of DPA policies are intended to be implemented when PE classes are not scheduled, separate from recesses, lunch breaks, and after school (Allison et al., 2016). DPA can be achieved in a variety of locations including classrooms, multi-purpose rooms, gymnasiums, and outside (Stone et al., 2012). Similar policies have been implemented in other provinces and countries around the world, with slight differences in the time children and youth are to be in continuous MVPA (Australian Government Department of Health, 2019; British Columbia Ministry of Education, 2011; Department of Health, 2019; Olstad et al., 2015; Ontario Ministry of Education, 2017; World Health Organization, 2010).

Despite school-based DPA policies, most children and youth are still not meeting PA goals (e.g., 20 minutes of MVPA every day) (Holt et al., 2013; Patton, 2012; Stone et al., 2012; Weatherson et al., 2019). There has been little research done to evaluate the impact of school based PA policies such as DPA (Weatherson et al., 2019). However, the research that is available does not indicate that DPA increases PA for children in schools. In Ontario, a study by Leatherhead and colleagues (2010) indicated that 80 percent of schools were implementing DPA, but schools indicating they were implementing DPA was not associated with students being identified as moderately active through selfreported data. A review by Olstad and colleagues (2015) indicated that DPA policies in Canada had little influence on school-aged children's PA levels.

Recently, research by Weatherson and colleagues (2017) found that teachers' DPA policy implementation approach impacted students' PA levels, specifically their level of MVPA, with a more prescriptive approach to policy implementation resulting in greater PA. With limited structure and instruction on how to implement DPA, often delivery approaches are left to the discretion of the teachers or school administration, which can result in students not meeting the DPA goals (Weatherson et al., 2017). School administrators and teachers report many barriers to implementing DPA in schools such as understanding the guidelines, lack of direction provided in the guidelines, and how activities should be structured towards DPA (Mâsse et al., 2013).

School administrators may impact the efficacy of DPA policies at the school level, but classroom and teacher-level barriers to implementing DPA are shown to be significant predictors overall (Allison et al., 2018). Common barriers affecting the uptake of DPA policies by teachers relate to environmental context and resources (e.g. lack of

training, time, limited resources, limited space, inclement weather conditions), capabilities and goals (e.g. lack of PA proficiency, lack of confidence, curricular demands, low prioritizing of PA), social influences (e.g. perceived parent or guardian values, lack of student motivation), and influences (e.g. poor teacher attitudes towards PA, lack of teacher motivation for PA) (Mâsse et al., 2013; Nathan et al., 2018; Weatherson et al., 2017). A systematic review by Dudley and colleagues (2011) found that most effective strategies to increase students' levels of PA and meet DPA goals are direct and explicit instruction teaching methods and providing teachers with quality professional development in PE instruction.

2.3 Quality Daily Physical Education

QDPE is well-organized PE programs implemented in PE classes for a minimum of 30 minutes each day for students in kindergarten to grade 12 during the school year (Chad et al., 1999; Physical Health and Education Canada, 2019). Whereas DPA is a policy, QDPE is programming that can support the acquisition of the DPA policy goal. QDPE programs include well-planned lessons with formalized instructions, developmentally appropriate activities tied to learning outcomes, and are taught by enthusiastic and competent instructors (Chad et al., 1999; Chen et al., 2014; Physical Health and Education Canada, 2019). Intramural activities and interschool sports are also ways to deliver and implement QDPE programming (Chad et al., 1999). The Canadian Association for Health, Physical Education, Recreation and Dance (CAHPERD) designed nine components to help establish quality programming like QDPE including: 1) daily physical activity 2) identifying and meeting the needs of children and youth 3) encourages positive attitudes towards PA 4) taught by qualified and enthusiastic teachers

5) adequate equipment and facilities 6) incorporates meaningful context and processes and 7) includes fitness components 8) suitable levels of competition and 9) strong administrative support (1997). It is worth noting that CAHPERD established these components 25 years ago, yet there is still a paucity of evidence that they are being utilized within PE settings (Mandigo, 2010).

The implementation of QDPE reflects how well teachers design learning tasks, explain information, organizes the class, and guides continuous learning during a lesson (Chen et al., 2014). Examples of QDPE include PA activities that maximize learning opportunities and student participation, explain key learning features precisely and accurately (e.g. demonstrations, examples, contextual scenarios, learning cues), effectively distributes students, PA learning materials or equipment, and PA space while reinforcing classroom management, closely observe and analyze task performance of students, make appropriate task adjustments, and provides tailored feedback to students (Chen et al., 2016).

QDPE also emphasizes enjoyment, fairness, success, and personal well-being (Physical Health and Education Canada, 2019). QDPE programs allow children and youth to develop the knowledge, skills, and habits to become skillful in movement and lead physically active healthy lives (Chen et al., 2014; Physical Health and Education Canada, 2019). More schools are incorporating the QDPE paradigms as it uses instructionally appropriate practices that maximize students' learning experiences with the chance to engage in sustained MVPA (Chen et al., 2014). Students exposed to QDPE programs are not only more active but also experience higher levels of PA in and outside of school overall (Carson et al., 2014; Chen et al., 2014). A study by Chen and colleagues

(2014) examined how quality PE affects students' daily PA levels in and outside of school. Results indicated that high quality instructional lessons during PE significantly affected students' daily PA levels in and outside of school (Sig.= 0.000, p < .01) (Chen et al., 2014). To add, students who participated in QDPE lessons were more physically active compared to those in poorly instructed QDPE lessons for overall daily PA levels and daily PA achieved outside of school (Chen et al., 2014). A study by Mackenzie and colleagues (2004) investigated a two-year QDPE program on students' PA levels in 24 schools. Participating schools were allocated to either a control or intervention group, where the control schools continued with regular PE programming and the intervention schools were provided with extra curricular materials, professional development training in PE (e.g. didactic instruction, modelling lessons, creating active PE curricula, class management strategies), and on-site follow-ups (McKenzie et al., 2004). Results showed students involved in QDPE programming had an 18 percent increase in overall PA levels and spent 52 percent in MVPA during PE lessons compared to control schools where students spent 48 percent of their time in MVPA (McKenzie et al., 2004).

It is to note, quality PE program instructors have a strong impact on student PA levels. Some provinces in Canada like British Columbia do not mandate PE to be taught by a PE specialist, particularly in elementary schools (Hatfield & Chomitz, 2015; Mâsse et al., 2013). Compared to non-PE teachers, certified PE teachers exhibit higher levels of effective teaching behaviours and provide students with inclusive sport activities that encourage skill-building (Constantinides et al., 2013; Hatfield & Chomitz, 2015). Additionally, teachers who are qualified specialists in PE usually enjoy teaching PE lessons, are better prepared, and are more confident to teach PE compared to teachers

who do not have a PE background (Mandigo et al., 2004; Thompson et al., 2000). Having certified PE teachers implement QPDE is advantageous compared to general classroom teachers however, school boards and provincial policies need to incorporate specific expectations, support resources, and accountability strategies that maximize students PA levels with all teachers (Hatfield & Chomitz, 2015). Reasons being is that some schools lack funding and proper PE professional development for both PE specialists and general classroom teachers to implement QDPE programs (Mandigo, 2010; Marshall & Hardman, 2016). Additionally, in Canada, approximately 29 percent of provinces view PE lessons as non-essential to the regular school curriculum and 87 percent of schools in Canada are lacking provisions to support QDPE (Marshall & Hardman, 2016). To combat declining PA programming offered at schools, one such strategy is to utilize movement integration within school classrooms.

2.4 Movement Integration (MI)

MI infuses short bursts of PA lasting one to 15 minutes at any intensity in general education classrooms during regular school time (Alcaraz et al., 1997; Dinkel et al., 2017; Webster et al., 2015; Webster et al., 2017). The main focus of MI is reducing sedentary time by increasing the amount of PA children and youth receive in elementary schools (Webster et al., 2015). MI acts as a supplement to PE classes and recesses in providing students with more opportunities to be physically active (Webster et al., 2015). MI is a specific tool that fits within the QDPE program and supports meeting the DPA policy. This tool is cost-effective, requires minimal preparation or equipment, and can be implemented in or outside of the classroom (Quarmby et al., 2019; Webster et al., 2015).

There are different approaches to implementing MI in school classrooms. Active breaks are the use of PA as a stand-alone strategy to break-up sedentary academic instruction which can be implemented in the classroom, between lessons, or within lessons (Webster et al., 2015). Curriculum-focused activity breaks are active lessons that integrate movement into existing curricula such as mathematics, language, and science (Quarmby et al., 2019; Webster et al., 2015). There are multiple benefits to MI including increased daily PA levels, improved academic performance, and reduced off-task classroom behaviour in children and youth (Carlson et al., 2015; Martin & Murtagh, 2017a; Watson et al., 2017). Due to numerous benefits, adaptability, and simplicity of MI, many national organizations are advocating that MI be implemented in schools (Heart and Stroke Foundation, 2017; Institute of Medicine, 2013; National Association for Sport and Physical Education & American Heart Association, 2010; ParticipACTION, 2018). Below is Figure 1 depicting the relationship between DPA, QDPE, and MI as they are separate entities from each other however, share a common goal.

Figure 1

Daily Physical Activity (DPA)	Quality Daily Physical Education (QDPE)	Movement Integration (MI)
<i>A policy</i> developed to increase children and youths PA levels.	<i>A program</i> that can support the acquisition of the DPA policy goal.	<i>A specific tool</i> that fits within the QDPE program and supports meeting the DPA policy.
 The policy: All elementary schools in Ontario (grades 1 to 8). Minimum 20 minutes of sustained MVPA. Intended to augment PE. Provided during instructional time outside of PE (not during recess, lunch hours, or after school). Planning at the school level, by teachers and/or administrators. Similar policies vary across each province in Canada. 	 The program: A well-planned school program PE provided for a minimum of 30 minutes each day to all students (kindergarten to grade 12) throughout the school year. Encompasses maximal learning opportunities, meaningful content, and appropriate instruction. Emphasis on fun, enjoyment, success, fair play, self-fulfillment, and personal health. Appropriate activities for age and stage of development for each student. Activities that enhance cardiovascular systems, muscular strength, endurance, and flexibility. Taught by qualified, PE teachers during PE classes. 	 The tool: Infusing PA, at any intensity, for 1 to 15 minutes, within general education classrooms during regular school time. Provided during instructional time (not during PE, recess, lunch hours, or after school). Goal is to increase PA and reduce sedentary time among children and youth. Different types of MI: Academic Infused MI (i.e. incorporates PA into academic content). Non-academic MI (i.e. implemented between lessons or during transitions).
Research indicates that:	Research indicates that:	Research indicates that:
- DPA is not being implemented uniformly	- Students provided QDPE have improved motor and fitness tests,	- Multiple benefits to MI include increased daily PA levels, improved

Summary Table of DPA, QDPE, and MI Model

 in Ontario elementary and middle schools. DPA is not being conducted as intended in terms of duration, intensity, or frequency. Numerous barriers to DPA at the organizational, interpersonal, and individual level. 	 better physiological outcomes, enhanced academic performance, higher enjoyment, and spend larger amounts of time in MVPA. Some QDPE programs are not implemented by PE specialists but general classroom teachers. 	 academic performance, and reduced off-task classroom behaviour in children and youth. MI is adaptable to comprehensive school approaches, supports QDPE, is cost-effective, requires minimal preparation or equipment, and can be implemented in or outside of the classroom. Numerous barriers to implementing MI at the interpersonal and individual level.
Key message: - DPA is a policy; it does not provide instruction, resources, or training to support the achievement of the policy target.	Key message: - QDPE programs provide resources, instructions, and guidelines so children and youth can achieve 30 minutes or more of PA while leading physically active healthy lives.	Key message: - MI is a specific tool that provides additional PA opportunities for children and youth throughout the school day, which contributes to QDPE and DPA activity outcomes.

2.41 MI & Physical Activity Outcomes

Multiple studies have investigated the impact of MI on daily PA levels and PA intensity indicating positive improvements (Bartholomew & Jowers, 2011; Donnelly et al., 2009; Goh et al., 2014; Kibbe et al., 2011; Mahar et al., 2006; Mahar et al., 2011; Martin & Murtagh, 2017a). A study conducted by Mahar and colleagues (2006) evaluated the effect of Energizers, a classroom-based PA program, on in-school PA levels and on-task behaviour in children from kindergarten to grade four from 15 schools across North Carolina. Energizers are short PA breaks, approximately 10 minutes long, organized in

the classroom that integrate learning material, require no equipment, and little teacher preparation (Mahar et al., 2006). The control group did not receive Energizers and the intervention group were prescribed Energizers from their teachers, who were trained before the intervention, and delivered Energizers each day for ten minutes over 12 weeks (Mahar et al., 2006). Pedometers were used to assess students' daily-in-school PA levels and determine if there was a difference in PA levels between the control and intervention group (Mahar et al., 2006). Results indicated that students in the intervention group took significantly more steps during school than students in the control group, averaging 782 more steps daily (Mahar et al., 2006). The difference of in-school steps between the intervention group and control group was statistically significant and the size of the difference was moderate (p < 0.05, ES = 0.49) (Mahar et al., 2006). This indicates that differences in daily-steps can contribute to a high amount of PA achieved over the course of a regular school year (Mahar et al., 2006).

Goh and colleagues (2014) investigated the effects of a classroom-based PA program called Take10! that integrates PA into academic concepts for approximately ten minutes. A total of 210 students from grade three to grade five classes participated in the intervention that took place over 12 weeks (Goh et al., 2014). Students' daily PA was measured using pedometers and physical intensity was determined with accelerometers in a sub-sample of students collected at baseline, mid-intervention, and end-intervention (Goh et al., 2014). Results demonstrated a significant effect size of time on students' daily in-school steps (p < 0.001, ES = 0.20) however, there was a decline in students' mean daily in-school steps by 152 from mid-intervention to end-intervention but the difference was not significant (p = 0.22) (Goh et al., 2014). Students accumulated 672

more steps during school at mid-intervention compared to baseline which was statistically significant and for the 72 students that wore accelerometers, there was a two percent increase in MVPA from baseline to the end of the intervention (Goh et al., 2014). Other studies that have implemented Take10! interventions indicate positive outcomes in the amount and intensity of PA students achieve during a regular school day, so much as 1000 extra steps per day and 0.5 hours spent in moderate-intensity, ultimately experiencing higher overall PA levels (Kibbe et al., 2011; Liu et al., 2008; Stewart et al., 2004).

Riley and colleagues (2014) evaluated a program called Encouraging Activity to Stimulate Young (EASY) Minds that integrates movement into mathematics lessons. Using a randomized control trial, one group of 27 elementary students were in the EASY Minds intervention and the other 27 students were in the control, continuing their usual math lessons (Riley et al., 2014). The intervention group received three 60 minutes of EASY Minds intervention organized by the research team within the classrooms over six weeks (Riley et al., 2014). After the intervention, significant effects were found in MVPA by 9.7 percent (p < 0.001) and reduced sedentary time by 22.4 percent (p < 0.001) during mathematics lessons and across the school day for the intervention group (Riley et al., 2014). Riley and colleagues (2016) also investigated the impact of the EASY Minds program delivered by teachers instead of the research team on PA and academic outcomes over six weeks. Ten classes from Australia were organized into an intervention group with three 60-minute lessons of EASY Minds a week or a control group which continued with normal math lessons (Riley et al., 2016). Results indicated significant intervention effects for PA steps accumulated by an additional 168 (p = 0.008), MVPA

intensity by an extra 2.6 percent (p = 0.009), and reduced sedentary time by 3.4 percent (p = 0.044) during EASY Minds math lessons and throughout the school day compared to the control group (Riley et al., 2016). These results are consistent with findings from other PA interventions examining the effect of PA levels among elementary school students (Donnelly & Lambourne, 2011; Kriemler et al., 2010; Liu et al., 2008).

MI also has positive effects on body-mass index (BMI) (Donnelly et al., 2009; Donnelly & Lambourne, 2011). Donnelly and colleagues (2009) investigated the effects of a three-year, cluster-randomized control trial on an MI program called Physical Activity Across the Curriculum (PACC) which integrates movement into academic lessons. The delivery of PAAC is to accumulate 90 minutes per week of moderate-tovigorous physically active academic lessons planned intermittently during a regular school day (Donnelly et al., 2009). Primary outcomes included BMI and secondary outcomes included daily PA and academic achievement (Donnelly et al., 2009). Twentyfour elementary schools consisting of grade two and three classes in North Kansas were cluster-randomized to either an intervention group consisting of PAAC or a control group (Donnelly et al., 2009). Results illustrated that there were no significant differences for change in BMI or the percentile of BMI however, the change in BMI decreased significantly from baseline to three years in students that were exposed to PAAC for 75 minutes or more per week (p = 0.02) (Donnelly et al., 2009). In addition, students that were at-risk for obesity at baseline shifted to normal BMI at the end of the PAAC intervention compared to the control group (Donnelly et al., 2009). Students in the PAAC intervention exhibited greater daily PA levels during a regular school day and on

weekends compared to the control group plus attained 27 percent of MVPA during academic lessons (Donnelly et al., 2009).

MI interventions such as Energizers, Take 10!, EASY Minds, and PAAC provide students with additional opportunities to be active during the school day while also contributing to the recommend PA guidelines (Riley et al., 2014). Teachers should be supported and encouraged to embed movement-based programs as they offer a practical solution to overcome time constraints (Riley et al., 2016).

2.42 MI & Learning Behaviour Outcomes

Evidence suggests that MI may have a positive impact on student learning behaviours such as time-on-task, selective attention, and academic motivation in-class (Watson et al., 2017; Webster et al., 2015). Engaging in short-bursts of PA during the school day can lead to immediate changes in learning behaviours, especially in students with behavioural issues (Bartholomew & Jowers, 2011; Martin & Murtagh, 2017b; Mullender-Wijnsma et al., 2015b). Two Canadian studies examined the effects of short bursts of high-intensity interval exercises called FUNtervals on off-task behaviour, time spent not engaging in academic learning, in primary school students (Ma et al., 2014, 2015). FUNtervals are short-bursts of high-intensity exercises like running, jumping, and squats that last approximately four minutes and can be performed directly in the classroom as a movement break (Ma et al., 2014, 2015). In the first study by Ma and colleagues (2014), 24 grade four students and 20 grade two students were exposed to either a no-activity break or a FUNterval break on alternating days for three weeks. Noactivity breaks consisted of non-lesson materials taught to students for ten minutes while FUNtervals were incorporated each day over five days lasting 10 minutes (Ma et al.,

2014). Off-task behaviour such as motor (e.g., fidgeting, drawing, restlessness), passive (e.g., gazing off, not making eye contact), and verbal (e.g., talking to other classmates, talking when not called upon) behaviour was observed fifty minutes after each no-activity and FUNterval break over the three weeks (Ma et al., 2014). Mean percentages of all offtask behaviour significantly decreased after the FUNterval intervention compared to the no-activity breaks in grade two classrooms (Ma et al., 2014). In grade two classrooms, passive off-task behaviour decreased by 9 percent (p < 0.01, ES = 0.74), verbal off-task behaviour decreased by 3 percent (p < 0.05, ES = 0.45), and motor off-task behaviour decreased by 15 percent (p < = 0.01, ES = 1.076) with the greatest intervention effect in students identified as having high off-task behaviour (Ma et al., 2014). In grade four classrooms, the average percentages of passive and motor off-task behaviour significantly decreased following a FUNterval break with an effect size of 0.31 and 0.48 respectively for passive and motor off-task behaviour (Ma et al., 2014). This study demonstrates that students engaging in four minutes of high-intensity PA, which is the shortest intervention protocol to date, may adequately decrease off-task behaviour (Ma et al., 2014)

Similarly, Ma and colleagues (2015) examined FUNtervals on improvements in selective attention and whether the relationship was predicted by students' passive, verbal, and motor behaviour. Selective attention is a decision-making function that is essential for learning concepts and academic success (Ma et al., 2015). Seven grade three to five classes with 88 students in total were either subjected to no-activity breaks, 10 minutes of non-lesson material, or FUNtervals, four minutes of short burst, high-intensity exercises lasting ten minutes overall for the total of three weeks (Ma et al., 2015). During week one, students were familiarized with a d2 test of attention which is an assessment of
individual attention and concentration related to academic performance (Brickenkamp, 2002). During week two and three, students were issued the d2 test after performing a noactivity break or a FUNterval break (Ma et al., 2015). Results indicated that motor, passive, and verbal off-task behaviour did not predict changes in selective attention, however, there was a significant main intervention effect (p < 0.05) on the d2 test performance with reduced errors by the third week in students that had FUNterval activity breaks (Ma et al., 2015). These results demonstrate that brief high-intensity bouts of exercise may lead to improvements in off-task behaviour and selective attention in elementary school students (Ma et al., 2014, 2015).

Additionally, Janssen and colleagues (2014) investigated acute PA breaks on selective attention in primary school children over four months. One hundred and twenty-three primary school students from grade five were assigned to four experimental breaks after one hour of usual cognitive lessons (Janssen et al., 2014). Each group was exposed to one of the four experimental breaks lasting fifteen minutes: a) continuing cognitive tasks such as mathematics or language exercises, b) a passive break such a listening to a story, c) a moderate-intensity PA break, or d) a vigorous-intensity PA break (Janssen et al., 2014). Moderate-intensity PA included walking to and from the gymnasiums or using equipment while vigorous-intensity activities included running to and from the gymnasium, jumping, or skipping (Janssen et al., 2014). Selective attention was assessed in the classroom after the fifteen-minute break by using the Test of Every day Attention for Children (TEA-Ch) test (Janssen et al., 2014; Manly et al., 2001). Selective attention significantly improved (p < 0.001) after a passive break, moderate-intensity PA break, and vigorous-intensity PA break with the strongest result (-0.59, 95% CI: -0.70; -0.49)

after completing moderate-intensity PA exercises (Janssen et al., 2014). Having PA breaks organized during the school day can potentially optimize selective attention during academic lessons and support learning outcomes in students (Janssen et al., 2014).

A qualitative study by Dyrstad and colleagues (2018) examined the response of physically active academic lessons within an Active School programme. Over 10 months, nine schools were randomly assigned to four control schools and five intervention schools (Dyrstad et al., 2018). Physically active academic lessons were approximately 45 minutes in length and implemented twice a week by classroom teachers within the intervention schools (Dyrstad et al., 2018). These lessons could occur outdoors or within the classroom at any given time and integrated into any academic subject within the curriculum (Dyrstad et al., 2018). Teachers stated that the classroom environment was less disruptive and children were able to focus for longer periods after the physically active academic lessons (Dyrstad et al., 2018). In addition, children struggling during academic lessons worked better with peers after active academic lessons, which motivated student learning (Dyrstad et al., 2018).

Research by Kerpan and colleagues (2019) investigated on-task behaviour in 13 grade four and five Indigenous students through the use of curriculum infused MI. The MI activities were Energizers, originally created by the Activity Promotion Laboratory in the Department of Exercise and Sport Science at East Carolina University (Mahar et al., 2010). Energizers were used by Mahar and colleagues (2006) when examining MI and on-task behaviour. Energizer activities were implemented during regular class time and lasted approximately five minutes each day over three weeks (Kerpan, Humbert, & Rodgers, 2019). On-task behaviour was measured using the guidelines established by

Mahar (2011) with the use of a repeated measures design, a two-observer system, and momentary time sampling (Kerpan, Humbert, & Rodgers, 2019). Results demonstrated that when students did not receive a MI break, on-task behaviour decreased significantly (p < 0.05) however when students received an MI break, time-on-task increased (p < 0.001) (Kerpan, Humbert, & Rodgers, 2019). This study illustrates that on-task behaviour may increase for students when exposed to MI (Kerpan, Humbert, & Rodgers, 2019).

Kerpan and colleagues (2019) also examined on-task behaviour in nine kindergarten and grade one Indigenous students using Energizers (2019). Using the same procedures the research team found that on-task behavior increased when kindergarten children took part in MI lessons (Kerpan, Humbert, Rodgers, et al., 2019). There was a significant difference (p < 0.001) in on-task behaviour from the start of the lesson until the end of the lesson when receiving the MI intervention.

Implementing MI programs during a regular school day is a feasible and effective approach for improving many learning-related behaviours including on-task behaviour, executive functioning, and academic motivation (Bidzan-Bluma & Lipowska, 2018; Dyrstad et al., 2018; Mahar et al., 2006; Mullender-Wijnsma et al., 2015b). These outcomes are measures of student attention, behavioural control, and in-class engagement which relate to academic performance (Grieco et al., 2015; Stallings, 1980).

2.43 MI & Academic Performance

Implementing acute or long-term bouts of PA contributes to structural and functional changes in the brain that positively affect cognitive function (Bidzan-Bluma & Lipowska, 2018; Institute of Medicine, 2013; Janssen & Leblanc, 2010). Multiple studies have examined the effect of short and long duration MI programs on students' academic performance indicating positive associations (Donnelly et al., 2009; Donnelly et al., 2016; Mullender-Wijnsma et al., 2015a; Mullender-Wijnsma et al., 2015b). A study conducted by Donnelly and colleagues (2009) found significant improvements (p < 0.01) in reading, writing, mathematics, and language skills over the course of a three-year PAAC intervention. The PAAC intervention included 90 minutes per week of moderate-to-vigorous physically active academic lessons planned intermittently during a regular school day and had a cluster randomized control trial design (Donnelly et al., 2009). This research also showed improvement in student body weight, as described in the previous sub-section (Donnelly et al., 2009).

Mullender-Wijnsma and colleagues (2015a) examined academic achievement in reading and mathematics after one year using a program called "Fit en Vaardig op school' (F&V) meaning fit and academically proficient. Six elementary schools with a total of 228 students from grades two and three were separated into a control group and an intervention group (Mullender-Wijnsma et al., 2015a). The intervention group received F&V lessons while the control group continued with regular classroom lessons (Mullender-Wijnsma et al., 2015a). Researchers created 63 F&V lessons which included physically active academic lessons where students had to execute mathematics and language skills while being physically active (Mullender-Wijnsma et al., 2015a). Implementation of F&V lessons lasted ten to 15 minutes during mathematics and language subjects three times a week during a regular school year with a goal of 90 minutes of PA achieved each week (Mullender-Wijnsma et al., 2015a). Although grade two children in the intervention scored lower compared to the control group, there was a significant interaction (p < 0.05) between the F&V condition and grade with respect to

post-test mathematics and reading scores (Mullender-Wijnsma et al., 2015a). Results from academic tests indicated that grade three students who took part in the F&V intervention scored higher in mathematics and reading in comparison to the control group (Mullender-Wijnsma et al., 2015a).

Hraste and colleagues (2018) investigated an integrated PA program in mathematics and geometry over the course of four weeks. The experimental group enrolled 19 students and the control group had 17 students (Hraste et al., 2018). Physically active lessons during mathematics and geometry were prepared for the experimental group lasting approximately 45 minutes each day while the control group continued with traditional teaching methods (Hraste et al., 2018). Results indicated that students in the intervention group were significantly more successful (p < 0.05) compared to the control group in attaining mathematics and geometry concepts (Hraste et al., 2018).

Finn and McInnis (2014) investigated teachers and students perceptions of integrating an Active Science curriculum into middle school science lessons. The Active Science program was implemented by teachers within their classroom and included seven physically active integrated science lessons for grade five and six students for 35 minutes two days a week for a total of seven weeks (Finn & McInnis, 2014). This study was a mixed-methods design (Finn & McInnis, 2014). During the active lessons, students wore heart rate monitors and pedometers to collect PA data (Finn & McInnis, 2014). After the intervention, teachers felt it was feasible to incorporate PA into science lessons and it improved students' science knowledge and inquiry skills through the use of integrated technology during the lessons (Finn & McInnis, 2014). Students felt by incorporating PA

into the science curriculum, they were able to learn science content more easily as it was fun, interactive, and reinforced learning through technology (Finn & McInnis, 2014).

Howie and colleagues (2015) sought to examine an acute-dose response of classroom exercise breaks with executive function and math performance in elementary school children using five minutes, 10 minutes, and 20 minutes of exercise breaks compared to 10 minutes of sedentary activity. Ninety-six students from grades four to five in five classrooms were randomized to receive either five minutes, 10 minutes, 20 minutes of exercise breaks, or 10 minutes of sedentary lessons (Howie et al., 2015). The classroom activity breaks were called Brain BITES and included exercises that promoted moderate-to-vigorous intensity during lessons delivered twice a week over four weeks by research staff (Howie et al., 2015). A Trail-Making Test, an Operational Digit Recall test, and a math fluency test were provided to students immediately before and after each condition to assess executive functioning, memory, mathematic performance (Hoza et al., 2015). Students that participated in 10 and 20 minute PA breaks had higher mathematics scores, estimated difference of 1.07 (p = 0.04, ES = 0.24) and 1.2 (p = 0.02, ES = 0.27) respectively, compared to the sedentary condition, yet, executive functioning did not improve (Howie et al., 2015). Although this study did not find a significant total effect between all four conditions, math scores did improve considerably in response to ten minutes and twenty-minute of Brain BITES (Howie et al., 2015).

The research on MI programs and academic achievement indicates that there is likely a positive relationship between these two variables (Riley et al., 2016; Webster et al., 2015). Integrating PA within the classroom can potentially be an accessible strategy for improving academic outcomes for a range of students (Riley et al., 2016).

2.44 MI & Student Enjoyment

Not only do MI programs improve PA outcomes, learning behaviours, and academic performance, they also increase student enjoyment and confidence in the classroom (Riley et al., 2017; Webster et al., 2015). Many students enjoy PA integrated during regular academic lessons within the classroom as it provides a break from sedentary instructional time while also being fun and interactive (Dyrstad et al., 2018). To build on this, McMullen and colleagues (2019) examined students' experiences of a MI program called *Moving to Learn Ireland* which aims towards reducing sedentary time by increasing PA within the classroom. Moving to Learn Ireland integrates movement activities into language subjects for primary and secondary grades (McMullen et al., 2019). One-hundred and 35 primary school students from two schools participated in the MI intervention that occurred over eight weeks where teachers implemented three lessons of Moving to Learn Ireland per week (McMullen et al., 2019). At the end of the MI program, three common themes emerged; an inherent enjoyment of movement, appreciation of learning through movement activities, and perceived physical benefits of being active in the classroom (McMullen et al., 2019).

Similarly, Howie and colleagues (2014) explored teacher and student perceptions to Brain BITES which is an MI program that incorporates aerobic exercises during regular class time (2014). Brain BITES was implemented in two grade four and two grade five classrooms twice a week over a five-week period (Howie et al., 2014). Onehundred and four students participated in four different conditions; five minutes, 10 minutes, and 20 minutes of Brain BITES, and 10 minutes of sedentary classroom activity (Howie et al., 2014). Teachers' experiences and perceptions of Brain BITES for students included increased enjoyment, improved learning, and reduced behavioural disruptions

(Howie et al., 2014). Students reported the benefits of PA, the effects of learning after Brain BITES, and overall enjoyment of active breaks (Howie et al., 2014). Students also noticed that they were more focused and awake after the Brain BITES activities which they perceived assisted with academic testing afterward (Howie et al., 2014).

Riley and colleagues (2017) investigated students' and teachers' perceptions of a MI program called Encouraging Activity to Stimulate Young (EASY) Minds that integrates movement into math lessons in order to enhance learning and enjoyment during math lessons while also promoting PA. Four teachers from grades five to six embedded EASY Minds into their daily math curriculum for three lessons each over a six week period (Riley et al., 2017). Students' found the EASY Minds program fun, engaging, and enjoyable while also limiting distractions like talking in class and time off-task during sedentary class time (Riley et al., 2017). Teachers also had positive perceptions about the program, stating improvements in students' overall engagement and enjoyment during physically active math lessons (Riley et al., 2017).

Finn and colleagues (2014) analyzed students' and teachers' perceptions of the Active Science curriculum which integrated PA into science lessons lasting approximately 35 minutes twice a week for a total of seven weeks. Students felt the Active Science lessons assisted with learning science content while encouraging active participation in class and enjoyment during science lessons (Finn & McInnis, 2014). Teachers also noticed positive student attitudes when implementing PA in the classroom (Finn & McInnis, 2014).

Implementing MI within the classroom can bring joy to a classroom and develop excitement towards learning curricular content, which may contribute to student success and an overall positive classroom atmosphere, which is crucial for student learning.

2.45 MI Barriers

Despite the numerous benefits of MI, there has been limited uptake from general classroom teachers (Webster et al., 2015). The commitment and regularity of MI is dependent on teachers' perceived benefits and barriers to integrating MI into the classroom (Dinkel et al., 2017). Most general education teachers have positive views of MI and notice the physical, mental, and academic benefits MI brings about in students yet, there is still limited uptake of programs (Cothran et al., 2010; Martin & Murtagh, 2017b; Parks et al., 2007; Stylianou et al., 2016; Webster et al., 2013).

Cothran and colleagues (2010) used a phenomenological approach to investigate teachers' perceptions of implementing MI into academic lessons over one year. Twenty-three teachers participated and were encouraged to implement a minimum of ten MI lessons over the year (Cothran et al., 2010). The benefits of integrating movement into the curriculum for teachers included student engagement, student well-being, and personal interest to be active, however, barriers to implementation included scheduling constraints, curriculum pressures, and perceptions of MI as additional work instead as a supplement to academic learning (Cothran et al., 2010).

Webster and colleagues (2017) examined 12 elementary school teachers' perceptions and experiences towards MI in order to design and implement a program called Partnerships for Active Children in Elementary Schools (PACES). PACES focused on increasing children and youths' PA levels during the school day while supporting

teachers who normally struggle with implementing movement in their classroom (Webster et al., 2017). Teachers were selected based on their low implementation of MI and each teacher was interviewed individually on the advantages, disadvantages, experience, barriers, and facilitators associated with MI (Webster et al., 2013; Webster et al., 2017). The challenges and barriers to implementing MI included logistical problems such as lack of time and an overcrowded schedule, teachers' knowledge and beliefs of MI such as their lack of confidence, willingness, or ability to implement MI, student behavioural issues, varying school climate, and lack of resources (Webster et al., 2017).

Quarmby and colleagues (2019) investigated the barriers of MI within classroom settings in discussions with 31 elementary school teachers using the socio-ecological model. The barriers teachers experienced with implementing MI included teacher confidence and competence, teacher attitudes and perceptions, student behaviours, physical environments such as space availability, preparation time, sharing spaces, safety, limited resources, school culture, and policy influences such as curriculum content and assessment pressures (Quarmby et al., 2019).

Martin and Murtagh (2017b) evaluated perceptions of five teachers and 129 students in an eight-week MI intervention called the Active Classroom. Teachers were provided a one-hour workshop prior to the intervention and received forty lesson plans, teaching resources, and lesson reminders (Martin & Murtagh, 2017b). According to the teacher participants, barriers to the use of MI included lack of time, space, adaptability to academic lessons, and regaining of student control (Martin & Murtagh, 2017b).

McMullen and colleagues (2016) sought to determine teachers' perceptions that encourage or inhibit the adoption of an MI program called *Moving to Learn Ireland*.

Moving to Learn Ireland is an MI program that can be integrated into academic content specifically English and Irish language along with mathematics (McMullen et al., 2019; McMullen et al., 2016). Teachers were provided two training workshops lasting one hour that explained the MI program, modeled practice movement lessons, discussed the progression of lessons, and provided additional activities (McMullen et al., 2016). Teachers were encouraged to incorporate *Moving to Learn Ireland* as much as possible with a minimum goal of three lessons per week over eight weeks (McMullen et al., 2016). Common barriers teachers' experienced when implementing movement in their classroom included limited time, space, unable to meet curricular demands, classroom set-up, class size, nature of the PA, classroom disruption, safety issues, and student control (McMullen et al., 2016).

Goh and colleagues (2017) found similar results as other MI researchers, indicating that time, student resistance, space constraints, and students' inability to perform academic learning and PA simultaneously were key barriers to MI use for teachers. The authors also examined facilitators to teacher use of MI (Goh et al., 2017). Teachers in this study identified that preparation time, gaining experience/program continuance, role modelling, adaptability, children's request for MI, and collaboration all aided in utilizing MI (Goh et al., 2017). Teachers felt that the more they implemented the activities, the easier they became, so being persistent was crucial (Goh et al., 2017). Participants also believed that when they engaged in the activities with the students and showed joy in doing them, it helped increase student desire for the program (Goh et al., 2017). Also, when students requested MI, the teachers were more likely to deliver them (Goh et al., 2017). Lastly, collaboration and mentorship amongst teacher colleagues and university partners was an important factor in MI use in this study (Goh et al., 2017).

In the work by Kerpan and colleagues (2019), perceptions about MI were examined in Canadian Indigenous teachers and students. Two teachers of a combined kindergarten and grade one class, as well as a grade four and five class, participated in one-on-one interviews while 13 grade four and five students participated in a focus group (Kerpan, Humbert, et al., 2019a). Teachers expressed positivity in regards to implementing MI in the classroom but also challenges including student chaos, safety issues, and a need for customization of MI activity to fit the class setting and students (Kerpan, Humbert, et al., 2019a). Both teachers' believed MI activities should be customized to their specific classroom and student needs (Kerpan, Humbert, et al., 2019a). Findings from this work also indicated that teacher coaching on MI that occurs in the classroom may support teachers in utilizing MI (Kerpan, Humbert, et al., 2019a).

In a recent systematic review on barriers and facilitators to MI, Michael and colleagues (2019) outlined barriers and facilitators according to a social-ecological model, identifying barriers and facilitators falling under intrapersonal and institutional levels. Institutional facilitators included administrative support and availability of resources (Michael et al., 2019). Institutional barriers included lack of time, lack of resources, lack of space, and lack of administrative support (Michael et al., 2019). Intrapersonal facilitators were perceptions that PA is valuable, perceived ease of implementation, and teacher confidence (Michael et al., 2019). Lastly, intrapersonal barriers included implementation challenges, lack of teacher motivation, and lack of

training (Michael et al., 2019). This work sums up the challenges teachers face when implementing MI and the factors that might lead to successful MI implementation.

Although teachers are supportive and aware of the benefits MI offers, many are still faced with barriers to utilizing and continuing MI even after training and interventions. However, two studies (Kerpan, Humbert, et al., 2019b; Kretlow et al., 2011) found that providing teacher coaching to elementary school teachers, aided in addressing MI barriers.

2.46 MI & Professional Development

To my knowledge there have been no studies that have exclusively studied MI professional development, what is known about MI professional development comes from previous MI research interventions where the training processes are explained. Most MI intervention studies and programs offer some training, such as one-time workshops, for teachers before asking them to implement a movement program directly in their classroom (Webster et al., 2015). Teachers may receive weekly reminder e-mails and inclassroom observation drop in's in some cases (Riley et al., 2017; Riley et al., 2016; Stylianou et al., 2016). These strategies may reduce perceived barriers while building self-efficacy and competency when implementing MI, leading to increased utilization and program continuance (Webster et al., 2015). However, the research illustrates that many intrapersonal barriers still exist despite typical MI training and maintenance strategies (Michael et al. 2019). Another limitation of past MI studies was that when published, training details were limited. Questions such as who led the training, the goals and purpose of the training, the length of the training, and the theoretical base for the training are often not discussed (Vazou et al., 2020).

2.5 Physical Education Teacher Professional Development

Although there is limited research available on professional development for MI, there has been research conducted on teacher professional development for PE. While MI and PE are different, the overlap of some of the goals (e.g. increased movement) makes PE professional development research relevant to MI.

A systematic review of teacher professional development for school based PE reviewed 46 published articles on teacher training and found there is some evidence that teacher training programs that are greater than one day, provide compressive content, are framed by theory, provide follow up or ongoing support, and measure teacher satisfaction are more effective at increasing student PA (Lander et al., 2017). However, the authors of this review indicated that the findings should be viewed cautiously as much of the literature does not provide adequate detail on professional development strategies. Moreover, the authors state that teacher professional development for PE is understudied in general (Lander et al., 2017). The authors suggested that due to limited evidence and poor reporting, the role teacher professional development is having on PA is unclear (Lander et al., 2017). A similar systematic review by Naylor and colleagues (2015) indicated that teacher training is an important factor in implementing PE interventions. Research also indicates that teachers want more quality professional development for PE (Stoddart & Humbert, 2017; Wright et al., 2020)

A recent study by Wright and colleagues (2020) examined the impact of jobembedded professional development on PE. This study provided details on training and examined multiple dependant variables including teacher's physical literacy, knowledge, confidence, satisfaction, and future intentions (Wright et al., 2020). Physical literacy is

defined as "the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life" (Tremblay et al., 2018). The job-embedded professional development was effective at changing teachers' ability in physical literacy-enriched program delivery for PE and enhancing PE (Wright et al., 2020).

Available research indicates that PE professional development should have the same features of other teacher professional development programs, which includes attributes such as job-embedded, instructional focus, collaborative, and authentic instruction (Edwards et al., 2019; Lander et al., 2017; Wright et al., 2020).

2.6 High-Quality Teacher Professional Development

Darling-Hammond and colleagues (2017) suggest high-quality professional development stems from seven shared features; 1) content focused 2) incorporates active learning utilizing adult learning theory 3) supports collaboration, typically in job-embedded contexts 4) uses models and modeling of effective practice 5) provides coaching and expert support 6) offer opportunities for feedback and reflection and 7) is of sustained duration. When combined, these seven features can lead to changes in teacher knowledge and practices as well as improvements in student learning outcomes (Darling-Hammond et al., 2017).

Content focused professional development involves specific curricular material such as mathematics, science, or literacy and is focused on what the teachers teach (Darling-Hammond et al., 2017). It is often job-embedded, meaning professional development situated in teacher's classrooms with students present (Darling-Hammond et al., 2017). Content specific professional development has shown to improve academic

outcomes in students and teacher learning (Darling-Hammond et al., 2017; Doppelt et al., 2009; Roth et al., 2011).

Active learning allows teachers to actively engage in creating and testing new teaching strategies they design for their students (Darling-Hammond et al., 2017). Some active learning strategies for teachers include interactive activities, collaboration, coaching, feedback, and reflection (Darling-Hammond et al., 2017). These strategies usually veer away from traditional sit-and-listen professional development (Darling-Hammond et al., 2017). The aim of active learning is to address how and what teachers learn in order to engage teachers directly in their new practices and connect with students (Darling-Hammond et al., 2017). Professional development that focuses on active learning improves student achievement as well as teacher pedagogy (Buczynski & Hansen, 2010; Greenleaf et al., 2011).

High-quality professional development that supports collaboration provides teachers an opportunity to share ideas with other teachers or coaches in job-embedded contexts (Darling-Hammond et al., 2017). Collaboration can consist of one-on-one, small groups, or school wide professional development interactions (Darling-Hammond et al., 2017). Collaboration has proven to be effective in promoting school-wide changes that go beyond individual classrooms (Allen et al., 2011; Buczynski & Hansen, 2010).

A randomized control trial study by Allen and colleagues (2011) investigated a website-mediated coaching program called My Teaching Partner-Secondary for improving teacher-student interactions through one-on-one collaboration with a coach. Initial training was provided for teachers in the form of workshops followed by two monthly coaching sessions from a remote mentor (Allen et al., 2011). Teachers were

required to submit a video of their teaching practices to coaches, reflect on their teaching, and discuss the relationship between teacher practice and student engagement with coaches (Allen et al., 2011). The study offered 20 hours of personalized, one-on-one, professional development training over 13 months (Allen et al., 2011). Students of teachers who were exposed to one-on-one collaborative coaching showed improvements in academic achievements (0.22 SD) compared to the control group resulting in an average increase in student achievement from the 50th to the 59th percentile (Allen et al., 2011).

Another study by Johnson and Marx (2017) used a Transformative Professional Development model to examine teaching practices and the school learning environment in two urban middle school science classes over three years. Two schools were the control group that continued with regular school programming and the other two schools were provided with the Transformative Professional Development model intervention which consisted of a two-week training for 120 hours in inquiry-based science teaching strategies, multicultural educational topics, and strategies for building literacy during year one (Johnson & Marx, 2017). Teachers involved in the intervention were also provided nine monthly whole-day development meetings after the two-week training to discuss their teaching practices, common issues, areas of improvement (Johnson & Marx, 2017). Through qualitative interviews, results demonstrated teachers in the intervention group improved in their teaching of science content, developed critical friendships with other teachers, assisted other participating teachers, built supportive relationships with their students, and implemented cooperative learning environments within their school classrooms (Johnson & Marx, 2017).

Professional development that utilizes models of effective practices is proven to improve student achievement (Darling-Hammond et al., 2017). This may take the form of watching someone model effective teaching methods or reviewing curricular material that is effective. This helps teachers attach their ideas and their classroom situations on to strategies and materials that are proven to be effective (Darling-Hammond et al., 2017). Models may include video or written cases of teaching, demonstration of lessons, unit or lesson plans, observations of peer teachers, and sample curriculum material (Darling-Hammond et al., 2017).

Effective professional development that provides coaching and expert support involves sharing of expertise about content and evidence-based practices that focuses on the teachers' individual needs (Darling-Hammond et al., 2017). Evidence-based practices provided to teachers include modeling strong instructional practices, supporting group discussion, and collaborative analysis of student work (Darling-Hammond et al., 2017). Additionally, many individuals with different backgrounds can fill the role as an expert but are commonly well diverse and specially trained in a specific field (Darling-Hammond et al., 2017). Research suggests that teachers who are provided with coaching and expert support are more likely to use the desired teaching practices and apply them more than those receiving traditional forms of professional development training like workshops (Darling-Hammond et al., 2017).

High-quality professional development that offers opportunities for feedback provides built-in time for teachers to think about, receive input on, and make changes to their teaching practices through reflection and feedback (Darling-Hammond et al., 2017). Providing teachers' opportunities for feedback and reflection help teachers move towards

implementing changes in their teaching practices that they have learned or seen modeled during professional development (Darling-Hammond et al., 2017). When professional development offers opportunities for feedback and reflection, it often includes the exchange of both positive and constructive feedback to improve teaching practices through the use of lesson plans, demonstration of lessons, or videos of instruction (Darling-Hammond et al., 2017; Johnson & Fargo, 2009).

Effective professional development occurs over an extended period of time. This provides teachers adequate time to learn, practice, implement, and reflect on new strategies learned that could change their practice (Darling-Hammond et al., 2017). Although there are no specified hours or amount of professional development sessions, research has indicated single one-time workshops are ineffective in changing teaching practices (Darling-Hammond et al., 2017; Desimone, 2009; Desimone & Pak, 2017). Offering teachers multiple professional development opportunities to engage in learning around distinct concepts or practices over a sustained duration may lead to greater changes in teacher practices and student learning (Darling-Hammond et al., 2017). Multiple studies have provided teachers with different forms of learning engagement such as multiple hour-long sessions or hour-long workshops over a semester or school year (Doppelt et al., 2009; Heller et al., 2012). The duration of professional development sessions has a large impact on teacher and student learning as well continuance outside of formal school environments (Darling-Hammond et al., 2017).

2.7 Teacher Coaching

Teacher coaching, sometimes known as embedded professional development or instructional coaching, has all the features of effective professional development

(Darling-Hammond et al., 2017) and is the preferred method of teacher professional development by practitioners, researchers, and policymakers (Croft et al., 2010; Darling-Hammond et al., 2017).

Teacher coaching as professional development is where coaches or peers observe or coach teachers within their classroom environment during instructional time and provide critical feedback for improvement (Kraft et al., 2018; Snyder et al., 2015).

Coaches are provided their own professional development and should have a repertoire of proven research-based strategies to help them assist teachers in addressing areas for change or improvement (Knight, 2007). Without their own professional development, coaches may be ineffective, misinform teachers, and lose time or money (Knight, 2007). Coaches are provided opportunities to learn how to: a) enroll teachers in coaching, b) identify appropriate environments for teachers to learn, c) model and gather data in the classroom and, d) engage in professional dialogue about classroom and teaching practices (Knight, 2007). These are some of the professional learning activities coaches should engage in to improve their coaching strategies (Knight, 2007). Coaches should also improve in areas of communication, relationship building, change management, and leadership (Knight, 2007). Finally, professional learning for coaches should build deeper knowledge and understanding about the teaching practices they are sharing with teachers (Knight, 2007)

Coaches also engage in professional dialogue with teachers and focus on developing specific skills to enhance their teaching practices (Lofthouse et al., 2010). This type of strategy is meant to be personalized for each teacher, context-specific, and sustained over a period of time (Kraft et al., 2018). Teacher coaching can improve

classroom instruction by providing individualized feedback on specific teaching skills and translate knowledge into new classroom practices (Kraft et al., 2018). Through the use of teacher coaching and unitizing various coaching strategies, it can help grow teachers' abilities to implement new curricular material and instructional resources (Kraft et al., 2018). As people, teacher coaches are empathetic, have strong communication and listening skills, and build trusting relationships (Knight, 2007). Teacher coaches encourage and support teachers' views of their classroom practices while creating a goalorientated plan (Knight, 2007). Furthermore, teacher coaches usually focus on a broader range of instructional issues such as classroom management, content development, and specific teaching practices (Knight, 2007).

Research indicates the teacher coaching is an effective method for enhancing teacher practices in the classroom (Briere et al., 2015; Dufrene et al., 2014). Teacher coaching commonly aims to enhance current teaching skills or develops new teaching skills that lead to enhanced practices (Dudek et al., 2019).

A study by Kretlow and colleagues (2011) examined the effects of in-service training and coaching on kindergarten teachers' accuracy in delivering group instructional units in math. Teachers were trained to use whole-class instruction strategies consisting of a model-lead-test for introducing new concepts and correcting errors, unison responding, and response cards (Kretlow et al., 2011). Descriptive data indicated that all teachers improved in their delivery of instructional units in math after receiving inservice training with a second level of improvement after coaching and reported high levels of satisfaction post-intervention (Kretlow et al., 2011).

A similar study by Kretlow and colleagues (2012) used in-service training and coaching to examine first grade teachers' accuracy in delivering research-based strategies, including model-lead-test for implementing new concepts and correcting errors, whole-class responding, and response cards. Three teachers were provided with a three-hour group in-service workshop, one individual preconference, one side-by-side coaching session, and one feedback meeting (Kretlow et al., 2012). Results showed teachers improved in their delivery of the research-based strategies after having inservice training, demonstrated a second level of improvement after coaching, and reported high levels of confidence and satisfaction with the professional development training overall (Kretlow et al., 2012).

Dudek and colleagues (2019) used a data-driven coaching model called the Classroom Strategies Coaching (CSC) to examine changes in teachers' universal practices. Prior to coaching, a CSAS-observer form would measure teachers' initial use of evidence-based instructional and behaviour management practices (Dudek et al., 2019). Thirty-two elementary school teachers from grade one to grade five were provided four 30-minute audio-recorded coaching sessions once per week for over four weeks followed by a post-intervention observation (Dudek et al., 2019). Results indicated teachers improved in their behaviour management practices and had meaningful reductions for change of instructional practices (d = 0.88) (Dudek et al., 2019). Small effect sizes were also found in teachers academic response opportunities (d = 0.32), academic praise (d = 0.33), and academic corrective feedback (d = 0.33) postintervention (Dudek et al., 2019).

Most research on teacher coaching examined either student achievement in numeracy, literacy, and reading programs (Kretlow et al., 2011; Kretlow et al., 2012; Rietdijk et al., 2017). While available research indicates that teacher coaching is effective, there has been little teacher coaching research conducted on PE (Lander et al., 2015; Wright et al., 2020) and none on MI.

2.71 Components of Teacher Coaching

Desimone and Park (2017) suggest for teacher coaching to be effective in improving teaching practices and student learning, five features should be present; a) content focus b) active learning c) coherence d) sustained duration and e) collective participation. These five features are best practices in general professional development because they improve not only teachers' knowledge but also teachers' practices directly in the classroom (Desimone & Pak, 2017; Desimone et al., 2002).

Content focus includes activities that are concerned and focussed on subject content and how students learn that content (Desimone & Pak, 2017). Coaches are able to collaborate with teachers and embed activities within different subject areas by helping teachers with lesson planning (Desimone & Pak, 2017; West & Staub, 2003). Research on content focus teacher coaching has shown positive outcomes on teachers' content knowledge and student performance with effect sizes ranging from 0.5 to 1.56 (Burchinal et al., 2012; Piasta et al., 2010).

Active learning includes opportunities for teachers to observe expert teachers or coaches, receive interactive feedback and discussion, review and analyze student work, and lead discussions instead of passively sitting and listening to lectures (Banilower & Shimkus, 2004; Desimone & Pak, 2017). Teacher coaching has proven to be more

effective if teachers are able to practice what they have learned in real settings more frequently and receive feedback on it (Desimone & Pak, 2017). Active learning allows teachers to engage with their coach which has demonstrated positive effects of feedback on teaching practices (Allen et al., 2011) especially in math and reading (Biancarosa et al., 2010; Campbell & Malkus, 2011).

A study conducted by Desimone and colleagues (2002) investigated the effects of professional development on teachers' instruction. Two hundred and seven teachers from 30 schools in 10 school districts in five states were sampled from 1996 to 1999 in order to examine teachers' professional development and its effects on changing teaching practice in mathematics and science (Desimone et al., 2002). Results indicated that active learning opportunities such as professional communication, colleague collaboration, lesson planning, observing and being observing by other teachers, and reviewing student work had a positive effect on increasing teachers' knowledge and skills of those practices (Desimone et al., 2002).

Coherence in teacher coaching involves subject goals and activities that are in line with the school curriculum, teacher knowledge and beliefs, student needs, as well as school, district, and state or province policies (Desimone & Pak, 2017). When teacher coaching is aligned with content standards, curriculum goals, and daily lessons, it becomes more successful and effective (Desimone & Pak, 2017; Desimone et al., 2002). Several studies have focused on professional development opportunities that are aligned with curriculum outcomes and teachers' daily instructional routines, which have been more successful as opposed to no alignment (Clements et al., 2011; Desimone et al., 2002; Fishman et al., 2003; Hindman & Wasik, 2012; Roschelle et al., 2010; Santagata et

al., 2010). More often than not, when professional development interventions are lacking alignment with curriculum goals, they are less likely to be implemented by teachers (Santagata et al., 2010).

Sustained duration is where teacher coaching activities are continuous and ongoing for an extended period of time (Desimone & Pak, 2017). Having sustained contact hours, periodic follow-ups, or a certain number of sessions or hours of teacher coaching can lead to successful pedagogical transformation (Buysse et al., 2010; Teemant, 2014). Teemant (2014) investigated the effectiveness and sustainability of instructional coaching outcomes in 36 urban elementary school teachers using focus groups and pre and post-intervention data over a one-year period. After providing a 30hour workshop and seven individual coaching sessions consisting of 15 hours total, teachers had statistically significant improvements in teacher pedagogy, sustainability, and attrition rates (Teemant, 2014).

Collective participation is also a powerful way of getting teachers involved in professional development because it aids in creating a productive learning environment where everyone's opinion is valued (Pogodzinski, 2015; Ronfeldt et al., 2015). During collective participation, teachers share opinions, commitments, expectations, and responsibility for student achievement with other teachers (Bryk & Schneider, 2002). This provides teachers a space to mutually discuss progress, instructional improvement strategies, student outcomes, and curricular modifications (Bean et al., 2010; Scott et al., 2012). Often times a teacher coach leads the collective participation (Desimone et al., 2002). Lack of planning may hinder collaborative participation, however, one-on-one

coaching is another alternative that may be new to professional development learning (Desimone & Pak, 2017).

2.8 Study Significance

Movement integration is gaining popularity among national organizations and education systems as it can be adaptable to curricular content, vary in intensity and duration, applied in regular classroom settings, and requires little or no equipment (Webster et al., 2015). MI is proven to support schools in reaching PA and education goals (Webster et al., 2015).

Despite the numerous benefits of MI, teachers are still experiencing difficulty implementing MI even after attending workshops or training sessions. Understanding teachers' barriers to implementing movement in the classroom and providing individualized support through personalized coaching may increase teachers' confidence and competence to use MI. Multiple studies have provided teachers with resources (Mahar et al., 2006; Riley et al., 2016), professional development training sessions (Bartholomew & Jowers, 2011; Dunn et al., 2012; Goh et al., 2014; Kelder et al., 2005; Mahar et al., 2006; Riley et al., 2017; Riley et al., 2016), and workshops (Donnelly et al., 2009; Dunn et al., 2012; Kelder et al., 2005) yet, none have examined the effect of teacher coaching on addressing teachers' barriers to MI. Additionally, no studies have focused on teacher coaching for MI. Teacher coaching is a type of high-quality teacher professional development that has been used successfully in a limited number of interventions related to PA (Wright et al., 2020) and in multiple studies in other curricular areas (Kraft et al., 2018).

Therefore, this research will seek to understand the common barriers teachers experience implementing MI, then use coaching strategies to address individual barriers within the classroom, and assess the impact on MI use and teacher confidence and competence.

Chapter 3. Theoretical Model

This research was informed by two approaches, the Classroom Strategies Coaching (CSC) Model for instructional coaching (Reddy et al., 2017) and the Instructional Coaching Principles developed by Jim Knight (2007). Both of these approaches are based on adult learning theory. Adult learning theory proposes adults have three tenets; they are problem driven and goal orientated, practical in their approach to learning, and learn best by doing (Knowles, 1984; Trotter, 2006). These two approaches also encompass the five key features of effective teacher coaching: content focus, active learning, coherence, sustained duration, and collective participation (Desimone & Pak, 2017). Their added value is that they provide theoretical structure, specifically adult learning theory, and valuable guidance on processes (Knowles, 1984; Trotter, 2006).

The CSC model promotes short-term, job-embedded interventions by focusing on the goals and skill needs identified by the teacher while using active learning to guide the process (Reddy et al., 2017). The model is intervention centered, with multiple classroom observations and visits generating data and feedback so that teachers can use data to inform their pedagogy (Reddy et al., 2017). In this model, the teachers and coaches work together to identify areas for improvement or change, develop a plan, and implement that plan. The CSC model is a tailored and collaborative data driven process. Decisions are made by collaboration to help reach goals and address problems. Coaches model effective instruction and teachers practice different approaches to instruction (Reddy et al., 2017).

The Instructional Coaching Principles (Knight, 2007) also informs this work. This framework is described as a partnership approach. These principles are all based on partnership because teacher coaching is an intensive support-based partnership (Knight, 2007; Knight & van Nieuwerburgh, 2012). This theoretical framework is based on adult learning theory. It is founded on seven principles; 1) Equality: Instructional Coaches and Teachers are Equal Partners 2) Choice: Teachers Should Have Choice Regarding What and How They Learn 3) Voice: Professional Learning Should Empower and Respect the Voices of Teachers 4) Dialogue: Professional Learning Should Enable Authentic Dialogue 5) Reflection: Reflection is an Integral Part of Professional Learning 6) Praxis: Teachers Should Apply their Learning to Their Real-Life Practice as They Are Learning and 7) Reciprocity: Instructional Coaches Should Expect to Get as Much as They Give (Knight, 2007; Knight & van Nieuwerburgh, 2012).

Principle one involves an equal partnership between coaches and teachers (Knight, 2007). Coaches recognize when collaborating with teachers that they are equals and believe each other's thoughts and opinions are valued (Knight, 2007). Principle two is concerned with individual choice, in which one individual does not make decisions for another, and decisions are made collaboratively (Knight, 2007). In principle three, all individuals within a partnership have opportunities to express their point of view (Knight, 2007). This allows coaches to gain a deeper understanding of teachers' opinions and expressions about the content being learned (Knight, 2007). Principle four involves

dialogue where both the coach and teacher arrive at a mutually acceptable decision (Knight, 2007). This means no dominance, control, or imposition is made on the other (Knight, 2007). Principle five involves reflection where coaches encourage teachers to reflect or consider ideas before implementing them (Knight, 2007). Principle six is about praxis in which teachers are free to recreate content learned in the way they see useful to them and put into practice (Knight, 2007). Followed by principle seven, reciprocity, where individuals involved benefit from the experience, knowledge, and achievement by what each person contributes (Knight, 2007). Coaches use the partnership approach to reflect on their previous actions, evaluate the effectiveness of such actions and strategize for the future (Knight, 2007; Knight & van Nieuwerburgh, 2012).

In combination, the CSC model and the instructional coaching principles, with their roots in adult learning theory have informed the methodology, methods, and processes for this research.

Chapter 4. Methodology

4.1 Mixed Methods

Qualitative methods include the use of interpretive/theoretical frameworks to investigate and address research problems by using context and meanings from individuals or groups of individuals in natural settings (Creswell & Poth, 2018). There are various interpretive and theoretical frameworks used in qualitative research that consist of views about the types of research questions, how to ask research questions, and how to gather data which guides the overall research (Creswell & Poth, 2018). The benefits of qualitative methods include the voice of participants, reflexivity of the researcher, and a complex, detailed interpretation of the problem (Creswell, 2013). The

uniqueness of qualitative methods is the ability to gather in-depth understandings about people and places under study which can be established into patterns or themes (Creswell, 2013).

Unlike qualitative research methods, quantitative research methods quantifies and statistically analyses variables such as numerical data to obtain results (Apuke, 2017). Research within a quantitative framework is grounded a positivist paradigm, also known as the scientific research paradigm, which relies on deductive reasoning, formulation of hypothesis, testing hypothesis, proposing operation and mathematical formulas, calculations, extrapolations, and expressions to develop conclusions (Kivunja & Kuyini, 2017). A benefit of quantitative research is the ability to generate precise measurements of data using structured and validated instruments to create objective findings that can be generalizable to broader populations (Apuke, 2017; Johnson & Christensen, 2008).

This research combines both qualitative and quantitative research methods, also known as mixed-method research. There are four different types of mixed method designs; triangulation design, the embedded, explanatory, and exploratory design (Creswell & Plano Clark, 2006). Mixed-methods research incorporates both quantitative and qualitative data by purposefully mixing both quantitative and qualitative methods during data collection, data analysis, and interpretation of evidence into a single study (Bowers et al., 2013; Creswell & Plano Clark, 2011). Mixed-methods research increases the quality of findings, minimizes biases, builds greater comprehensiveness, utilizes different perspectives of data analysis, and increases the scope of practice (Bowers et al., 2013; Creswell & Plano Clark, 2011; Mayoh & Onwuegbuzie, 2015).

The strength of these two methodologies brought together allowed for a greater understanding of the topic and for answering the research questions. In this study, quantitative methods was used to assess changes in MI use and describe changes in teacher MI confidence and competence. Qualitative methods was used to understand the MI barriers that teachers face and how to best support them in overcoming those barriers through teacher coaching. The process best fits with an embedded design, also known as a nested mixed-method design. When using this design, a researcher typically embeds a qualitative component within a quantitative design or a quantitative component within a qualitative design (Creswell et al., 2003). The embedded design combines both qualitative and quantitative data, but one data set plays a supplementary role within the overall design (Creswell et al., 2003). This research used a one-phase model of an embedded design where quantitative and qualitative data was obtained pre-intervention followed by quantitative data post-intervention (Creswell & Plano Clark, 2006). The sequential approach of obtaining quantitative data first followed by qualitative data helped with developing and implementing the intervention as well as explain the results post-intervention because the participants' voices and perspectives aided in describing the quantitative intervention effect (Creswell & Plano Clark, 2006). Using an embedded mixed methods approach also provided a richer description of the complexities and interactions participants have with a certain phenomenon, in this case MI (Creswell et al., 2003).

4.2 Philosophical Worldview

This study was grounded on a pragmatic worldview, which is concerned with "what works" (Creswell & Poth, 2018, p. 27) and focuses on the outcomes of the research

problem. Pragmatism is not solely committed to one philosophy or reality and looks at multiple approaches to collecting and analyzing data, which fits well with mixed methods (Creswell & Poth, 2018). This worldview is concerned with the "what" and "how" of the research (Creswell & Poth, 2018, p. 27) and using multiple methods of data collection (Murphy, 1990; Tashakkori & Teddlie, 2003). A pragmatic worldview allowed for the use of multiple types of data collection procedures to investigate the research topic, while focusing on the practical implications that address the research problem (Creswell & Poth, 2018).

4.3 Research Positioning

Positionality is a tool that researchers use to be reflexive in their practice and to clarify for others what their background, perspective, and worldview are in relation to their topic of inquiry (Brydon-Miller & Coghlan, 2014). "A researcher's background and position will affect what they choose to investigate, the angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and the framing and communication of conclusions" (Malterud, 2001, p. 483). Reflexivity is the process of being reflective of one's background and positions. It involves self-searching for preconceptions and acknowledging the subjectivity of research (Hsiung, 2010). Preconceptions are different from bias, in that bias is when the researcher fails to not examine or acknowledge their preconceptions (Malterud, 2001).

I am a white woman from a working-class background who grew up in Whitby, Ontario, where my research is taking place. School played an important role in my life growing up. During high school, I was highly interested in academics and PE. PE was optional during the second year and onwards in high school however; I continued it for

all four years. I performed very well as an athlete and joined two sport teams, basketball and track and field. I competed in many competitions including the Ontario Federations of School Athletic Associations Championships. As a high school athlete, I gained skills and habits that have allowed me to lead a healthy, active lifestyle as a young adult. During my undergraduate degree, I majored in Health Sciences with a specialization in Kinesiology. During this time, I participated in activities outside of university, which included CrossFit, hot yoga, and flag football. My education in Kinesiology and experiences with school sports and PE have made a positive impact on my life. This is why I am interested in school-based PA promotion research.

My professional background includes extensive work with children in a PA setting. I have been working with children and youth for eleven years as a day camp counsellor at Trafalgar Castle Day Camp located in Whitby, Ontario. In 2016, I was promoted to Assistant Director and, since then, Director. During my time at Trafalgar Castle Day Camp, I have organized and facilitated positive youth development programs that encouraged fun, fair-play, inclusivity, and high participation. After being promoted to Director, I was responsible for organizing daily camp programs, hiring staff members, facilitating camp entertainment, and addressing daily camper, counsellor, and parental issues. I am also highly active within my community in the Durham Region. I currently hold a CrossFit Level One Certificate and have been coaching CrossFit since 2018. I also work as a Yoga Assistant at a hot yoga studio. With this acknowledgment of my background in sports and children's programming, I recognize that I have strong beliefs about the value of PA in society and in school. I also accept that I have a life where I

have had the social supports, finances, and time to put towards sports and leisure exercise, and these advantages are not available to all people.

4.4 Grounded Theory

Grounded theory is a qualitative research approach where the researcher generates a general explanation (a theory) of a process, an action, or an interaction formed by the views of a group of participants (Creswell & Poth, 2018, p. 82). This type of theory development is an inductive approach that is generated or "grounded" in data from participants who have experienced the process (Strauss & Corbin, 1998). Instead of testing or verifying an existing theory, the researcher seeks to develop a theory by interrelating categories of information based on the data gathered from participants (Creswell & Plano Clark, 2018; Lingard et al., 2008).

Grounded theory has often been used in mixed-methods, because of its rigorous approach and theoretical output; it was originally developed to be used with both qualitative and quantitative research (Guetterman et al., 2019). However, grounded theory does need to be adapted in most cases to meet the needs of a mixed-methods study (Guetterman et al., 2019). The core features of grounded theory are theoretical (purposeful) sampling, memoing, and iterative study design (Creswell & Plano Clark, 2018; Lingard et al., 2008)

Theoretical (purposeful) sampling involves ongoing selection, revisiting, and interviewing of participants who are chosen to help the researcher best develop a theory (Creswell & Plano Clark, 2018; Lingard et al., 2008). In this study, purposeful sampling was used to select teachers who had low MI implementation. Teachers self-selected for the intervention, however, teachers with low MI implementation were of interest and

were contacted. This helped the researcher investigate if teacher coaching supported teachers struggling to implement MI in their classrooms. Ongoing selection was used for recruitment. Ongoing selection involves purposefully recruiting participants while simultaneously coding and analyzing data in order to develop, challenge, and fill the gaps in the emerging theory (Chun Tie et al., 2019; Lingard et al., 2008).

Memoing occurred as data was collected and during MI interventions. During memoing, the researcher journals in field notes what happened, ideas, and future plans. Memoing about each MI session allowed for new information to be incorporated and compared to emerging themes found during the interviews which produced richness that is typical of ground theory analysis (Lingard et al., 2008). Memoing of ideas allows the researcher to formulate the process that is being seen and guides the direction of the emerging theory (Creswell & Poth, 2018).

With an iterative study design, the data collection and analysis are conducted simultaneously. The researcher is constantly comparing data from participants with an idea of an emerging theory (Creswell & Plano Clark, 2018). This process consists of going back and forth between participants, collecting new information, and filling in the gaps of the evolving theory (Creswell & Plano Clark, 2018). This is the central principle of grounded theory, where data is collected and compared with other examples for similarities and differences (Lingard et al., 2008). This study used interviews with teacher participants to determine what barriers prevented or limited their use of MI. During each interview, data collected was compared to emerging categories throughout other interviews. This process is referred to as constant comparative method of data analysis (Creswell & Plano Clark, 2018). Moreover, emerging data was constantly being

examined and compared with new data coming from field notes (memoing) taken during each intervention visit. Each intervention visit resulted in new strategies and data because of the changes teacher participants and the teacher coach were making. This procedure fits well with the constant comparative data analysis approach of grounded theory (Creswell & Poth, 2018).

4.5 Procedures and Methods

Ethical approval for this study was provided from Ontario Tech University Ethics Board (REB #3329). For this study, the procedures included a five-stage approach which can be found below in Figure 2. In the first stage, we provided a lunch and learn on the topic of MI to numerous elementary schools in the DCDSB. My Supervisor, Dr. Kerpan, established a partnership with DCDSB to examine and promote MI in 2017. A lunch was provided for teacher attendants to incentivize attendance and ideally attract teachers who may not use MI, and thus ideal candidates for an intervention. At these lunch and learns, a presentation was provided that described the benefits of MI and gave sample activities.

One month after the lunch and learn we sent an online survey to all attendees to determine if they were using MI, this comprised stage two of this study. Please see appendix B for Survey 1 and the subsequent section describing the survey instrument. Teachers were informed that there were no benefits or consequences to indicating that they do or do not utilize MI. The instructions encouraged honesty. The survey questions pertained to recollection of the lunch and learn, use of different MI strategies, and quantity of MI use, as well as demographic indicators. At the end of the survey there was a question that asked if the participant would like to be contacted about a study in which they would be interviewed about MI barriers, and then potentially provided with
professional development through an intervention study. We also explained that the study would be incentivized with one 50-dollar Visa gift card for each participant; it was done to promote participation. We felt it was important to provide a strong incentive to take part in the study because we were attempting to get teachers to participate who would otherwise not use MI.

Unfortunately, the original online survey did not bring forth many participants. As a result of this, we went to schools with the permission of the Principals and handed out pen and paper surveys. In order to do this, the survey had to change slightly, because we could not assume that teachers attended the lunch and learn. Please see Survey 1.1 in appendix C for the modified version that originated from Survey 1. This approach generated a larger group of interested participants.

Stage three of this study included identifying potential participants from the survey results who indicated they used MI the least and who were interested in the study, and then asking them if they would like to participate via the contact information they provided in the survey. Twelve participants that were identified via this method agreed to participate in the research study.

Stage four of this was the intervention, which is broken into four components discussed in the subsequent section describing the intervention. The four components are Intervention Development, MI Coach Training, Individual Teacher Intervention Design, and Classroom Visits.

Stage five of the study was a follow-up survey provided to teacher participants one month after being provided the teacher coaching intervention. The survey questions

pertained to quantity of MI as well as confidence and competence. Please see appendix G

for Survey 2 and the subsequent section for a description of the instrument.

Figure 2

Methods Flow Chart

Stages	Procedures	Goal and Product
ONE • Pre-data collection relationship building, developing baseline knowledge, development of participant pool.	• Delivery of 10 Lunch and Learn Presentations in DCDSB schools.	 Established a baseline level of knowledge of what MI is amongst participant pool. Provide traditional professional development for MI, which served to a) provide a comparison of professional development strategies for MI for participants to compare teacher coaching to, and b) allowed for the recruitment of participants who are using MI the least.
 TWO Quantitative Data Collection and Analysis of Survey One. Participant Recruitment. 	• Deployment of Survey One online and pen and paper format.	 Analyze descriptive data. Identify and recruit participants based on descriptive data and participants opting-in to the study.

THREE • Qualitative Data Collection and Analysis.	 Individual interviews. N = 12 Code data in NVivo. Thematic analysis. 	 Identified personal barriers to MI. Data used to design a personal teacher coaching intervention for each participant.
FOUR • Intervention	 Three teacher coaching sessions with MI coach. Four Intervention Components: Intervention Procedures Development. MI Coach Training. Individual Teacher Intervention Development Classroom Visits. 	• Journaling and field notes after each intervention session.
FIVE • Quantitative Data Collection and Analysis for Survey Two.	• Survey Two deployed online to participants (n=12) who took part in the intervention.	• Collect and analyze data on quantity of MI, as well as confidence and competence in comparison to Survey One data on same variables.
SIX • Interpreting Mixed- Methods Data Together.	• Merging of both quantitative and qualitative data results for interpretation and explanation.	• Identify key findings that come to light based on both qualitative and quantitative data, including surveys, interviews, and field notes.

4.6 Survey Instrumentation

The instruments used in this study were two surveys designed to describe MI use, teacher confidence, teacher competence, and gather demographic information. This type

of descriptive research is one of the most common types of quantitative research in health science and social science and involves collecting data through questions designed for a specific population (Gall et al., 2007). Survey research can help researchers assess attitudes, beliefs, and behaviors over time, which aligned with the goal of this project (Gall et al., 2007). Surveys for this study were developed by Dr. Serene Kerpan, based on previous MI survey questions used by Webster and colleagues (2017) and previous MI research (Michaels et al., 2019; Vazou et al., 2020).

Survey 1.1 in appendix C administered in 2018 was designed to assess recollection of a lunch and learn training session, recollection of different MI strategies, measure quantity of MI use, as well as gather demographic indicators. The first question asked about consent to participating in the survey and the second question asked if respondents participated in the lunch and learn. This helped determine what teachers were present during the lunch and learn and if they were willing to complete the survey. The third question asked if the teachers used MI through a dichotomous question (yes/no). MI was briefly defined for the participant, as it can be an unfamiliar term, examples of what activities count as MI were included. This question was developed in consultation with our school partners who are PE consultants and know the teachers, their resources, and their backgrounds well. The fourth survey question examined if teachers implemented different forms of MI. Teachers were asked to check off all the strategies that they utilized. There were eleven pre-determined options with one open-ended option titled "other", in order to determine if there were other forms of MI strategies that teachers might be using that were not listed. This type of question was pre-coded with a response option as it provided multiple strategies that could be selected while also

providing an open-response for the respondents to elaborate (Kelley et al., 2003). The fifth question asked how often teacher participants used MI in any form by indicating number of times per week; a) zero time per week, b) once a week, c) 2 to 3 days per week, and d) 4 to 5 days per week. This was a closed-ended question in order to determine how many times per week teachers implemented MI or do not implement MI as much. Those who implemented MI the least, or not at all were contacted and asked to participate in the research study. The sixth question was closed-ended asking teachers if they were utilizing any strategies to increase MI presented at the lunch and learn with a dichotomous yes or no option. This aided in determining if teachers used the strategies and resources provided at the lunch and learns offered at schools. The seventh question used a first point Likert-type scale (Likert, 1932) of five options asking if the lunch and learn provided; a) very valuable information, b) some valuable information, c) little valuable information, d) no valuable information, and e) I do not recall what information was presented. Using a Likert-type scale helped identify if the lunch and learns were effective in providing additional knowledge and strategies about MI. This was helpful as we best determined how to promote MI to educators and it was useful information for our school partners. The eighth question asked what grades teachers taught by listing junior / senior kindergarten to grade nine. Teachers were asked to select all grades that applied because some classroom teachers are responsible for more than one grade class (e.g. librarian, French second language teacher). The ninth question inquired about teaching experience listing the pre-coded options: a) one year or less, b) 1 to 5 years, c) 6 to 10 years, d) 11 to 20 years, and e) over 21 years. Asking about years of teaching experience helped determine teaching demographics. For example, teachers with greater teaching

experience may be inclined to change their teaching practices and are more willing to integrate different forms of PA compared to new teachers (Vazou & Skrade, 2014). Question ten questioned if teachers were interested in potentially participating in the research study by selecting either yes or no. This question also indicated the study would be incentivized.

Survey 1.2 in appendix D was adapted from Survey 1.1 due to low online return rate. The questions are similar but Survey 1.2 participants were asked if they attended the lunch and learn in 2018 followed by a yes or no option. This identified what teachers, if any, were present during the lunch and learn in 2018. The next modified question was question seven which asked "to what extent do you believe that the lunch and learn sessions presented valuable information?" followed by six options asking if the lunch and learn presented; a) very valuable information, b) some valuable information, c) little valuable information, d) no valuable information, e) I do not recall what was presented, and f) I was not present at the lunch and learn. The addition of "I was not present at the lunch and learn" identified teachers who were not at the lunch and learn as the pen and pencil survey was delivered to all teachers, not just those who attended the lunch and learn.

The post-intervention survey (Survey 2) in appendix E was administered one month after completing all movement coaching sessions. Some questions were openended allowing for respondents to express their experiences about having a teacher coach visit their class, if the teacher coach assisted with MI implementation, confidence levels after the MI sessions, and MI continuance after the MI sessions. The first question asked "are you utilizing any of the movement integration activities that the movement

integration educator led with you and your class?" through a dichotomous option (yes / no). The second question asked "have you used any of the strategies the movement integration educator used with you and your class to reduce the barriers to movement integration (e.g. ways to use movement integration in small classrooms, or how to manage chaos)" with a dichotomous question (yes / no). The third question asked "are you using more movement integration, in any form, since the movement integration educator visited your classroom?" with a dichotomous question (yes / no). The fourth question asked "on average, how often do you use movement integration in any form since the movement integration educator came to your class?" followed by pre-coded options a) zero times per week, b) once a week, c) 2-3 times per week, and d) 4-5 time per week. This identified if teachers were implementing MI more frequently after receiving three sessions of teacher coaching. Question five was a Likert-type scale that asked "to what extent do you believe that the embedded professional development on movement integration you received has increased your confidence to lead movement integration with your class?" with five options consisting of a) a great deal, b) a lot, c) a moderate amount, d) a little, and e) none of the above. Question six was also a Likerttype scale and asked "to what extent do you believe that the embedded professional development on movement integration you received has increased your skills and ability to lead movement integration with your class?" followed by five options a) a great deal, b) a lot, c) a moderate amount, d) a little, e) none at all. Both these questions helped determine if teachers' confidence, competence, and abilities to implement MI had increased with professional development training. Question seven asked "which benefits do you perceive with your class, if any, due to movement integration? Please check all

that apply" with multiple options including a) none, b) improved student attention, c) increased student calmness, d) increased student effort, e) improved learning outcomes (test scores, marks, quality of work), f) increased student enjoyment or happiness during or after movement integration, and g) other. This type of question is open-ended with multiple options to select from as there may be various perceived student behaviours that teachers noticed within their classroom. Question eight is a Likert-type scale that asked "how likely are you to use movement integration in the future?" with pre-coded options of a) very likely, b) likely, c) neither likely or unlikely d) unlikely, e) very unlikely. Question nine asked "Do you believe that other teachers would benefit from embedded professional development on movement integration?" with pre-coded options of a) yes, b) no, c) open comment. Having an open comment provided more descriptive data in determining if embedded professional development was effective for implementing MI and teacher learning. Question ten was an open-ended question that asked "what was the biggest benefit of embedded professional development for movement integration?" allowing participants to describe their experiences with having professional development training for MI. Question eleven was also open-ended and asked "what was the biggest challenge of the embedded professional development for movement integration project?" which provided respondents to describe any challenges they experienced with the embedded professional development sessions. Question twelve and thirteen are similar to Survey 1 which asked participants what grades they taught by selecting all that apply (e.g. junior-K or senior K, grade 1, grade 2, etc.) and years of teaching experience (e.g. one year or less, 1 to 5 years, 6 to 10 years, etc.). Question fourteen was a Likert-type scale that asked "on a scale of 1-5, 1 being low incentive and 5 being high incentive, how

much did the \$50 gift card incentivise your participation in this study. Your honesty is appreciated, it helps us understand what incentives help get educators involved in research" with five pre-coded options from one to five. Question fifteen was open-ended and asked, "is there anything else you would like to share with us regarding movement integration or your participation in this project?" This allowed us to determine additional or new information concerning MI and embedded professional development.

4.7 Qualitative Interviews

Individual, semi-structured interviews were used in this research study. This allowed for the confidentiality of each participant while also providing an opportunity for the participant to express their honest feelings, opinions, and experiences about MI. Interviews build a deeper understanding on the topic of study by capturing the emotions and behaviours of the participant being interviewed which could be missed in other methods of data collection.

The interview guide, found in appendix F, contains open-end questions with probes and a summary about MI and associated benefits. Prior to conducting the interview, the guide was piloted with a volunteer not affiliated with the research study to examine consistency and clarity in advance. The questions in the interview guide include teaching experiences (e.g. How long have you been teaching? How long have you been teaching at your current school?), barriers with implementing MI (e.g. Can you tell me about why you are not currently using movement integration with your class?) and probes (e.g. adaptability issues, safety), opinions that may help with implementing MI (e.g. Can you think of any potential ways to alleviate the issues you just discussed?), and teacher coaching (e.g. Do you think having the movement integration educator come to your

class and coach you and the students through a few activities would help?). Individual interviews occurred at a time and place most convenient for the participant, which was normally at their school. Each interview was approximately 10 minutes and was audio recorded. The audio recording for each interview were transcribed using Audacity software. Transcripts were checked for accuracy post transcription.

4.8 Participants and Recruitment

The power calculation to determine sample size was done using G Power 3.1 (Faul et al., 2009). An effect size of 0.5 was used in the calculation based on the metaanalysis of teacher coaching interventions by Kraft et al., (2018). Using α of 0.05 at 80% power, it was predicted that 28 participants were needed to yield a significant effect. The inclusion criteria for this study was:

- Full-time teachers registered with the Ontario College of Teachers and have a valid license to teach in Ontario.
- 2. Teachers with the lowest pre-MI implementation.
- 3. Teachers teaching in the Durham Catholic District School Board. Exclusion Criteria:
 - 1. Supply teachers.
 - 2. Early childhood educators (ECE).

For this study, we recruited 12 teacher participants (n=12), the discrepancy between the required sample size for adequate power and the number of actual participants will be discussed in the limitations section of the thesis. Participants came from seven schools within Durham Region located in Pickering, Ajax, Whitby, Brooklyn, and Oshawa. They had been teaching for an average of 13.5 years with a standard deviation of 2.07 years and mean of 2.4 years. There were 10 female participants and two male participants. Teacher participants taught in grades kindergarten to grade eight.

One question in Survey 1 and 1.1 asked about teaching experience, which can be found below in Figure 3. Approximately 42 percent of teachers have 11 to 20 years of experience followed by 33 percent having 6 to 10 years of experience, 17 percent having greater than 21 years of experience, and 8 percent having 1 to 5 years of experience. The majority of teachers participating in this study had 11 to 20 years of experience with teaching.

Figure 3





Another question inquired about what grades each teacher currently taught which can be found below in Figure 4. Approximately 50 percent of teachers taught grade 4 and grade 5, followed by 25 percent of teachers teaching grade 3 as well as grade 8. Seventeen percent of teachers taught each of the following: junior and/or senior

kindergarten, grade 1, grade 2, grade 6, and grade 7.

Figure 4

Grades Taught by Teacher Participants



4.8 Intervention

This intervention had four components: Intervention Procedures Development, MI Coach Training, Individual Teacher Intervention Development, and Classroom Visits.

4.81 Intervention Procedures Development

The intervention process for this study was directed by the Classroom Strategies Coaching (CSC) Model developed by Reddy, Dudek, Lekwa (2017), and the Instructional Coaching Principles developed by Jim Knight (Knight, 2007). The development was also guided by the key components of successful teacher coaching: content focus, active learning, coherence, sustained duration, and collective participation. Our consultation

with the DCDSB indicated that teachers felt they had little time to participate in professional development. With that in mind, we decided to use a short qualitative interview that informed the tailored interventions (Knight, 2007) and three brief intervention visits (Reddy et al., 2017) to each participant's classroom. Research indicates that individual teacher coaching interventions are successful because they allow the teacher to let their guard down, speak frankly, and be vulnerable (Knight, 2007). Based on best practices in teacher coaching, the intervention was designed specifically to increase MI use, and not any other physical activities. Modeling and observing are also important activities in teacher coaching, the three intervention visits allowed for both of these activities to happen (Desimone & Pak, 2017; Knight, 2007; Reddy et al., 2017). Having three visits increased contact time providing a sustained intervention duration (Desimone & Pak, 2017; Knight, 2007; Reddy et al., 2017). In previous research on MI interventions ongoing support or feedback was not provided (Vazou et al., 2020). Lastly, the teachers and the teacher coach made decisions on MI in a collaborative manner so that the teachers' experience and expertise was valued and respected, which is an important practice for intervention success (Desimone & Pak, 2017; Knight, 2007; Reddy et al., 2017).

4.82 MI Coach Training

Training of the MI Coach, who was the graduate student conducting this research, was done through three steps: reviewing literature, designing sample strategies, and practical training for interviewing and MI intervention visits. Knight (2007) outlines five tactics for translating research into practice in teacher coaching; 1) clarify: read, write, talk, 2) synthesize, 3) break it down, 4) see it through the teachers' and students' eyes, 5)

simplify. Following this, the MI coach first read all available research and intervention strategies on MI, took notes, and developed a worksheet to study intervention strategies linked to specific barriers in appendix G. This allowed the coach to break down the research, synthesize it, and then simplify it. Once this process was complete, the lead researcher provided mock scenarios to the coach and had the coach explain how they would address the barriers. For example, the lead researcher would give the scenario "the teacher explains in her interview that she feels very pressed for time during the day, and when you get to the classroom on your first visit the classroom is quite small". The coach would then propose strategies and MI activities that would aid in addressing those barriers. One hour of this face to face mock training was provided, upon which the lead researcher felt the coach was well prepared.

For this study, the MI activities used were developed by Thompson Publishing. Thompson Publishing has a partnership with DCDSB and each school has a set of Functional Fitness Movement Charts that have curriculum-based activities that use developmentally appropriate fundamental movements. The charts are clear, simple, safe, and have built-in progressions. Figure 5 and Figure 6 highlight some of the movements from the Thompson Publishing Perfect Practice card deck.

Figure 5

Thompson Publishing Functional Fitness Movement Charts.



Note. These exercises are called Y Stand-Up, Shoulder Taps, and Power Jumps. They are part of the Thompson Publishing Perfect Practice card deck.



These were the MI activities used for the intervention. But the majority of the training did not pertain to learning the charts; the training was primarily focused on what activities to pick for certain scenarios, what strategies could be used to start and complete MI, what strategies could be used for classroom management during MI, and how to improve classroom safety. These strategies align with the most common MI barriers cited

in the literature and the most important strategies to coach for in any teacher coaching intervention (Knight, 2007; Reddy et al., 2017; Webster et al., 2015).

Another component of MI coach training was communication skill development. The Instructional Coaching Principles are established upon the values of partnership, relationships, rapport, and respect. These values hinge upon good communication. When these values guide teacher coaching interventions trust is built and a teacher is willing to be vulnerable, try new strategies, and step out of their comfort zone (Knight, 2007). Knight (2007) encourages teacher coaches to offer personal stories, laugh and share jokes, empathize, offer positive comments, and listen with great effort and attention. Communication training consisted of reviewing best interviewing practices for teacher coaching, taking a graduate level qualitative research course which provided interview training, one 30-minute meeting to review strategies with the lead researcher, and then reflecting after the first three interviews with the lead researcher.

4.83 Individual Teacher Intervention Development

Prior to the intervention starting, the MI coach interviewed each teacher regarding their barriers to MI (interview process described in previous section). One-to-one interviews are one of the most effective ways to enroll teachers in professional development opportunities and they allow individuals to speak much more candidly compared to small or large group interviews (Knight, 2007). One-to-one interviews also help teacher coaches achieve three goals. First, interviews aid in gathering specific information about teacher and classroom challenges, student needs, and social norms specific to a school (Knight, 2007). By using this information, coaches can modify coaching sessions to the needs of teachers and students (Knight, 2007). Second,

interviews allow teacher coaches to educate participants about the partnership framework, methods, and opportunities offered by teacher coaching (Knight, 2007). During interviews, teacher coaches can describe their partnership approach to coaching, listen to teachers' concerns, and assure that as coaches they are there to help, not to evaluate (Knight, 2007). Finally, interviews provide an opportunity for teacher coaches to develop trusting, one-to-one relationships with teachers (Knight, 2007). For this study, each recorded interview was approximately 10 minutes in length which provides enough time to gather all necessary information (Knight, 2007). Relationship building through conversation was done when the recording device was off to make participants more relaxed.

From the qualitative data, the MI coach identified specific strategies to focus on in the classroom with that teacher and their class. These strategies can be found in appendix G. Also, before attending the first coaching sessions, the MI coach and teacher developed proactive management strategies, classroom routines, rules, and positive reinforcement strategies that they felt may be effective in the class.

Interventions were designed to be approximately five to 15 minutes in length at each visit, with three visits in total. Although correlation evidence suggests longer professional development sessions up to 20 contact hours or more leads to successful changes in teaching practices (Garet et al., 2001), no clear consensus about duration, frequency, or intensity has been made (Desimone, 2009; Vazou et al., 2020). However, MI spread across a school year or semester, that are on-going, and include follow-ups, are associated with a strong impact on teacher and student learning (Darling-Hammond et al., 2017; Desimone, 2009). In particular, Knight (2009) explains coaching may involve

several interactions lasting days, weeks, or even months. Although a more prolonged intervention timeframe and increased contact hours would have been ideal, shorter intervention visits were chosen because of time constraints, one teacher coach trained for this study, and consultation results with school partners. Our school partners for this study indicated that they felt three visits being no more than 15 minutes each would be appealing and not overwhelming for potential participants.

4.84 Classroom Visits

MI intervention visits were scheduled once a week over the course of three to four weeks during similar times of day. This allowed students to become familiar with having a coach present and to continue to establish a trusting relationship between the coach and the teacher. One week prior to the first MI visit, both the coach and the teacher would discuss over e-mail shared ideas of potential MI exercises or activities that could be implemented and that may be helpful to the teacher based on their barriers to MI. Knight (2007) mentions the first conversation is important for both the teacher and the coach to collaboratively identify the teaching practices that are to be implemented in the classroom. In some cases, the first conversation does not necessarily provide enough data to identify where the coach and teacher start (Knight, 2007). As long as the teacher and coach identify together a particular best practice or set of best practices, that will lead to a greater chance of making a difference in teacher and student learning (Knight, 2007).

After the coach and teacher together identified MI activities that could be implemented, the coach would explain what would occur in the classroom. Then the coach would email the activities to the teacher, usually one day prior to the intervention visit. The teacher would access the MI exercises or activities through the Thompson

Publishing website <<u>http://thompsonbooks.com/kto12/fitness-</u>

charts/home/videoslessons/>. The MI activities consisted of various bodyweight movements that integrated exercises such as push-ups, lunges, squats, and jumps in order to limit set-up time and equipment for teachers. Upon arrival, the MI coach would set up the exercises or activity stations around the classroom by posting the functional fitness charts to a wall where students can easily see. The teacher would direct their students' attention towards the MI coach for instruction and would usually organize the students in pairs or equal groups.

The first MI visit was a model lesson provided by the teacher coach. A model lesson consists of a teacher coach modelling a lesson, watching teachers teach, and engaging in discussions about what teachers noticed while watching teacher coaches or what teacher coaches noticed while watching teachers (Knight, 2007). Knight (2007) mentions that some teachers find "observing" intimidating, hence some teacher coaches will use the term "visit" instead or say "You watch me; I watch you." Prior to the model lesson, the MI coach and collaborating teacher would clarify their roles with respect to the behaviour management in the classroom. In most cases, teachers were responsible for the overall classroom management while the coach was a second set of eyes in the classroom and integrated management strategies that pertain to MI into the model lesson. During the first visit, the MI coach would perform a model lesson by explaining outcome goals of the visit to the teacher and the class, explain the rules for making MI fun and safe, demonstrate MI activities, clarify proper movement technique, and guide transitions from one activity to the next. The teacher would observe the coach during the MI visit and assist students during the MI exercises or activities by demonstrating or performing

the movements with students, providing verbal encouragement, and managing student behaviour. Once the MI activities were completed, the MI coach would use stop signals, provided to the class at the onset of the lesson, to transition back to sedentary learning. Immediately after the model lesson, the coach would debrief with the collaborating teacher and discuss how the lesson went, if the teacher had any thoughts or questions, and what different MI exercises or activities may be implemented for subsequent MI visits where now the MI coach would observe the teacher.

Data of each MI visit was recorded in a journal immediately after. The data gathered during each MI visit includes the date and time, duration of MI visit, MI exercises/activities, positive or negative student reactions, overall student dynamics, teacher behaviours, and teacher practices. Knight (2007) explains that data gathered during each visit could vary, depending on what intervention teachers are learning to use. This data was able to guide and tailor subsequent MI visits based on the teachers' barriers and needs as well as student responses. This led to the development of intervention strategies that focused on fitting teacher preferences and classroom contexts (Webster et al., 2015).

After the first model lesson, the MI coach would move towards observing the teacher during the subsequent MI visits while providing guidance and support. From the prior interventions, journaling MI activities would be chosen for the next visit. Again, these activities would be sent via email to the teacher before the next intervention visit. When the coach arrived for the second or third intervention visit, they would discuss what worked and what did not work during the prior visit and suggest some strategies to integrate during this visit.

Second and third MI visits would vary in duration from five to 15 minutes and the coach would provide assistance as necessary or requested. The coach would not step in unless the teacher indicated they wanted the coach to do so prior to starting or during the MI activity. The goal was that at each intervention visit, the teacher would become more comfortable and confident in delivering the MI activities and the MI coach would move from practitioner to observer at the final visit.

During the second and third visit, the teacher coach would focus their attention and note what the teacher did well. More often than not, teacher coaches think the most important aspect of observing a lesson is to find areas for improvement yet, the most crucial part of the observation may be the practices the teacher does well (Knight, 2007). Observing what needs to be improved is quite easy however, seeing, recording, and communicating what went well is sometimes more difficult (Knight, 2007). Teacher coaches who take note of the positive things that occur in the classroom can provide a great service to teachers and the school. One of the most common challenges of being an educator is the emotional exhaustion that comes with it and trying to reach every child every day, which makes it difficult for teachers to see the good they are doing (Knight, 2007).

Immediately after the final visit, the MI coach would debrief with the teacher about the MI visit and thank them and their students for their time and commitment to PA and health. In some situations, the teacher would ask the MI coach to talk to the class about MI on the last visit and answer questions. Some teachers requested more MI coaching visits, to which we agreed to. We felt this maintained good relationships with the teacher and the school and prevented teachers from feeling like they were left without

the support they wanted or needed. Although this decision impacted the fidelity of the intervention, this was warranted to ensure that our reputation with the school communities was left in good standing. Figure 7 is a model of the classroom visits with each outcome, which can be found below.

Figure 7

Classroom	Visits	Model
•••••••		

Process	Outcomes	
Strategy planning with teacher	• Share ideas of potential MI exercises and	
participant	activities.	
	• Develop proactive strategies, classroom	
	routines, rules, and reinforcement	
	strategies.	
First MI coaching classroom visit	• Model lesson delivered by MI coach.	
	• Teacher participant observes MI coach.	
	• Debrief immediately after model lesson.	
	• MI coach journaled what happened during	
	model lesson:	
	• Date and time	
	• Duration of MI visit	
	• MI exercises/activities	
	• Positive or negative student reactions	
	• Overall student dynamics	
	• Teacher behaviours	
	Teacher practices	
Second MI coaching classroom visit	• Observe teacher participants use MI.	
	• Offer guidance and support if requested by	
	teachers.	
	• Debrief immediately after MI visit.	
	 Ivit coach journaled what happened during model lesson 	
Third MI coaching classroom visit	Observe teacher participants use MI	
	 Offer guidance and support if requested by 	
	teachers.	

• Debrief immediately after MI visit.
• Thank the students and teacher for their
time.
• MI coach journaled what happened during
model lesson.

Chapter 5. Data Analysis

5.1 Grounded Theory Analysis

Qualitative data was used to investigate teachers' individual barriers to MI. All individual interviews were audio-recorded and transcribed verbatim using Audacity and Microsoft Word. The primary researcher immersed herself in the data throughout the transcribing process by reading and re-reading transcripts to familiarize herself with the data (Smith et al., 2009). Using grounded theory analysis (Strauss & Corbin, 1998), three phases of coding were conducted: open, axial, and selective (Creswell & Poth, 2018). Coding is an essential part of grounded theory analysis which involves exhaustive reading, identification of topics, ideas, and categories to identify important subtopics (Espriella & Gómez Restrepo, 2020). Throughout this process, the supervisor and primary researcher reviewed each theme, category, and core category to ensure consistency, depth, and that each participant's views were captured and appropriately categorized (Espriella & Gómez Restrepo, 2020).

Open coding for major themes and categories was completed in NVivo 12. Codes were created for each new idea and codes found to be similar or related in meaning would be grouped together to form categories (Corbin & Strauss, 1990; Creswell & Plano Clark, 2018). Emerging categories from each interview were compared for similarities or differences using constant comparison (Creswell & Plano Clark, 2018). Constant

comparison allows researchers to review the transcripts and understand the participants' perspectives while identifying common ideas from different points of view (Lewis-Pierre et al., 2017).

After open coding, axial coding was performed to relate the categories. During axial coding, the database is reviewed so that the researcher can understand how specific coding categories are related or explain the primary phenomenon (Creswell & Poth, 2018).

Lastly, selective coding was conducted, which determines core categories and accounts for all the relationships between the categories (Creswell & Plano Clark, 2018; Espriella & Gómez Restrepo, 2020). From this stage, a theoretical model begins to develop.

5.11 Trustworthiness

The rigor of the qualitative component of this study can be assessed by trustworthiness. Trustworthiness in a qualitative study is used to support the argument that the inquiry's findings are "worth paying attention to" (Lincoln & Guba, 1985) and to evaluate qualitative content analysis (Elo et al., 2014). The most commonly used components for evaluating qualitative content analysis are those developed by Lincoln and Guba (1985). The four components that lead to trustworthy qualitative research include credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985; Shenton, 2004).

Credibility is often compared to internal validity and allows researchers to accurately identify and describe those who participated in the research (Elo et al., 2014). Credibility also helps researchers investigate how congruent the findings are to real-life

conditions (Shenton, 2004). Transferability is related to external validity and the reasoning that findings can be generalized or transferred to other settings or larger populations (Elo et al., 2014; Shenton, 2004). Dependability addresses the issue of reliability and stability of data over time under different conditions (Elo et al., 2014). Although the goal of reliability is to replicate the research and obtain similar results, dependability aims to help the reader comprehend that by replicating the study, results may differ because the study is carried out at a different time (Shenton, 2004). Confirmability is concerned with the researchers' objectivity to the data's accuracy, relevance, and meaning (Elo et al., 2014; Shenton, 2004). Confirmability ensures "the work's findings are the result of the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher" (Shenton, 2004, p. 27).

Multiple methods were employed to ensure these components of rigor and trustworthiness were addressed, including: early familiarity with research partners and schools, member checking, frequent debriefing with the principal investigator, encouraging participants to be honest in their responses, triangulation of data, writing in thick description, use of mixed methods, having an audit trail, presenting a worldview and being reflexive, and being forthcoming with limitations.

As the primary investigator, I developed an early familiarization with the collaborating school district before collecting data (Shenton, 2004). This allowed me to gain a deeper understanding of the organization and to establish trusting relationships between parties involved (Shenton, 2004). This helped me get a sense of the school belief system, familiarity with the school environment as well as teacher and school dynamics. Once research began, I was able to meet with teachers frequently in their classrooms each

week over an extended period of time. This allowed me to build trusting relationships with each teacher during the MI sessions and get a sense of different teaching styles, classroom logistics, and student dynamics. This process increased the credibility of the study.

During interviewing and throughout the research process, I reminded participants regularly that participation was optional and encouraged participants to be candid. I also let participants know that my research would have the same level of credibility no matter what ideas and experiences came forth (Shenton, 2004). These strategies increased the credibility of this research.

Member checking was another method I used to increase trustworthiness of this study (Shenton, 2004). This technique is considered very important when establishing credibility (Lincoln & Guba, 1985). Both transcripts and emergent categories and themes were reviewed with teacher participants to ensure what they said corresponded to what they intended and to offer explanations for particular categories and themes based on the interview dialogue (Shenton, 2004). Each teacher saw no issues with their transcript and felt the categories and themes reflected their words and perspectives. Member checking aided in credibility.

Debriefing sessions with my superior and partners throughout the research process occurred recently. Debriefing included reviewing transcripts, data analysis of core categories, categories, and themes, refining methodology, and development of results. Debriefing and scrutiny from supervisors and peers brought forth critical questions of the work and increased the credibility and confirmability of the findings.

Triangulating the data was another method used to strengthen the credibility and conformability of this study. To triangulate the data I used quantitative survey data, oneon-one interview data, observations, and memos through journaling. I found using these multiple sources of data complemented my findings as well as assisted with explaining participant views and experiences with MI and teacher coaching.

The way in which research is written can strengthen the credibility, transferability, confirmability, and dependability of the study. By generating rich, thick descriptions, it enables the transfer of information to other contexts and helps others determine whether the findings can be transferable based on shared characteristics (Lincoln & Guba, 1985). This allows the reader to make a confident transfer of information to other settings or larger populations (Elo et al., 2014). Thick description also presents the researcher's background and worldview. By richly describing the setting, methodology, and limitations, the reader can determine the relevance and meaning of the data for themselves and their setting.

5.2 Quantitative Data Analysis

Quantitative data from the pre and post-intervention surveys were analyzed with SPSS Version 26 (IBM Corp, 2019). Data analysis sought to determine 1) if teacher coaching increases the quantity of MI provided to students post-intervention, 2) if teacher coaching improves teacher confidence in providing MI to students, and 3) if teacher coaching improves teacher competence in providing MI to students. Descriptive and inferential statistics were used for the analysis of the data from this study.

The Wilcoxon Matched-Pairs Signed Rank Test was used to determine if there was an increase in the quantity of MI sessions implemented from pre-intervention to

post-intervention. The Wilcoxon Matched-Pairs Signed Rank Test is a nonparametric test used for ordinal data and data that does not meet the criteria for normal distribution (MacFarland, 2016). This type of non-parametric test is also used when data is obtained before as a pre-test measure, then a treatment is applied, and after a treatment period as a post-measure on the same participants (MacFarland, 2016). In this study, teachers' preintervention MI implementation was collected before the MI intervention and one month after the MI intervention.

The Exact Test of Goodness-of-Fit and Kendall's tau-b (τ_b) correlation coefficient in SPSS was used to analyze other survey data that was appropriate for inferential statistics; including post-intervention measures of teacher confidence and competence of MI use. The Exact Test of Goodness-of-Fit is a statistical test used for small sample sizes and will measure how far the observed data deviates from what would be expected if the observed data represented the population (McDonald, 2014). It will also help establish what observed data is different from what is expected if participants selected answers by chance. Kendall's tau-b is a non-parametric measure of the strength and direction of association that exists between two variables on an ordinal scale (Lund Research Ltd, 2018). Kendall's tau-b accounts for tied ranks and is more conservative with smaller sample sizes (Vogt, 2011). The measure of association ranges between -1 and +1, with absolute values close to 1 indicating a strong association and 0 indicating no association between the ordinal variables, meaning there is no relationship (Gibbons, 1993). This will help determine if there is an association between teachers' confidence and competence levels after receiving teacher coaching.

Descriptive statistics in SPSS were used for all survey data that is not analyzed with inferential statistics. Descriptive statistics were used to present data on questions pertaining to: 1) if teachers were utilizing any of the MI activities that the movement integration educator led with the class, 2) if teachers utilized any of the strategies the movement integration educator used to reduce the barriers to MI, and 3) if teachers are using movement in any form since the movement educator visited the classroom. Additional questions analyzed by descriptive statistics included; a) the benefits teachers' perceived due to MI, b) how likely teachers' will use MI in the future, c) if other teachers would benefit from embedded professional development on MI, d) the biggest benefit of embedded professional development for MI, e) the biggest challenge of embedded professional development for MI, and f) how much the gift card incentivized teachers' participation.

Chapter 6. Results

6.1 Qualitative Interview Results

This section contains the category data from the individual participant interviews that occurred prior to the intervention. In keeping with grounded theory, the information gained from the interview data was organized into core categories, categories, and themes. One core category included barriers to implementing movement with five categories: (a) challenging spaces, (b) limited confidence and competence, (c) relying on other sources, (d) student chaos, and (e) time constraints. The second core category included envisioning MI strategies with one category identified as new resources and strategies. The third core category was reasons for embedded professional development with no category but comprised of two themes: (a) another perspective, and (b) teacher learning.

6.11 Barriers to Implementing Movement

One core category that emerged from the interviews was the barriers to MI teachers' discussed. Teachers expressed various barriers that would prevent or derail the implementation of movement activities during the school day. These barriers included challenging spaces, limited confidence and competence, relying on other sources, student chaos, and time constraints.

One category that emerged from barriers to implementing movement included challenging spaces with two main themes, limited facility use and limited utilization of space. Some teachers felt there was limited access to facilities within the school including the gym, library, or empty classrooms to do movement activities. Participants stated these types of areas are usually booked for presentations or other events. One teacher shared,

"Everybody's got their gym time and then you hear daily "the gym is booked for this, the gym is booked for that...If someone's not using their library time, you know you can come into the library but quite a bit often it's being used for some sort of presentation." (P4)

Additionally, some teachers felt they were unable to utilize their classroom space effectively during movement breaks. If teachers find their classrooms are not spacious enough, then it derails them from performing any type of movement. One teacher mentioned, "*Like I'm not too savvy on what we can do to utilize the space that we have*" (*P2*). Another teacher said, "*There's just no way [to fit] 32 desks in there. There's very little room*" (*P4*). Many teachers struggle to find the best seating arrangement for their classroom to optimize space, especially if they are in a portable, which can be difficult when trying to implement movement activities. A teacher who taught in a portable stated, "*Well we're pretty much crammed in there and I've tried lots of different seating arrangements*...*I* have enough students but the problem is that I don't have the space" (P4).

This also affects curriculum-cover teachers who visit different classrooms. Curriculum-cover teachers need to adjust to the different seating arrangements in each classroom, which can be difficult when trying to implement movement activities even at different grade levels. A French teacher elaborated on this, *"So I have to handle right now the different seating arrangements right now [and] physical arrangement of the classroom" (P9).*

Limited confidence and competence was another category that emerged from the interviews. Teachers that expressed a lack of confidence or ability to organize and implement movement activities successfully or efficiently would refrain from doing movement activities with their students. Four themes were captured including adaptability issues, lack of knowledge, perceptions of physical activity levels, and prioritizing sedentary academic lessons. Adaptability was a barrier to implementing movement as some teachers struggle to adapt the school curriculum to movement. One teacher touched on this, *"I just don't have the knowledge of connecting it to curriculum to make it relevant" (P2)* and another teacher said *"Just trying to think of ways to include it in different lessons that we have" (P3)*. Teachers have a lot of curriculum to cover as well. One teacher expressed this issue, *"Another reason is honestly I just have so much*

curriculum that I'm trying to teach" (P4), and one teacher mentioned, *"Trying to get through the curriculum is the first reason [I do not use MI]" (P10).*

Lack of knowledge was another theme that prevented teachers from implementing movement. This theme is concerned with a teacher's lack of understanding of how to implement movement in their classroom. One teacher mentioned how lost she feels about where to start movement activities, "I don't really know yet too much with moving around in that confined space to like really get our heart rate up... And sometimes I'm just kind of lost on where to start," (P2). Teachers may feel discouraged from implementing movement if they do not have a general knowledge of PA or a background in PE. One teacher shared, "Because I can't say that I know everything about those [MI] breaks, which I don't" (P1) and another teacher expressed her concerns with "not knowing what I'm doing [with MI]" (P11). Likewise, one teacher commented, "Not knowing what kind of activities that I can do that would be considered enough daily activity" (P11). If teachers are taught how to implement movement and are provided new ideas and resources, then it may help boost teachers' confidence and ability to provide PA opportunities to their students. One teacher mentioned, "I feel like if I had an arsenal of all these new ideas and things I can do, I feel like I could feel more confident doing it" *(P6)*.

The next theme included perceptions on physical activity and personal physical activity levels. Some teachers indicated their own PA levels or PA history impacted their use of MI. One teacher explained:

"... I am not like a super athletic person myself so...I was so down and exhausted. So if I, ya I need to be working on getting my own energy levels up to kind of match them to be able to participate more." (P2)

Another teacher mentioned their past PA experiences with concussions. This teacher said, "*I don't want to expose myself to risk at – uh, reinjuring myself*" (*P12*). Previous injuries from engaging in PA might affect teachers' perceptions for implementing movement in their classroom. The same teacher also mentioned,

"...My issue is heart rate so for whatever reason whenever my heart rate gets over 140 all my symptoms come back. All my concussion symptoms... So I can instruct now but I can't participate but I have a hard time because I like participating, shutting off that participation and then usually it's too late." (P12)

Another theme that emerged from the interviews was prioritizing sedentary academic lessons. This theme concerns teachers prioritizing academic lessons over movement lessons. Although teachers have a busy schedule, many feel the need to prioritize sit-and-learn lessons as opposed to moving and learning. Being behind schedule in curricular concepts, many teachers will not implement movement and carry on with necessary lessons. One teacher expressed, "*If I'm slightly behind schedule my– that unfortunately like it gets tossed aside. I focus much more on like curriculum content*" (*P9*). Another teacher mentioned "*So, movement breaks isn't something I think about so much so*" (*P8*). Likewise, one teacher shared,

"It's in the middle of an lesson sometimes I'll say "okay well you know were going to take a break between this, this one and this one"...but they haven't quite gotten to where I need them to be in order to take that little break." (P4) Relying on other resources is another barrier to implementing movement. This category relates to how teachers rely on curriculum-cover teachers, GoNoodle, YouTube, and other video-based resources as an active break from doing sedentary curricular work. Instead of teachers facilitating movement on their own, they use other available resources to provide movement to their students. One teacher stated, *"So I kind of rely on our curriculum-covers teachers. They are all like kinesiology majors. So they have all the, the cool moves and game ideas" (P2)*. Another teacher also shared, *"So it's easier sometimes to just put something up on YouTube that already exists that they can follow" (P2)*. Likewise, one teacher commented, *"I'll throw in either some Just Dance on YouTube, or some GoNoodle, but again those ones, they tend to get more animated and its, its harder to bring them down" (P4)*.

Another category that emerged from the interviews was student chaos. Teachers do not implement movement if their students become chaotic during movement activities in class. Many teachers expressed difficulties with settling their students back down to learn after doing a movement activity. One teacher stated, "[*The*] biggest barrier is [*that*] sometimes it takes them about 15 to 20 minutes to actually get settled into a task" (P7). Likewise, one teacher also shared, "So one is definitely trying to real them back in because with 26 boys in the room they get very excited and then it takes a while for them to settle back down" (P4). This can be daunting to teachers because it takes time out of learning to calm the students back down. Especially if there is a large class or if some students have specific needs. One teacher mentioned: "I have one boy in my class with a very severe case of ADHD so we do a lot of focusing on the opposite of calming, keep everything like as low energy as possible for, to kind of accommodate him." (P2)

Also, many teachers expressed time constraints as a barrier to implementing movement. There are many time commitments for teachers consequently leading to less time for movement. Some noted losing track of time altogether to implement movement. One teacher stated, "*I think the main thing might be just to not making time*" (*P3*). Another teacher shared, "So I just find the timing and trying to fit it into my day is not as easy set say" (*P5*). Some teachers mentioned finding the time to implement MI a challenge. One teacher said, "*It's more just the, the getting, the time, finding time to do it*" (*P5*) and another teacher commented, "*I find that sometimes it's just time constraints*" (*P4*).

6.12 Envisioning MI Strategies

A second core category that emerged from the interviews was envisioning MI strategies. These were potential strategies identified by participants to aid with addressing MI barriers. The category that emerged from this core category included new resources and strategies with six related themes including adapting to the curriculum, classroom routine, confined space activities, easy recall, relocating, and student engagement.

Adapting to the curriculum involves integrating the academic curriculum into movement. Teachers reported that having traditionally sedentary curriculum blended with movement activities would help by providing PA to their students while reinforcing curricular concepts. One teacher stated, *"I think a thing I really want to do is actually link it to curriculum, so they don't just see it as a time filler when we need to" (P2)*. Another

teacher reported, "Just already having like a list or some resources available to easily just bring it in to add to different lessons" (P3). Likewise, a teacher stated, "Just ideas of how do we integrate it within my lessons" (P11). Integrating MI into traditionally sedentary curriculum was an important proposed strategy.

Teachers were interested in integrating MI activities into the classroom routine. It may be difficult to notice when students need to move, so creating a routine where students know when and what time their MI activities are may address movement barriers. One teacher said, "*Just trying to find when the kids need the break in moving around*" (*P5*) and another stated, "[*It*] would be helpful and if I make it part of my routine obviously the kids would get used to it to" (*P6*). Similarly, one teacher commented, "*If it is in regular routine, and it's part of their expectations, it will, they will be able to adjust accordingly*" (*P7*).

The theme confined space activities was about movement activities that can be done in confined spaces, as smaller spaces was a teacher identified barrier to MI. One teacher commented, "So just trying, trying to find ways to do things within, within such a small area" (P4). Some teachers were in a portable so space for them is limited. A teacher mentioned, "Well we're pretty much crammed in there and I've tried lots of different seating arrangements...But, just different strategies for things, for, for the confined space" (P4). Participants felt by creating MI activities that can be done in confined spaces; they may be better able to provide their students with MI.

Easy recall was another theme mentioned during the teacher interviews. Easy recall was identified as the ability to recall MI activities quickly. Some teachers noted that having activities on hand would be very useful and easy to implement. One teacher
stated, "I think its maybe building up some ideas of different types of movements that we could do to just have it on hand" (P3). Another teacher commented, "Whether it's not planned or incidental right like it's just 'oh I see that the kids are busy that they need to move' then just pull out something and move" (P5). This strategy would allow teachers to use a few movements and implement MI quickly when their students need a break, during transitions, or to reinforce concepts.

Another theme that was mentioned during the interviews included relocating. Relocating was about moving movement activities outside of the classroom rather than indoors. One teacher commented, "*Think well especially now that the weather is getting nicer, like to do more outside*" (*P2*) and another teacher said, "*Well outside, outside would work*" (*P4*). If the weather does not permit, some teachers might want to relocate to another space in the school. One teacher said, "*Possibly find a space in the school*… [*Or*] have an empty classroom in our school that could be something that a classroom could move into" (*P10*). Relocating may help address movement barriers that teachers experience within their own classroom.

6.13 Reasons for Embedded Professional Development

This core category explores the reasons for having a MI coach in the participants' classrooms. Two themes emerged from this core category: another perspective and teacher learning. Multiple teachers spoke about having a movement educator coach them on movement activities, as it would provide them with a new perspective. One teacher commented, "*[It] will maybe reinvent the wheel, something different… And have a different perspective on it right" (P1)*. Another teacher said,

"But to see someone else show how easy it could be done to easily integrate would be, would be good for them to see someone else and to know that this is what's happening and try to, you know, try to do better" (P3).

Many teachers wanted different ideas and felt a MI coach visiting their class would help them learn new ways to bring movement to their classroom. One teacher said, "So I'm just looking like for, different ideas. More fresher ideas I guess you can say to refresh my teaching" (P9), and another teacher commented, "We're always looking for fresh ideas" (P10). Likewise, a teacher stated, "So I'd love some ideas" (P8) and another teacher mentioned,

"Well it's always good to have fresh eyes... But I'm sure there are other things that can be done. Especially someone who has training in, in Phys Ed and, and movement integration" (P4).

One teacher also commented, "Different activities that I can use in the classroom for this" (P7), and another teacher expressed how it would be "easier just to find ways to integrate it in the classroom right" (P5). Many teachers wanted new ideas or suggestions on how to implement movement in their classroom. One teacher said, "Give me more ideas right... the more ideas the better right" (P12). Another teacher stated, "So somebody helping me to maybe give me some suggestions or ideas and try to implement" (P1). Likewise, one teacher mentioned, "I'm always interested in looking at different ways of that other people do things" (P7). One teacher also shared, "So I would love to see the ideas that you have and what other people have so I love that" (P6). Therefore, by providing teachers with different movement activities, it allows for new ideas and perspectives that teachers might not have been aware of and could implement with students in their classroom.

The second theme that emerged from the interviews was teacher learning. Teacher learning is about observing how someone implements MI and for teachers to be provided the opportunity to try themselves. Many teachers expressed that they want to be shown how to implement movement activities by someone who specializes in PA In doing so, it can help teachers implement movement on their own without having to rely on other resources. One teacher commented, "I want to know kind of where to start and how to actually do it myself and not rely on like technology to do the work for me" (P2). Similarly, one teacher mentioned, "show me ways to do it so it's just quick bursts even in-between, going from French to science, or religion to social studies" (P11). The same teacher also said, "It won't be the same as having somebody and show me how to do it" (P11). One teacher also commented, "I think again because I am a new teacher I think getting that help and then seeing new ideas is always going to help me be better" (P6). By having a movement specialist visit each class and coach each teacher on how to facilitate movement activities may help overcome the challenges some teachers are experiencing.

6.2 Quantitative Results

The overall sample size of teacher respondents for the pre-intervention survey (appendix C and D) was 107. This number includes the 12 participants who opted in for the intervention study.

6.21 Pre-Intervention Survey Results

Table 1 found below displays teachers' responses and percent frequencies of the teachers who provide or do not provide MI opportunities in the classrooms. In this study, 88% of teachers provide their students with PA opportunities in the classroom, 9% did not. Out of the 107 teachers who answered the survey, three teachers did not answer the survey question pertaining to the use of movement integration.

Table 1

Answer	Responses	Percent Frequency	
Yes	94	88%	
No	10	9%	
Not Answered	3	3%	

Percent Frequency of Teachers that provide MI Opportunities

Table 2 found below illustrates teachers' responses and percent frequencies of the strategies used to implement movement. Pre-intervention survey results indicate that 72% of teachers use online resources like YouTube or GoNoodle and 59% use brain or exercise breaks to integrate movement during normal classroom time. The percent of teachers that use academic lessons with integrated PA, physically active transitions between classes, and classroom movement to integrate movement in the classroom are 40 to 47% of teachers. Thirty-three percent of teachers use morning or afternoon exercise routines followed by 17% that use other pre-packaged kits and 13% that use other resources like DPA, standing desks, or their own movement activities. Ten percent of teachers use alternative classroom equipment and functional fitness charts to integrate

movement. Only 6% of teachers indicate they do not use MI while 5% use classroom rules and/or procedures.

Table 2

Percent Frequency of the Strategies Teachers use to Implement Movement

Strategies	Responses	Percent Frequency
Classroom rules and/or procedures	5	5%
I do not use MI	6	6%
Functional Fitness Charts	11	10%
Alternative classroom equipment	11	10%
Other	14	13%
Other pre-packaged kits	18	17%
Morning or afternoon exercise routines	35	33%
Classroom arrangements	43	40%
Physically active transitions	47	44%
Academic lessons with integrated PA	50	47%
Brain or exercise breaks	63	59%
Online resources (e.g. YouTube or GoNoodle)	77	72%

6.22 Pre-Intervention Survey Results for Intervention Participants

Teacher participants' pre-MI implementation are shown below in Figure 8. Pre-MI implementation frequency from the 12 participants showed that 8% of participants did not implement MI and 50% of teachers implemented MI once per week. About 42% of teachers were implementing MI 2 – 3 days per week and this increased to 50% after one month of partaking in the intervention. There were no participants utilizing MI 4 – 5 days per week.

Table 3 found below illustrates teacher participants' responses and percent frequencies of the strategies they use to implement movement. Pre-intervention results

from the 12 participants demonstrated that zero percent use classroom rules and/or procedures and 8% use other (e.g., standing desks), alternative classroom equipment, morning or afternoon exercise routines, and physically active transitions respectively to implement movement during normal classroom time. Seventeen percent of teacher participants use the functional fitness charts and 25% reported that they do not use MI or other pre-packaged kits and classroom arrangements to implement movement. Academic lessons with integrated PA and brain or exercise breaks were strategies used by 33% of the teacher participants and 58% reported using online resources such as YouTube or GoNoodle.

Table 3

Strategies	Responses	Percent Frequency
Classroom rules and/or procedures	0	0%
Other (e.g. standing desks)	1	8%
Alternative classroom equipment	1	8%
Morning or afternoon exercise routines	1	8%
Physically active transitions	1	8%
Functional Fitness Charts	2	17%
I do not use MI	3	25%
Other pre-packaged kits	3	25%
Classroom arrangements	3	25%
Academic lessons with integrated PA	4	33%
Brain or exercise breaks	4	33%
Online resources (e.g. YouTube or GoNoodle)	7	58%

Percent Frequency of the Strategies Teacher Participants use to Implement Movement

Figure 8



Teacher Participants Pre-MI Implementation

6.23 Post-Intervention Survey Results

The project hypothesis states that the quantity of MI provided to students will increase after the teacher coaching intervention. Using the Wilcoxon Matched-Pairs Signed Rank Test, results indicated that one month after providing the teacher coaching intervention there was a statistically significant increase from pre-intervention to postintervention with a large effect (Z = -2.138, p = 0.0165, r = 0.6). The median score for pre-MI implementation was one time per week (represented as 1) compared to the median score for post-MI implementation, which was 2 - 3 days per week (represented as 2). One month after the intervention, 25% of participants were using MI 4 – 5 days per week. Furthermore, no participants reported using MI zero times per week after one month of the intervention. Figure 9 found below depicts the frequency of MI implemented per week from teacher participants' pre to post-intervention and Figure 10 illustrates the indication of significance from pre to post-intervention for MI implementation.

Figure 9

The Frequency of MI Implemented per week: Pre and Post Intervention



Figure 10





Note. * p < 0.05. A median score of 1 is coded as once per week and a median score of 2 is coded as 2 - 3 days per week for implementing MI.

The Ranks table provides data on the comparison of participants from pre-MI implementation and post-MI implementation. Two participants had negative ranks after receiving the teacher coaching intervention. This indicates that there was a decrease in the quantity of MI provided to their students after receiving the teacher coaching intervention. Nine participants showed positive ranks indicating an increase in the quantity of MI provided to their students after receiving the teacher coaching intervention. Only one participant had a tie rank, indicating no change in the quantity of MI implemented after receiving the teacher coaching intervention.

6.24 MI Confidence and Competence

A Kendall's tau-b correlation was performed to determine the relationship between confidence and competence amongst the 12 intervention participants. The results demonstrate a strong, positive correlation between confidence and competence which was statistically significant ($\tau_b = 0.627$, p = 0.018). As teachers increased their MI competence, they also increased their confidence to use MI.

Figure 11

Teachers Confidence Levels in Facilitating MI after Receiving Teacher Coaching



Confidence Levels

Figure 12

Teachers Competence Levels in Facilitating MI after Receiving Teacher Coaching



Competence Levels

The Exact Goodness-of-Fit test was performed to analyze confidence and competence individually. Using the Exact Goodness-of-Fit test for confidence, findings indicated a marginally statistically significant result (p = 0.048) demonstrating that the observed results are significantly different from what would have been expected if all options were selected equally. When answering the question "To what extent do you believe that the embedded professional development on movement integration you received has increased your confidence to lead movement integration with your class" 8% selected "a great deal" and 58% of teachers selected the option "a lot". Twenty-five percent of teachers selected "a moderate amount" and 8% selected "a little". In total, 66% of teachers indicated that they had "a great deal" and "a lot" of confidence in facilitating MI activities with their students after receiving teacher coaching. More than half of the teacher participants were confident in facilitating MI activities with their students after receiving teacher participants? confidence levels in facilitating MI after receiving teacher coaching.

The Exact Goodness-of-Fit test demonstrated a statistically non-significant effect (p = 0.705) for competence. The survey question asked, "To what extent do you believe that the embedded professional development on movement integration you received has increased your skills and ability to lead movement integration with your class?" This indicates that there was no statistically significant difference in the observed and expected options of teachers' responses. Based on the responses, approximately 33% of teachers selected "a lot" and "a moderate amount" respectively and 25% of teachers selected "a great deal". This demonstrates teachers' options to competence were all

relatively equally selected. Figure 12, found above, depicts teacher participants' competence levels in facilitating MI after receiving teacher coaching.

6.25 Future Implementation Intention and Teacher Benefits

Survey 2 contained questions about participants' future implementation of MI, found below in Figure 13, and the benefits they experienced during the intervention. One question asked, "How likely are you to use MI in the future?" Approximately 67% and 33% of teacher participants reported "very likely" and "likely" to implement MI in the future after one month of receiving teacher coaching. There were no responses indicating "neither likely or unlikely", "unlikely", or "very unlikely" for this question.

Another question asked participants if other teachers would benefit from embedded professional development on MI. One-hundred percent of teacher participants reported "yes" to this question. All teacher participants who were involved in this study believe other teachers would benefit from embedded professional development, such as teacher coaching, to implement MI.

Figure 13



Teacher Intentions for Future Implementation

Likeliness of Implementing MI

6.26 Participants Post-Intervention Survey Comments

In the post-intervention survey, we asked teacher participants "What was the biggest benefit of embedded professional development for MI?" Many teachers mentioned how their students benefitted from doing MI in their classroom. One teacher stated, "Students were more engaged when academic activities were combined with movement activities" (P2). Another teacher reported, "The students enjoyed learning the new moves" (P3). A participant also mentioned how performing MI during normal classroom "breaks up the day for the kids and creates a fun environment for the students to learn" (P12). Likewise, one teacher reported, "...It allows some sort of a break in their daily routine" (P9). Finally, a teacher mentioned that by having the teacher coach present, allowed her to work with individual students:

"Having an extra instructor in the class allowed me the time to work with individual students. I was able to see areas of weakness that I would have missed if I had been the one leading the group." (P10)

Another benefit teacher participants mentioned after one month of embedded professional development was having different MI activities and strategies to use with their class. One teacher stated, "*I had more strategies for movement in a small space*" (*P4*) and another mentioned, "*Getting ideas for the different movements and making them fun*" (*P8*). Similarly, one teacher reported, "*Increased knowledge of movement integration*" (*P1*). Learning new MI strategies may have been a large benefit to teachers during the teacher coaching sessions. Another teacher stated, "*Learning simple moves can only take a few [minutes] especially during transition times*" (*P5*). Lastly, one

teacher mentioned how the teacher coaching sessions "acted as a reminder to utilize it in the classroom regularly [and] to be provided with sample activities" (P7).

In the post-intervention survey, we asked another question to teacher participants inquiring, "What was the biggest challenge of embedded professional development for MI?" Many teachers reported classroom *"space" (P12)*. Others felt that the biggest barrier was student behaviour. One teacher mentioned, *"My challenge is how each class is set up. I have 6 different classes and they are all laid out differently" (P8)*. Another teacher said, *"Classroom space, [and] behaviour management of some students with attention difficulties" (P2)*. A few teachers noticed that it took longer to settle students back down to start learning again after facilitating an MI activity. One teacher mentioned, *"...By allowing a physical break of 5-10 minutes, at first, students took longer than normal to settle back into the mindset of going back to French" (P9)*. Likewise, one teacher reported, *"The biggest challenge was just calming the students down following the activities as this was a very busy group" (P10)*.

Another challenge that teachers experienced with embedded professional development for MI was finding the time to implement MI and consistently trying to implement MI. One teacher said, "Increasing the amount of times of week performing movement integration in the class" (P1) and another mentioned, "Remembering to use it and be consistent" (P6). Similarly, one teacher reported, "Trying to use it daily and at a good time" (P11). One teacher felt challenged to implement MI because "As a teacher, it is to get off the mindset of being in a race to cover as much as possible from the curriculum" (P9). Furthermore, one teacher experienced challenges with recalling the

different MI activities used during the embedded professional development sessions. This teacher stated, *"Trying to remember all the movements" (P3)*.

In the post-intervention survey, we asked teachers to share their experiences or opinions regarding MI or their participation in this research project. A few teachers mentioned they had increased confidence and teacher learning. One teacher mentioned, *"Kristina, who worked with our class, helped my confidence greatly to be able to plan and execute movement activities with my class" (P2).* Another teacher also stated, *"I really enjoyed it and I am thankful to have someone come in and teach me all of these new things" (P6).* Teachers who participated in this research project mentioned how they enjoyed the MI visits. One teacher reported that it was a *"rewarding experience for both the students and myself" (P3)* and another teacher said, *"I am very happy to have taken part in this…" (P8).*

Many teachers reported how their students enjoyed the MI visits with the teacher coach. One teacher stated, "*Kristina was engaging and the students really enjoyed her visits*" (*P4*) and another mentioned, "*The students loved it when Kristina came into the class*" (*P5*). Similarly, one teacher commented on how "*it was a great experience and the kids really enjoyed Kristina's positive energy and enthusiasm*" (*P8*) and another stated, "*...my students enjoyed learning from her!*" (*P2*). One more teacher mentioned, "*The students enjoyed having someone else come in to our class*" (*P7*).

Furthermore, teachers mentioned how they would benefit if there were additional MI visits as opposed to three sessions. One teacher commented, "A few more visits with a variety of activities would be great" (P7). Another teacher stated, "I would have loved to have had more lessons and perhaps a larger variety of classes" (P10). Likewise, one

teacher mentioned, "I am very happy to have taken part in this and would benefit from even more visits from Kristina" (P8).

Chapter 7. Discussion

7.1 Barriers to Movement Integration

The purpose of the current study was to determine what barriers are preventing teacher participants from implementing MI in their classroom and the impact of teacher coaching on addressing these MI barriers. While many studies exist on teachers' barriers to implementing MI in the classroom (Cothran et al., 2010; Goh et al., 2013; Goh et al., 2017; Vazou et al., 2020; Webster et al., 2015), applied research to address barriers is lacking (Kraft et al., 2018). Existing literature is available on teacher coaching in specific curricular areas (e.g. mathematics) however; there is no empirical literature available on teacher coaching and PA. This study's results will add new knowledge to MI and teacher coaching literature.

Previous research has shown teachers experience multiple barriers to implementing movement in their classroom including limited time, lack of infrastructure (e.g. materials, resources, space), classroom control, safety issues, limited experience with PA, negative attitudes of colleagues or administrators towards PA, negative personal attitudes towards PA, and perceptions that PA may interfere with daily classroom routines or curriculum outcomes (Dinkel et al., 2017; Dyrstad et al., 2018; Goh et al., 2013; Goh et al., 2017; McMullen et al., 2014; McMullen et al., 2016; Webster et al., 2015). Findings from this research are consistent with existing literature, as teacher participants expressed several barriers to implementing MI. Using grounded theory,

reported barriers consisted of five categories: a) challenging spaces b) limited confidence and competence c) time constraints d) student chaos, and e) relying on other sources.

Challenging spaces included two themes, limited facility access and limited utilization of space. In a study by Martin & Murtagh (2017b) teachers with larger class sizes also experienced this issue, especially when trying to implement larger movement activities. It appears from this study and others that if teachers have limited space or are unable to find an available area, many may refrain from implementing MI altogether.

Under the category of limited confidence and competence, teachers discussed adaptability issues, lack of knowledge, perceptions of physical activity levels, and prioritizing of sedentary academic lessons. Adapting the curriculum to movement poses difficulty if teachers have minimal experience or knowledge to do so. In many cases, teachers will prioritize curricular activities they are confident and competent at teaching. Previous research indicated many teachers experience challenges in adapting academic lessons to integrate PA (Bartholomew & Jowers, 2011; Dinkel et al., 2017; Goh et al., 2017; Martin & Murtagh, 2017b; Webster et al., 2018). Infusing academic content with PA may require more familiarity in teaching an academic concept which new teachers starting the profession may lack (Vazou et al., 2020). Existing literature also demonstrates that teachers lack knowledge of how to integrate MI with curriculum content or do not understand how to implement MI effectively (Dyrstad et al., 2018; McMullen et al., 2016; Quarmby et al., 2019; Webster et al., 2017). Perceptions of one's own PA levels was another barrier reported by teacher participants. Previous research suggests teacher's own personal experiences with PA and values of PA may influence their confidence and willingness to promote PA in the classroom (Cothran et al., 2010;

Goh et al., 2017). Professional development opportunities for learning how to incorporate MI are infrequently provided to teachers, as a result, many do not know where to start or how MI should appear in the classroom (Webster et al., 2017). Past research shows teachers might feel more inclined to implement MI if the activities are of shorter duration, incorporate academic content, and are easy to implement in the classroom (McMullen et al., 2014).

Time constraints was another barrier identified by teachers in this study. In previous literature, many teachers reported lack of time for implementing MI due to competing curricular demands and threats to classroom control during MI activities (Goh et al., 2013; Martin & Murtagh, 2017b; McMullen et al., 2014; Webster et al., 2015; Webster et al., 2018). In a study by Cothran and colleagues (2010), many teachers saw MI as an addition to their already crowded schedule. In this study, many teachers reported MI as "*another thing for me to have to think about*" (*P2*) in addition to their curricular demands, which fits with previous findings on this barrier.

Student chaos was also an issue impeding the use of MI for teachers in this study. Teachers were fearful of poor student behavior or potentially uncontrollable behavior during MI. This aligns with the literature; many studies document this barrier (Goh et al., 2013; Martin & Murtagh, 2017b; McMullen et al., 2014; Webster et al., 2015; Webster et al., 2018). Chaos transitioning back to sedentary learning after facilitating an MI activity is a primary concern for teachers (McMullen et al., 2014; Stylianou et al., 2016). In this study, teachers also mentioned transitioning back to sedentary learning a challenge.

Relying on other resources such as YouTube or GoNoodle was also a cited barrier in this research. Teachers felt providing video led movement was easier to implement

than teacher led MI. One study by Webster and colleagues (2018) reported some teachers' preferences of MI activities involved the use of technology. Although these activities are easy to provide and can be beneficial in many ways, they might not be inclusive, adaptable, or challenge skill related components of fitness such as strength, agility, coordination, and balance. Moreover, 76 and 53 percent of children and youth ages three to four and five to 17 are engaging in recreational screen time than is recommended by the Canadian Guidelines for screen-based sedentary behaviours (ParticipACTION, 2018).

In addition to discussing barriers, teachers also discussed the resources and strategies that they felt may aid with implementing MI. Teacher participants stated resources such as adapting to the curriculum, classroom routine, confined space activities, easy recall, relocating, and student engagement that may help them implement MI more frequently. This aligns with previous research as many teachers expressed the need for adequate resources such as pre-packaged kits, equipment, manuals, predetermined PA lessons, step-by-step curriculum guides, and MI professional development as a strategy to help with MI implementation and adapting MI to the curriculum (Martin & Murtagh, 2017b; Vazou et al., 2020; Webster et al., 2015; Webster et al., 2017). Teachers also felt they wanted MI to fit with their classroom routine. Multiple studies have indicated that teachers would like short and simple MI activities that are part of their classroom routine and procedures as it makes MI easier to implement (Dinkel et al., 2017; Stylianou et al., 2016; Webster et al., 2018; Webster et al., 2017). Confined space MI activities was another strategy teacher participants mentioned to help them implement MI. Although not mentioned in the literature, most teachers' reported adapting MI activities during the

interventions to fit with their classroom space so students can perform activities safely (Goh et al., 2017; Quarmby et al., 2019). Moreover, teachers wanted MI activities that they could easily recall or bring out to use. This is comparable with other research, as many teachers expressed their need for accessible and easy to use MI activities (McMullen et al., 2016; Stylianou et al., 2016; Webster et al., 2018). Teacher participants also mentioned relocating to another area may help with MI implementation if their classroom was too small. In a study by Webster and colleagues (2017), teachers discussed having a designated area to perform MI activities, especially if classroom space was limited to aid with MI implementation. Lastly, teacher participants mentioned student engagement helpful to implementing MI. Previous research demonstrates students' request for MI and enjoyment during MI activities aids with continuing MI implementation for most teachers (Goh et al., 2017; Martin & Murtagh, 2017b; Stylianou et al., 2016; Webster et al., 2017).

7.2 Designing the Intervention

We addressed barriers identified by participants in a professional development intervention for MI, based on the promising practices for professional development (Darling-Hammond et al., 2017) the principals of teacher coaching (Desimone & Pak, 2017), and the Instructional Coaching Principles developed by Jim Knight (2007). Darling-Hammond and colleagues (2017) identified seven features of effective professional development in their work: 1) content focused 2) incorporates active learning 3) supports collaboration 4) uses modelling of effective practice 5) provides coaching and expert support 6) offers opportunities for feedback and reflection 7) is of sustained duration. Similarly, Desimone and Park (2017) suggest for teacher coaching to

be effective in improving teaching practices and student learning, five features should be present: a) content focus b) active learning c) coherence d) sustained duration and e) collective participation.

In our study the interventions focused solely on MI, ensuring they were content focused. In our study active learning was utilized because we involved teachers directly in creating and trying new teaching strategies (Darling-Hammond et al., 2017; Desimone & Pak, 2017). Collaboration was at the center of this intervention, the MI coach and the teacher participant collaborated throughout the intervention. A model of effective practices consisted of a modeled MI lesson provided by the MI coach directly in the teachers' classroom. Teacher coaching and support was conducted through the multiple visits intervention approach, where the MI coach could provide coaching to the teacher on the second and third classroom visit. The debriefing meetings after each intervention session allowed for feedback and reflection. To provide a sustained duration, the MI visits occurred consecutively over three to four weeks and were approximately five to fifteen minutes in length for a total of three visits.

According to Knight and colleagues (2007), teacher coaching is an intensive support-based partnership (Knight & van Nieuwerburgh, 2012). Teacher coaching should be founded on equality between the coach and teacher, teacher choice, empowering teachers' voices, dialogue, reflection, practice, and reciprocity (Knight, 2007; Knight & van Nieuwerburgh, 2012). In this study, equality was manifested through the belief that teachers' thoughts and beliefs are valuable. The MI coach listened to learn and understand the teachers' perspectives in the qualitative interviews and at each debriefing meeting. In this intervention, teachers were not told what to do in the intervention, they

had a choice in intervention activities and scheduling. Teacher participants were encouraged to use their voices to share concerns or issues from the beginning of the study onward. The relationship that the MI coach developed with participants assisted in supporting teachers to share their opinions. The MI coach and teacher participant engaged in dialogue throughout the intervention period and came to mutually agreed upon decisions through conversation. Reflection was weaved into the intervention through respect for teachers' professional knowledge and experience. The MI coach did not dictate what the teacher should think or feel about MI, this was done to provide space for teachers to reflect and come to their own conclusions. Through the intervention the plans that the teacher coach and participant made were put into action, which allowed the teacher to practice the teaching skill they wanted to develop. Both the teacher participants and the MI coach felt they benefited from their relationship, their experience together, and the intervention as a whole because there was a real mutual benefit for both resulting in a partnership reciprocity.

We addressed participant identified barriers by designing an MI intervention where we would develop MI strategies and resources unique to each participant. The most common actions realized to address barriers were: addressing space issues, enhancing confidence and competence, supporting classroom management, and working within time constraints.

MI activities that could be performed in confined classrooms were developed. The MI coach worked with the teacher participants to rearranged classroom furniture to create a larger space if necessary or supported teachers in relocating MI outdoors or to another area in the school like the gymnasium or library.

Sharing easy to use resources and relationship centered coaching processes were used to address competence and confidence issues. The MI coach provided each teacher participant with resources, would meet and email discussing the resources, and work together to select resources the teacher felt they could lead. The MI coach would also perform a model lesson (Knight, 2007) so the teacher could observe and ask questions if needed. After the model lesson, the MI coach would observe the teacher for subsequent MI visits while providing guidance and support. Each MI visit was followed by a quick debriefing meeting. Scheduling three MI visits consistently for three to four weeks provided teachers an opportunity to prioritize MI and create a routine for integrating movement in their classrooms.

To address the common barrier of classroom chaos or fear of chaos, the MI coach collaborated with the teacher to develop proactive management strategies (e.g., start/stop signals or phrases, calming exercises after MI), classroom routines, rules, and positive reinforcement strategies prior to the MI visit. Providing such management strategies has shown to reduce student chaos during and after MI (Stylianou et al., 2016; Webster et al., 2015).

To address time constraints, the MI coach developed MI activities shorter in duration, typically less than five minutes, or implement MI during transition times between lessons. Implementing shorter duration MI activities or MI activities during naturally occurring transition times holds promise for easier implementation in the classroom and may help foster the view of MI as a teaching reinforcement instead of an additional requirement (Martin & Murtagh, 2017b; Michael et al., 2019; Stylianou et al., 2016).

7.3 Intervention Outcomes

Quantitative findings from the teacher coaching intervention indicated it was successful in supporting low MI use teachers in the use of MI. There was a significant increase in teachers' quantity of MI implementation after one month of providing three teacher coaching intervention sessions one week apart. In a study by Martin and Murtagh (2017b) teachers were provided lesson ideas, resources, and professional development training, this positively influenced teachers' acceptability of the Active Classroom movement program. Similarly, in a study by Goh and colleagues (2017), teachers indicated that initial training, which included teacher training sessions and mentoring, was helpful with increasing their understanding of the program Take 10!. Another study by Stylianou and colleagues (2016) provided monthly, in-service professional development training for teachers to increase the amount of classroom-based PA offered to students. Results demonstrated a significant increase in the number of classroom-based PA implemented in class by teachers after the intervention compared to the year before however, these results should be interpreted with caution as they were self-reported by teachers and there was no control group (Stylianou et al., 2016). Another study by Delk and colleagues (2014) investigated teachers' implementation of five to 10 minutes PA breaks over a three-year intervention with three different training conditions. Results indicated that more than half of teachers who received either PA training or support implemented one or more PA breaks during class time (Delk et al., 2014). Teachers who received both training and support from program facilitators significantly increased the amount of PA breaks used and had the highest levels of PA break implementation (Delk et al., 2014).

Previous literature has also examined professional development on student achievement in other subjects like math, literacy, and science as well as teaching delivery and practices (Bean et al., 2010; Biancarosa et al., 2010; Buczynski & Hansen, 2010; Campbell & Malkus, 2011; Greenleaf et al., 2011). Professional development training in the form of coaching has demonstrated significant results in students' content knowledge and assessment testing of content learned (Bean et al., 2010; Buczynski & Hansen, 2010; Campbell & Malkus, 2011; Greenleaf et al., 2011) as well as improving teachers delivery of instructional practices (Kretlow et al., 2011; Kretlow et al., 2012). Professional development training like teacher coaching may help promote changes in teacher learning, teachers' perceptions about MI programs, and the likelihood of subsequent program implementation (Cothran et al., 2010).

In total, 66% of teachers indicated that they had "a great deal" and "a lot" of confidence in facilitating MI activities with their students after receiving teacher coaching. However, there was no statistically significant difference in the observed and expected options of teachers' responses to the question asking about teacher competence. Previous research on MI indicated teachers who felt more efficacious or perceived themselves to have higher competence in facilitating MI, were more likely to be willing to implement MI and implemented MI more frequently (Parks et al., 2007; Webster et al., 2015). A study by Morgan and Bourke investigated non-specialist preservice teachers and in-service teachers on their experiences with school PE and PE teaching confidence (2008). Teachers reported having "a moderate level" of PE teaching confidence and those who had negative experiences with PE were less likely to engage in PA and had lower confidence levels teaching PE compared to those who had positive experiences (Morgan

& Bourke, 2008). These results demonstrated that teachers' previous experiences with school PE influences their confidence and competence to teach PE to students (Morgan & Bourke, 2008). Multiple studies express teachers' low levels of confidence and ability to teach PE or any PA program due to lack of training, limited exposure to PE teaching, and inadequate knowledge of PE (Morgan & Bourke, 2005; Xiang et al., 2002). The influence of personal school PA experiences plays an important role in teachers' confidence and perceived competencies with implementing any PA program, consequently affecting student PA outcomes and achievements (Morgan & Bourke, 2008). In this study, the relationship between confidence and increased MI use along with plans for future use indicate that focusing on teacher confidence in implementing MI may hold promise with regards to increasing children and youths MI in classrooms.

In this study, teacher participants had an average of 13.5 years of teaching experience. Some research indicates that teachers who have more years of teaching experience have higher perceived competence and willingness to implement movement (Vazou et al., 2020) thus, the sample of teachers involved in this study may be biased in their willingness to implement MI and potentially to be successful in the intervention. Future MI, teacher coaching research may want to investigate teacher coaching with participants who have limited teaching experience to determine if teacher coaching is an effective intervention for different sub-groups of teachers.

When surveyed one month after the intervention, all participants perceived teacher coaching as a beneficial way to deliver MI professional development. Moreover, teacher participants indicated that they are "very likely" or "likely" to use MI in the future. These findings in combination with the increase in MI use finding indicate that the

teacher coaching processes used in this study are effective for MI professional development and may have the ability to support longer term use of MI. This finding coincides with the findings from Webster and colleagues (2018) as intervention teachers recognized new advantages to implementing MI, gained more appreciation of the various sources for MI support, and learned how easily MI can be integrated into classroom routines. Similarly, past research has documented teachers' appreciation for MI after receiving professional development training, indicating that it assisted with MI implementation in the classroom (Goh et al., 2017; Martin & Murtagh, 2017b). This shows teachers heightened appreciation for teacher coaching on MI and learning how impactful movement opportunities can be effectively integrated in the classroom (Webster et al., 2018)

Although participants self-reported higher use of MI one month post-intervention, it is important to recognize that this is self-reported data. Future research may want to objectively measure MI use post-intervention. Moreover, researchers should also investigate how long there was an intervention effect. For example, would MI use stay high throughout a school year if the intervention was implemented early in the year or even in a previous year?

In the post-intervention survey, teacher participants were asked what benefits and challenges they experienced during the embedded professional development sessions for MI. Many teachers reported how their students enjoyed doing MI in their classroom. This result is consistent with other findings, as many teachers noticed positive student responses to MI and enjoyment during MI activities, which is an important facilitator for implementing MI (Martin & Murtagh, 2015; McMullen et al., 2014; Naylor et al., 2006;

Riley et al., 2017; Stylianou et al., 2016). Additionally, teachers identified having different MI activities and strategies on hand as a benefit. Providing teachers with available resources may help with program implementation and continuation, especially if teachers have limited knowledge on how to implement MI or lack the confidence or competence to do so. Previous research has shown teachers value resources like demonstrations, professional development training opportunities, content of movement ideas/activities, or equipment provided by researchers and administrators as it is a great support to program implementation (Stylianou et al., 2016; Webster et al., 2017).

Although teachers expressed numerous benefits to the MI embedded professional development sessions, there were some challenges identified. Despite the tailored intervention, some participants stated classroom space and transiting students back to sedentary learning after performing MI as continuing challenges. Another challenge teachers were still experiencing was finding the time to implement MI. Many teachers view in-class movement programs as a competitor to other school priorities (Michael et al., 2019). This finding may indicate that interventions focusing on the individual may not address all the barriers to MI. Using a social-ecological model by Michael and colleagues (2019) conceptualized the different levels of factors that can directly or indirectly influence MI use. This intervention sought to primarily address the interpersonal barriers to MI but did not address the interpersonal, institutional, community, and public policy factors that impact MI. In the review by Michael and colleagues (2019), four barriers were categorized as institutional: lack of time, lack of resources, lack of space, and lack of administrative support. In this systematic review, the competing curricular demands and lack of time often were related to pressures stemming

from standardized testing and having an overcrowded curriculum. Little research exists on addressing the institutional barriers, or any other level of barrier that exists on a socialecological model for MI. Future research should attempt to address institutional barriers as these barriers may affect the individual barriers.

In the post-intervention survey, teachers also expressed how they would have preferred additional MI visits and more activities. Although the intervention consisted of three weekly sessions, research is lacking on optimal delivery of MI professional development, including the dose (frequency and duration), intensity, or type of movement (Vazou et al., 2020). Future research should seek to determine what the optimal dose of MI professional development is, and if it is different for different subsets of teachers.

A strength of this study is that it reports details that are commonly not reported in MI interventions (Vazou et al., 2020). According to a systematic review of past MI interventions by Vazou and colleagues (2020), little research has examined the environment of classroom MI interventions consequently lacking details in teacher trainings and theoretical or empirical basis of trainings. Many interventions do not identify objectives, training activities, teacher satisfaction with training, and specific training outcomes (Vazou et al., 2020). This study provides a detailed description of the teacher training through the use of an intervention reporting template by Hoffman and colleagues (2014) for intervention description and replication.

This research also is driven by theory and empirical evidence. Theory is important for guiding research and interventions as evidence suggests theory-informed interventions result in better outcomes by uncovering a complex phenomenon, identifying tentative explanations, understanding an intervention's success or lack

thereof, and establishing evidence-based practices (Heath et al., 2015; Michie & Prestwich, 2010). Theory driven professional development provides a foundation and systemic approach for effective long term changes in teaching practices and student achievement (Darling-Hammond et al., 2017; Knight, 2007).

Another strength in this study was the use of on-going support and feedback. Teacher participants' received one-on-one, teacher coaching which included on-going support and feedback during the MI intervention. In the systematic review by Vazou and colleagues (2020), most MI interventions rarely provided any form of support during the intervention phase. Continual guidance and feedback creates a richer learning environment for teacher learning by allowing teachers to think about, receive input on, and make changes towards their teaching practices (Desimone & Pak, 2017).

7.4 Limitations

While this study is novel in its focus on addressing teacher participants' barriers to MI by using teacher coaching, it is not without limitations. One limitation was the number of participants. This study consisted of a sample size of 12 participants in the intervention. A larger sample size would have been ideal but this would have required additional study resources in interventionists. Moreover, a district school strike occurred during this study, which made recruitment difficult. Many grounded theory studies have larger sample sizes of 30 to 50 participants (Kowalski et al., 2018). Moreover, because data analysis occurs in tandem with data collection in grounded theory, we were able to constantly look at what new data was coming forward. As we approached the tenth qualitative interview, data saturation was occurring where little to no new information

was coming from participants. At that point, we decided to recruit two more participants to be prudent.

Another limitation was the self-reporting of MI use. We encouraged potential participants to answer the survey questions honestly, but some participants may have overestimated or underreported MI use. A final limitation was failing to ask for MI use confidence and competence in the pre-intervention survey, as it was an important measure that we gathered data on post-intervention. This limited the ways in which we analyzed this data.

Despite the limitations from this study, we were able to gain a deeper understanding of teacher participants' barriers to MI and address barriers using three oneon-one teacher coaching sessions over three weeks. Additionally, students were able to experience and benefit from five to 15 minutes bouts of MI implemented by their teachers. This study adds to the growing body of research on teachers' perceptions about MI and to the teacher coaching literature.

7.5 Emergence of Theory through Mixed Methods Research

The purpose of grounded theory is to develop a theory or tentative theory which helps to explain a phenomenon. The combination of qualitative and quantitative data have been used to inform the proposal of relationships and predictions about MI and teacher coaching. The previous literature in both the MI and teacher coaching field has also influenced this emerging theory, where the researcher is going back and forth between participants, collecting new information, comparing the data, and filling in the gaps

Through this mixed-methods research, we have explored the role teacher coaching can have on addressing the common barriers to teacher use of MI. Both the qualitative and quantitative findings corroborate each other and bring strength to the study together, greater than if either quantitative or qualitative were used alone. The research questions for this study aligned with both qualitative and quantitative methods. The study was informed by qualitative data generation, which led to an informed intervention and the intervention dependent variables were best assessed through quantitative and qualitative measures to give an integrated and comprehensive picture of the results.

Through this work, I propose as a tentative theory that teacher coaching is a type of high-quality professional development that can influence teacher use of MI. Teacher coaching has been examined in other curricular areas, but rarely in PE or in the promotion of PA. This research examined teacher coaching and a type of PA promotion and found positive relationships between teacher coaching and MI in different types of data that helped illuminate the benefits of teacher coaching for MI use. Future MI interventions may want to use the evidence-informed teacher coaching processes to increase the probability of success. When the barriers to teacher use of MI are addressed, and teachers receive adequate professional development for MI, there is a higher likelihood that students will reap the benefits of increased PA throughout the school day.

Chapter 8. Conclusion

MI is an effective alternative to incorporating PA in classrooms due to its versatility in frequency, duration, intensity, and types of activities. It is well established that MI provides benefits to behaviour, physical health, mental well-being, and academic

outcomes in children and youth (Bidzan-Bluma & Lipowska, 2018; Hollis et al., 2016; Martin & Murtagh, 2017a; Webster et al., 2015). Yet, many teachers still experience barriers to implementing MI in their classrooms (Webster et al., 2015). It is important for researchers and interventionists to inform teachers of the benefits of MI and how to make recommendations for implementing adequate amounts of PA for students during regular classroom time (Webster et al., 2015).

Effective professional development opportunities like teacher coaching, have been promising for improving and sustaining changes in teaching practices and student learning (Darling-Hammond et al., 2017; Desimone & Pak, 2017). This is the first study to our knowledge that has used teacher coaching to support MI. Our findings indicate that teacher coaching may be a successful professional development strategy for increasing the quantity of MI implemented by low MI use teachers. Teachers in this study reported an improvement in confidence to use MI. Additionally, all teacher participants perceived teacher coaching as a beneficial way to deliver MI and reported "very likely" or "likely" to use MI in the future. This demonstrates the potential effectiveness and feasibility of the teacher coaching MI professional development approach.

The developmental process of the teacher coaching sessions and the interview data may help tailor future MI interventions for low MI use teachers. Overall, this study provides useful information on how to develop and document an evidence-informed and theory-led intervention for teacher professional development and provides promising findings on the impact of teacher coaching on MI.

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Appendices

Appendix A: Superintendent Letter of Support



August 14, 2018

Re: Letter of Support and Partnership

I am writing in advocacy of the Supporting Durham Catholic School District Teachers in Implementing Movement Integration project led by Dr. Serene Kerpan, University of Ontario Institute of Technology, James MacKinnon, Teaching and Learning Services Consultant, and Pat Costello, Board Liaison for Extra-Curricular & Community Programs.

The Durham Catholic District School Board is excited about this partnership and the opportunity to provide workshops on evidence based-practices for our teachers. These lunch and learn workshops will provide information and hands on training on integrating more movement into the day for our students, benefiting them physically, emotionally, and cognitively. We also look forward to future research collaborations with Dr. Kerpan on physical activity promotion in Durham Catholic District Schools. These lunch and learn workshops will allow Dr. Kerpan to become familiar with many of our schools and meet hundreds of our teachers. The question and answer periods during the lunch and learns will allow Dr. Kerpan, Mr. MacKinnon, and Mr. Costello to better understand the needs and concerns of our educators and from their develop future school-based research projects.

Sincerely.

Tracy Barill Superintendent of Education

Appendix B: Post Lunch and Learn Survey 1

Online Survey Consent Form

You are invited to participate in a web-based online survey on the recent lunch and learn on movement integration you participated in. The survey is four questions and you will be entered into a draw for a wireless Bluetooth speaker if you participate. We encourage you to answer these questions honestly. By doing so you help us understand if the lunch and learn sessions improved movement integration. This is a research project being conducted by Serene Kerpan, a Professor at University of Ontario Institute of Technology. Your participation in this survey is voluntary. You may refuse to take part in the survey or exit the survey at any time. There are no foreseeable risks involved in participating in this survey. Your survey answers will be sent to a link at SurveyMonkey.com where data will be stored in a password protected electronic format. Survey Monkey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. The only way you will be identified is if you decide to provide your name and email address or phone number at the end of the survey. If you have questions at any time about this survey, you may contact the lead researcher, Serene Kerpan at serene.kerpan@uoit.ca or 905.721.8668 ext 2961. Please select your choice below. You may print a copy of this consent form for your records. Clicking on the "Agree" button indicates that:

- You have read the above information
- You voluntarily agree to participate
- You are 18 years of age or older
 - o Agree
 - o Disagree
- 1. Did you attend the lunch and learn?
 - Yes
 - o No
- 2. Are you utilizing any of the activities that were taught at the lunch and learn?
 - o Yes
 - o No
- 3. Have you developed your own physical activities to increase movement in your classroom?
 - o Yes
 - o No

If participants answer "no" to questions 2 and 3 they will be directed to this question:

4. Would you like to participate in one-on-one professional development to enhance your skills and confidence to integrate movement in your classroom? This would involve a movement integration educator coming to your classroom 3 times (10 minutes each time) and leading you and your class through an activity that gets your students active in the classroom. If you participate in the embedded professional development you will receive a \$50 Visa gift card. Please answer

"yes" if you would like to participate in this opportunity or if you would like more information.

- Yes, please provide a phone number we can text or call you at, or you may provide an email address.
- o No

Appendix C: Survey 1.1

You are invited to participate in a survey on physical activity movement integration. Movement integration involves reducing your students' sedentary time (e.g., sitting) and/or increasing their physical activity during regular classroom time. The survey will take less than 5 minutes to complete. We encourage you to answer these questions honestly. By doing so you help us understand how to improve professional development and child physical activity levels. This is a research project being conducted by Serene Kerpan, a Professor at Ontario Tech University. Your participation in this survey is voluntary. You may refuse to take part in the survey or stop the survey at any time. There are no foreseeable risks involved in participating in this survey. Your survey answers will be provided to Serene Kerpan. Your individual survey answers will not be shared with Durham Catholic District School Board. DCDSB will only receive an aggregate of all answers that will be anonymous. At the end of the survey you will be asked if you would like to participate in a research study on movement integration professional development. If you indicate you are interested we may contact you and provide you with more information regarding the study. If you have questions about this survey, you may contact the lead researcher, Serene Kerpan at serene.kerpan@uoit.ca or 905.721.8668 ext 2961. Checking or circling the "Yes" on question one indicates that:

- You have read the above information
- You voluntarily agree to participate
- You are 18 years of age or older
- 1. Do you consent to participating in this survey in the described manner above?
 - o Yes
 - o No
- 2. Did you attend a lunch and learn?
 - o Yes
 - o No
- 3. Do you provide opportunities for your students to decrease sedentary time and/or increase physical activity during normal classroom time (this is called movement integration)? This could be done by:
 - Using functional fitness charts provide to your school.
 - Integrating physical activity into academic lessons (e.g. teaching a math lesson that includes opportunities to be physically active).
 - Using brain/exercises breaks.
 - Starting the day with an exercise routine, dance, or other movement activity in your classroom.

- Establishing classroom rules and procedures that incorporate physical activity opportunities (e.g. requiring students to walk about the perimeter of the classroom to go sharpen their pencils).
- o Yes
- o No
- 4. Please Indicate how you integrate movement during normal classroom time by checking all strategies listed below that you use:
 - o I do not use movement integration during normal classroom time
 - Functional Fitness Charts
 - Academic lessons with integrated physical activity (e.g. using physical activity to teach math)
 - Brain or exercise breaks that you have developed yourself
 - Other pre-packaged kits or curricula from the internet or other sources
 - Online resources such as YouTube or GoNoodle
 - Physical activity transitions when preparing to take the class somewhere (e.g. to lunch, library)
 - Morning or afternoon exercise routines
 - Classroom rules and/or procedures (e.g. when you sharpen your pencil, you must hop on 1 foot there and back)Classroom arrangements (e.g. desks in groupings to create large open spaces)
 - Alternative classroom equipment (e.g. using exercise balls instead of seats, desks on wheels)
 - Other (please specify):
- 5. On average, how often do you use movement integration in any form?
 - Zero times per week
 - o Once a week
 - o 2-3 days a week
 - \circ 4-5 days a week
- 6. Are you utilizing any of the strategies to increase movement integration presented at the lunch and learn?
 - o Yes
 - o No
- 7. To what extent do you believe that the lunch and learn session presented valuable information?
 - Very valuable information
 - Some valuable information
 - Little valuable information
 - No valuable information
 - o I do not recall what information was presented

- 8. What grade do you currently teach? If you teach more than one grade please select all that apply.
 - Junior-K or Senior-K
 - Grade 1
 - o Grade 2
 - Grade 3
 - Grade 4
 - Grade 5
 - Grade 6
 - Grade 7
 - Grade 8
 - Grade 9
- 9. How many years of teaching experience do you have?
 - o One year or less
 - \circ 1-5 years
 - \circ 6-10 years
 - o 11-20 years
 - Over 21 years
- 10. Would you be interested in participating in a study on movement integration professional development? This study would involve a movement integration educator coming to your classroom 3 times (10 minutes each time) and leading you and your class through activities that gets your students active in the classroom. If you are selected to participate in the professional development study and you complete the study you will receive a \$50 Visa gift card.
 - o Yes
 - o No

Appendix D: Survey 1.2

You are invited to participate in a survey on physical activity movement integration. Movement integration involves reducing your students' sedentary time (e.g., sitting) and/or increasing their physical activity during regular classroom time. The survey will take less than 5 minutes to complete. We encourage you to answer these questions honestly. By doing so you help us understand how to improve professional development and child physical activity levels. This is a research project being conducted by Serene Kerpan, a Professor at Ontario Tech University. Your participation in this survey is voluntary. You may refuse to take part in the survey or stop the survey at any time. There are no foreseeable risks involved in participating in this survey. Your survey answers will be provided to Serene Kerpan. Your individual survey answers will not be shared with Durham Catholic District School Board. DCDSB will only receive an aggregate of all answers that will be anonymous. At the end of the survey you will be asked if you would like to participate in a research study on movement integration professional development. If you indicate you are interested we may contact you and provide you with more information regarding the study. If you have questions about this survey, you may contact the lead researcher, Serene Kerpan at serene.kerpan@uoit.ca or 905.721.8668 ext 2961. Checking or circling the "Yes" on question one indicates that:

- You have read the above information
- You voluntarily agree to participate
- You are 18 years of age or older
- 1. Do you consent to participating in this survey in the described manner above?
 - o Yes
 - o No
- 2. Did you attend a lunch and learn on movement integration in the fall of 2018?
 - o Yes
 - o No
- 3. Do you provide opportunities for your students to decrease sedentary time and/or increase physical activity during normal classroom time (this is called movement integration)? This could be done by:
 - Using the functional fitness charts provided to your school.
 - Integrating physical activity into academic lessons (e.g., teaching a math lesson that includes opportunities to be physically active)
 - Using brain/exercise breaks.
 - Starting the day with an exercise routine, dance, or other movement activity in your classroom.
 - Establishing classroom rules and procedures that incorporate physical activity opportunities (e.g., requiring students to walk around the perimeter of the classroom to go sharpen their pencils).
 - Yes
 - o No
- 4. Please indicate how you integrate movement during normal classroom time by checking all strategies listed below that you use:
 - I do not use movement integration during normal classroom time
 - Functional Fitness Charts
 - Academic lessons with integrated physical activity (e.g. using physical activity to teach math)
 - o Brain or exercise breaks that you have developed yourself
 - Other pre-packaged kits or curricula from the internet or other sources
 - Online resources such as Youtube or GoNoodle
 - Physically active transitions when preparing to take the class somewhere (e.g., to lunch, library)
 - Morning or afternoon exercise routines
 - Classroom rules and/or procedures (i.e., when you sharpen your pencil, you must hop on one foot there and back)
 - Classroom arrangements (i.e., desks in groupings to create large open spaces)

- Alternative classroom equipment (i.e., using exercise balls instead of seats, desks on wheels)
- Other (please specify)
- 5. On average, how often do you use movement integration in any form?
 - Zero times per week
 - Once a week
 - \circ 2-3 days a week
 - \circ 4-5 days a week
- 6. Are you utilizing any of the strategies to increase movement integration presented at the lunch and learn?
 - o Yes
 - o No
- 7. To what extent do you believe that the lunch and learn sessions presented valuable information?
 - Very valuable information presented
 - o Some valuable information presented
 - Little valuable information presented
 - o No valuable information presented
 - I do not recall what was presented
 - I was not present at the lunch and learn
- 8. What grade do you currently teach? If you teach more than one grade please select all that apply.
 - Kindergarten Year one or Two
 - o Grade 1
 - o Grade 2
 - Grade 3
 - o Grade 4
 - o Grade 5
 - o Grade 6
 - o Grade 7
 - Grade 8
 - o Grade 9
- 9. How many years of teaching experience do you have?
 - One year or less
 - o 1-5 years
 - 6-10 years
 - 11-20 years
 - o Over 21 years
- 10. Would you be interested in participating in a study on movement integration professional development? This study would involve a movement integration educator coming to your classroom 3 times (10 minutes each time) and leading

you and your class through activities that gets your students active in the classroom. If you are selected to participate in the professional development study and you complete the study you will receive a \$50 Visa gift card.

- o Yes
- o No

If you selected yes, please provide a phone number we can text or call you at, or you may provide an email address.

Appendix E: Post Movement Integration Intervention Survey: Survey 2

- 1. Are you utilizing any of the movement integration activities that the movement integration educator led with you and your class?
 - o Yes
 - o No
- 2. Have you used any of the strategies the movement integration educator used with you and your class to reduce the barriers to movement integration (e.g. ways to use movement integration in small classrooms, or how to manage chaos).
 - o Yes
 - o No
- 3. Are you using more movement integration, in any form, since the movement integration educator visited your classroom?
 - Yes
 - o No
- 4. On average, how often do you use movement integration in any form since the movement integration educator came to your class?
 - Zero times per week
 - Once a week
 - o 2-3 days a week
 - 4-5 days a week
- 5. To what extent do you believe that the embedded professional development on movement integration you received has increased your confidence to lead movement integration with your class?
 - A great deal
 - o A lot
 - A moderate amount
 - A little
 - o None at all

- 6. To what extent do you believe that the embedded professional development on movement integration you received has increased your skills and ability to lead movement integration with your class?
 - A great deal
 - o A lot
 - A moderate amount
 - A little
 - None at all
- 7. Which benefits do you perceive with your class, if any, due to movement integration? Please check all that apply.
 - o None
 - Improved student attention
 - Increased student calmness
 - Increased student effort
 - Improved learning outcomes (test scores, marks, quality of work)
 - Increased student enjoyment or happiness during or after movement integration
 - Other: leave comment box.
- 8. How likely are you to use movement integration in the future?
 - Very likely
 - o Likely
 - Neither likely or unlikely
 - Unlikely
 - Very unlikely
- 9. Do you believe that other teachers would benefit from embedded professional development on movement integration?
 - o Yes
 - o No
 - Comment box: Why do you think teachers would, or would not, benefit from embedded professional development on movement integration?
- 10. What was the biggest benefit of embedded professional development for movement integration?
 - Open answer
- 11. What was the biggest challenge of the embedded professional development for movement integration project?
 - Open answer
- 12. What grade do you currently teach? If you teach more than one grade please select all that apply.
 - o Junior-K or Senior K
 - \circ 1st Grade

- \circ 2nd Grade
- \circ 3rd Grade
- \circ 4th Grade
- \circ 5th Grade
- \circ 6th Grade
- \circ 7th Grade
- o 8th Grade
- 13. How many years of teaching experience do you have?
 - One year or less
 - 1-5 years
 - 6-10 years
 - o 11-20 years
 - Over 21 years
- 14. On a scale of 1-5, 1 being low incentive and 5 being high incentive, how much did the \$50 gift card incentivise your participation in this study. Your honestly is appreciated, it helps us understand what incentives help get educators involved in research.
 - o 1
 - o 2
 - o 3
 - o 4
 - 5
- 15. Is there anything else you would like to share with us regarding movement integration or your participation in this project?
 - Open answer

Appendix F: Interview Guide

- 1. How long have you been teaching?
- 2. How long have you been teaching at your current school?

Preamble to next questions:

I want to refresh your memory about movement integration and what was shared at the lunch and learn session. Movement integration is short bouts of physical activity done in school classrooms. Movement integration occurs when students are physically active for one to 15 minutes. The intention of movement integration is not to replace physical education, but to supplement it by providing children additional opportunities to move during the school day, which provides them many cognitive benefits that are important for learning and overall health. A benefit of movement integration is that it can be easier

to implement than other types of physical activity because it can be inserted into the school day, it is done in the classroom, and it requires minimal or no equipment. Also, the students do not need to get changed into gym clothes or outdoor attire such as snowsuits or boots. On the survey you identified that you were not using movement integration with your class, and that is ok! In fact, many teachers aren't using it yet. We have a few ideas on why this might be, but we want to know about your opinion and experiences. May I ask you a few questions about this?

 Can you tell me about why you are not currently using movement integration with your class?
 Prompto:

Prompts:

- adaptably issues (making the activity fit in your classroom)
- safety concerns
- fear of class getting out of control
- time constraints
- afraid of what administrators or others might think if they saw your class engaging in this type of activity
- not confident it will help students
- 4. Can you think of any potential ways to alleviate the issues you just discussed?
- 5. Do you think having the movement intergradation educator come to your class and coach you and the students through a few activities would help? Prompts:
 - If no, why
 - If yes, why

Appendix G: Strategies to Address Barriers to Movement Integration

Barriers to Movement	Strategies
Integration	
Adaptably issues (making the activity fit in your classroom)	 Small classroom: MI from sitting (at desk or floor time) Squatscalator (either in pairs if in groups or with the person next to you) Mini Fitness Blasts as a Class (use a 4-6 fitness charts and do one at a time with the class for a minute before going onto the next; charts set up at the front and students stay where they are) Heads or Tails; works if students are sitting in groups (pick 2 charts label "heads" or "tails". A student flips a coin and whatever the side of the coin
	lands on, the students who said that side perform the
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	movement)
	2) Messiness
	- Activities that do not use supplies or make a mess.
	- Squatscalator
	- Mini Fitness Blasts (using charts that have no
	equipment is square heel kicks criss-cross high
	thighs lateral leg lifts sidekicks V Stand-Un etc.)
	3) Organizing classroom space to accommodate
	movement
	- Rearranging desks
	- Stacking chairs
Safety concerns	1) Students injuring themselves
Safety concerns	Mini Fitness Blasts: with body movements only (in
	- while Fulless blasts, with body movements only (ic.
	Stand Un etc.)
	2) Using minimal equipment
	- Squatscalator
	- Show Me Your Answer
	- Heads or Tails
	- Rock Paper Scissors
	2) LET US DLAV principles (Weaver et al. 2013)
	5) LET USTEAT principles (weaver et al., 2015)
	- Avoiding elimination
	- Making small teams
	- Maximizing space
Fear of class getting out	1) Contained movements
of control	2) Movements performed on-the-spot as a class
	- Desk pushups plan and wave mountain climbers
	Y-stand up, heel kicks, triangle lunges etc.
	3) Classroom ground rules
	4) Start/stop signals
	5) Calming transition activities back to sedentary learning
	immediately after MI
	- Inhale/exhale while stretching
	- Reaching up towards ceiling and down towards the
	floor
	- Focus on breathing
Time constraints	1) Mini fitness blasts (lasting 5 min max)
	- Using a circuit of 4 charts, students are in groups,
	spend a minute at each chart then rotate)
	- Mini Fitness Blasts as a Class (setting up 4-5 fitness
	charts in front of the class (one by one) and students
	perform each movement for 1 min)

	 Show me your answer (teacher generated for test/quiz review; can do for 5 min max with a few questions) Mail Tag (one class game to get everyone active for 5-10 min; have charts set up outside (can use 4-5) place numbers, separately, in an envelope, each number corresponds to a chart. Students with the envelopes have to run and tag other students who don't have "mail". Once a student is tagged (gets mail) they have to perform the movement that
	 Tennis Ball Tag (similar as above but with tennis balls: can do for 5-10 minutes outside)
Afraid of what administrators or others might think if they saw your class engaging in this type of activity.	 Incorporating academic concepts into PA Show Me Your Answer (Students are spaced evenly around the classroom, with enough space to stretch out their arms. The exercise from each chart is explained, practiced and assigned a letter than corresponds to an answer choice for each question in the test. Each question and their possible answers are read aloud, with each answer clearly assigned a letter. Once the question and answers are read, students are given a five second count to select the chart they believe represents the correct answer choice. Ensure that all students execute their exercise at the same time to minimize copying. Repeat until the test is complete. Code Breakers (Students receive cards with the numbers 1 through 6 written in a random order. The numbers correspond the 6 Functional Fitness Charts randomly spread out throughout the playing area. Travelling together in teams, students attempt to 'break their code' by completing the exercises in the order that they appear on their card; can tie in concepts from subjects) Puzzle Circuits Word Builder (write a list of key words, using a different color for each. Place each latter at a station with a fitness chart. Place students in small groups and give each group a sheet with a scrambled word written on it in the correct color. Students will travel from station to station, performing the exercises, and gathering the letters they need to complete their word; adaptable to other concepts)

	- Using the stretching fitness charts; performing a few as a class with light/calming music
Not confident it will help students	 Generating activities that sparks students interests Ask the class what they like or would like After an MI activity, use 'thumbs up' or 'thumbs down' if the class liked the activity or did not like the activity.
Lack of resources	 Using the Fitness charts Using Music Pair-Sharing (students making up exercises and sharing them with peers, then doing them as a class) Outside resources (just dance, YouTube, Go Noodle etc.)