Effect of Job Embedded Professional Development on Teachers Confidence and Knowledge to Deliver Physical Literacy Enriched Physical Education

by

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Supervisory Committee

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Abstract

A gap in physical literacy-oriented (PL) professional development (PD) for generalist teachers exists and thus their capacity to develop PL and maximize student health is potentially limited. Specifically, a job-embedded professional development (JEPD) approach has been found to be an effective strategy for improving teacher knowledge and confidence. We explored the feasibility of a novel JEPD program (10 weeks) and its impact on teachers' capacity to deliver PL enriched physical education (PE) and student PL. A pragmatic feasibility trial with mixed methods included quantitative measurement of teacher PL knowledge and confidence (pre) and knowledge, confidence, satisfaction and intention (post), as well as self-reported change, to evaluate impact on teacher capacity and practices. A pre-post comparison of student PL outcomes (motor skills using PLAY Basic) during the JEPD and teacher implementation phase explored the impact on student PL. 15/44 teachers participated in surveys and 11/44 completed interviews (87% female, mean age bracket = 25-44 years). Confidence to deliver PL enhancing PE increased significantly after JEPD ($p<.0001$). Teachers were highly satisfied with the JEPD ($X =4.67/5$) and intended to change their practice ($X =4.09/5$). At 3 months, teachers reported changes including enhanced lesson planning, increased activity variety (often from the JEPD), intentional skill development, student focused discussions, introductory, transition and closing activities and more equipment adaptations. During JEPD, with the exception of throwing ($p <.0001$), children's (47% female, mean age = 7.9 (1.7)) change in running, jumping, kicking and balance walk backwards did not differ from usual practice (UP). During teacher implementation motor skill competence regressed; confounding factors such as seasonality could not be ruled out. JEPD appears

feasible and effective for changing teacher capacity to deliver PL enhancing PE however, post JEPD teacher implementation and outcomes need further exploration.

Keywords: physical literacy; physical education; professional development; physical activity; in-service teacher training; children; elementary school; teachers

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Chapter One: Introduction and Literature Review

1.1 Introduction

Physical literacy (PL) has the potential to provide professionals with a framework to develop the skills, confidence and knowledge that lead to a healthy life for the full lifespan of an individual (Roetert, Ellenbecker, & Kriellaars, 2018). The idea that PL can support a better, more fulfilled life has excited many practitioners in a wide variety of fields, including public health, sport, recreation and education, which have seized on the concept as a means to increase levels of physical activity (Jurbala, 2015). PL is described by the International Physical Literacy Association (2017) as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life. This definition encompasses the development and integration of skills in four essential domains that are interconnected; cognitive, affective, physical and behavioural. In addition to this, a new Australian definition adds in the social aspects of movement and physical activity (Keegan, Dudley, & Barnett, 2020). Developing the elements of PL lasts a lifetime, but the focus for most practitioners of the concept and initiatives to develop PL have been on children (Edwards et al., 2018). This is because the early years of life are critical for optimum development of the brain and effective movement patterns (Goddard Blythe, 2005). Because of this, quality physical education (PE) in school is important in order for children to acquire confidence in movement, appropriate physical competencies for their developmental age and knowledge and attitudes to be motivated to be active (Higgs, 2010).

The school setting is recognised as a key environment to provide opportunities for physical activity for all children, regardless of their socioeconomic status, culture or community (Faulkner et al., 2008). Because PE programs can reach almost all children in Canadian elementary schools , teachers play an important role in both developing physical literacy within their students and the understanding of the concept among their teaching peers through their implementation of games and activities (Stoddart & Humbert, 2017). In the current Physical and Health Education curriculum for British Columbia, PE is focused on the development of PL, and more specifically, building confidence and competence in movement skills in a variety of environments and contexts (Province of Britsh Columbia, 2018). Teachers are expected to translate this curricula into practice, with the expectation that their students will have received the confidence, motivation, knowledge and skills to lead a healthy, active life (Decorby, Halas, Dixon, Wintrup, & Janzen, 2005). However, numerous studies have noted a gap in available professional development support and resources for PE and therefore generalist teachers may lack the confidence and knowledge to effectively teach PE (Decorby et al., 2005; Law et al., 2018; Naylor et al., 2015; Silverman & Mercier, 2015; Stoddart & Humbert, 2017). Added to this, Stoddart & Humbert (2017) also surmised that teachers were confused about the definition of PL, and their definitions were often simplistic.

Professional development (PD) is considered an essential mechanism for deepening teachers' content knowledge and developing their teaching practices (Desimone, Porter, Garet, Yoon, & Birman, 2002). Teachers are attracted to PD through their belief that it will expand their knowledge and skills, contribute to their growth and enhance their effectiveness with students (Guskey, 2002). Quality PD includes a focus on content and

how students learn that content; in-depth, active learning opportunities; links to high standards; the participation of a collection of teachers from the same school; as well as being of extended duration (Desimone et al., 2002). Guskey (1996, 2010) posited the Model of Teacher Change and stated that teachers hoped to gain specific, concrete and practical ideas that directly related to the day-to-day operation of their classrooms through PD. However, changes in teacher practice would only happen when the PD was seen to be successfully implemented in the classroom situation, leading to a change in student learning outcomes and subsequently teacher practices and attitudes.

With the focus on achieving these observable student level outcomes and subsequent teacher beliefs and attitudes, professional development research has begun to examine embedded professional development and its effect on teachers in various subjects. Job-embedded professional development (JEPD) incorporates the markers of quality PD by allowing for the sharing of what teachers know between each other, creating a community around what they want to learn, and for them to connect new concepts, strategies and knowledge to their own unique context and classrooms (Darling-Hammond, 1995). These elements align with the elements of quality PD mentioned above, and leads to observability of enhanced student outcomes within the classroom context. There is a body of research that has focused on whether traditional teacher training interventions lead to an increase in classroom PA opportunities and student's PA (McKenzie, Sallis, Kolody, & Faucette, 1997) and improvement of fundamental movement skills (Breslin et al., 2012; Lander, Barnett, Brown, & Telford, 2015; Mitchell et al., 2013; Wick et al., 2017). For example, Wick et al. (2017) showed beneficial effects on FMS development through a meta-analysis of 30 articles, although they recommended

cautious interpretation due to the quality of evidence in some of the papers they analysed. Research has shown that PE specialists provide more effective PE programs (McKenzie et al., 1997) yet evidence also suggests that generalist teachers are able to teach effective PE with the right support (Faucette, Nugent, Sallis, & McKenzie, 2016; McKenzie et al., 1997).

The following literature review explores these concepts in more depth to provide a rationale for examining the impact of PL/PE related job embedded professional development for elementary grade teachers on the knowledge, confidence and practices of teachers in delivering physical literacy enhancing PE. In addition, it will provide an overview of the impact of previous interventions to improve PL components in children Included in this literature review are:

1) A background on PL including an overview of the current definition of the term and the current state of PL related policy and practitioner delivery.
2) An overview of foundational theories related to changing teacher knowledge, beliefs and attitudes and practice, including strategies such as job-embedded professional development to enhance teacher knowledge and
3) An overview of instruments available to quantify PL

1.2 Physical Literacy

Although there is an emerging literature on measurement tools and interventions to date the majority of literature on physical literacy has been dedicated to defining physical literacy. A number of definitions have appeared internationally but were founded in the

early work of Whitehead who suggests that PL is rooted in the philosophical underpinnings of monism, phenomenology and existentialism (Whitehead, 2010). These roots lead Whitehead to conclude that PL was part of the embodiment of human existence (monism), allowing humans to nurture and develop their full potential through unique interactions and experiences for each individual (existentialism), and that these experiences and interactions lead to distinct perspectives and world views (phenomenology) (Whitehead, 2007). Jurbala and Shearer argue that the philosophical underpinning of the PL concept makes it unique and separate from other related terms such as physical activity and fundamental movement skills (Jurbala, 2015; Shearer, 2018) while Pot, Whitehead and Durden-Myers (2018) suggest that understanding these complex and detailed philosophical underpinnings is crucial to grasping the true nature of PL (Pot, Whitehead, & Durden-Myers, 2018). However, this philosophical approach also presents a significant barrier for practitioner clarity and comprehension of the term (Jurbala, 2015). The philosophical elements of physical literacy highlight a deeper rationale and framework to guide facilitation practices, where teachers and practitioners need to understand aspects such as each person's unique experiences, the characteristics of the task and the interaction with the environment (Barnett et al., 2020). These philosophical underpinnings are also represented in many effective teaching models/practices. For example, when analysing the Spectrum of Teaching styles (Goldberger, Ashworth, & Byra, 2012; Mosston & Ashworth, 2008) the inclusion style encourages teachers to allow learners the autonomy to choose equipment or tasks for their own ability level. This is crucial for engaging all individuals in the same task and keeping everyone motivated through a learner centred approach (Edwards et al., 2019;

Mosston & Ashworth, 2008; Whitehead, 2010), taking into account their previous experiences. Additionally, the reciprocal style of teaching begins to intentionally link to the cognitive domain of PL, where individuals not only understand what movement to make, but how the movement is formed and can be improved. By giving the student observer specific and observable movements to look for in another person's performance, and to then communicate those elements back to the performer, the teacher is building a knowledge and understanding of movement (Almond & Whitehead, 2012; Goldberger et al., 2012). This style also ultimately leads to opportunities to enhance a learner's self-confidence and self-worth, and therefore increasing motivation to participate in physical activity by intentionally creating the link between the mind and the body (Whitehead, 2013). Consequently, despite its philosophical underpinnings the definition currently used by Canadian practitioners in the field (developed and refined by the International Physical Literacy Association, 2017) describes PL very pragmatically as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life. This definition is used as the underlying definition for this study and encompasses the development and integration of skills in four essential domains that are interconnected; cognitive, affective, physical and behavioural.

1.2.1 Cognitive

The cognitive domain refers to the knowledge and understanding of an individual to use appropriate movements and behaviours in various contexts (Edwards, Bryant, Keegan, Morgan, & Jones, 2017) allowing for the individual to decide on creative and imaginative movement in relation to all aspects of the physical environment (Green,

Roberts, Sheehan, & Keegan, 2018). The cognitive domain also encompasses the understanding of the benefits of a healthy lifestyle and appropriate risk awareness and safety considerations associated with physical activity in many different environments (Tremblay, Bartlett, et al., 2018). All these elements combined lead to an understanding and appreciation of embodied health, leading to a rich and balanced life (Green et al., 2018). Cale and Harris (2018) argue that knowledge and understanding are the key attributes within the PL definition, providing the foundation for knowing how and when to perform and therefore supporting the appreciation of the other domains within the individual.

1.2.2 Affective

The affective domain relates to an individual's motivation to be active as well as their confidence in physical activity (Whitehead, 2010), and can include the characteristic of self-esteem (Edwards et al., 2017). These components encompass the enjoyment and enthusiasm for PA that an individual experiences, and the self-assurance one has to participate in PA (Tremblay, Bartlett, et al., 2018). The two specific sub-themes detailed within the affective domain, motivation and confidence, can be looked at more specifically in their own right. Motivation is seen as being proactive towards and interested in physical activity, along with persevering through setbacks like injuries and negative experiences (Green et al., 2018). Confidence relates to the ability to progress in tasks through your own volition, with the understanding that these learned skills will benefit you in the future (Green et al., 2018). Studies have found a correlation between confidence and motivation and increased physical activity levels (Bauman et al., 2012),

meaning we need to take psychosocial factors in to account when creating interventions (Tremblay, Longmuir, et al., 2018).

One theory that is closely linked to many of the aspects of physical literacy and most utilised to understand motivation and perceived confidence is self-determination theory (Gunnell et al., 2018). Self-determination theory attempts to distinguish between different types of motivation based on different reasons or goals that result in an action. The most simple distinction is between intrinsic motivation, which refers to doing something because it is interesting, fun or enjoyable, and extrinsic motivation, which refers to doing something because it leads to a future outcome (Ryan & Deci, 2000), such as health, beauty or fitness goals (Ryan, Williams, Patrick, Healthier, & Deci, 2009). For children, physical activity and the participation in active games are more associated with intrinsic factors. Within the larger framework of self-determination theory, cognitive evaluation theory explains the relationship between the individual and unique activities, also linking back to phenomenology. Each individual will be motivated to participate in some activities and not others, and also at certain times and not others (Ryan et al., 2009). These elements allow us to understand that each individual and their experience and engagement in an activity, along with the situational and contextual environment, will affect their intrinsic motivation to participate (Ryan et al., 2009). These experiences and events bring about feelings of competence, satisfying a basic psychological need (Ryan & Deci, 2000). This feeling of competence, or feeling effective in ongoing interactions with an environment or situation, aligns with Whiteheads definition of confidence in relation to PL (Gunnell et al., 2018).

1.2.3 Physical

The physical domain is described as developing physical competence and movement patterns in a wide range of skills, environments and of different intensities and duration. (Tremblay, Bartlett, et al., 2018). Movements should also be performed with poise, economy and effectiveness in a wide variety of challenging environments (Green et al., 2018). These movements are developed and refined by partaking in imaginative, stimulating tasks and situations that are realistic and relevant to the individual (Durden-Myers, Green, & Whitehead, 2018). This is best done through free play, physical education and sport participation which allows children to learn and experience movements by interacting with the environments they inhabit (Green et al., 2018).

One of the main elements in the physical competence domain is the development of fundamental movement skills (FMS). FMS are defined as basic movement patterns that do not occur naturally, and therefore have to be learned, and are suggested to be foundational for more complex physical activities and movements (Barnett et al., 2016). The FMS can be categorised in to locomotion (run, jump and others), manipulative (catch, kick and others) and balance (stability control) groups, and if children cannot proficiently perform movements from these broad categories they will have limited physical activity opportunities later in life (Stodden et al., 2008). Analysis has shown that teaching and developing FMS at an early age has beneficial outcomes to locomotion and object control skills (Wick et al., 2017), and that FMS do not develop through free play alone (Logan, Robinson, Wilson, & Lucas, 2012). It is pertinent to note here that FMS do not constitute the entirety of the PL concept, nor that of physical competence domain which is much broader than FMS (Edwards et al., 2017). It has been proposed that FMS

are a part of a broader set of movement competencies that are acquired from birth which also encapsulates other ‘foundational’ movement skills such as the movements required for activities such as swimming, cycling and body weight training (such as squats and push ups) (Hulteen, Morgan, Barnett, Stodden, & Lubans, 2018). These movement competencies do not easily fit into the traditional classifications of FMS, but still greatly contribute to an individual being physically active for life (Hulteen et al., 2018). The proposed foundational movement skills model defines these movements as “goal-directed movement patterns that directly and indirectly impact an individual’s capability to be physically active and can be developed to enhance physical activity participation and promote health across the lifespan” (Hulteen et al., 2018, p.1536). This model also encapsulates movements acquired through the early years and specialised movement skills that often relate to sport or more specific movement competencies. The broader range of movement skills and use of the word ‘foundational’ allows for the understanding that developing competency in many skills will facilitate physical activity participation, a lack of competency in one skill (e.g., kicking) does not necessarily mean inactivity (Hulteen et al., 2018). Mastery of movement is formed through exposure to a combination of motor patterns that allows for adaptability and performance of motor skill patterns that form new, novel movements for the individual (Seifert et al., 2013). Because of this, it is important that all programs seek to develop PL ensure the development of sophisticated movements that build on the basics of FMS (Giblin, Collins, & Button, 2014).

1.2.4 Behavioural

The behavioural domain is a recent addition to the original concept theorised by Margaret Whitehead, first included in the Canadian PL Consensus Statement (Tremblay, Bartlett, et al., 2018). Indeed, Whitehead herself does not recognise behaviour as an additional domain, but one that is woven into the other three (Robinson, Randall, & Barrett, 2018) and is a characteristic innately associated with PL development (Edwards et al., 2017). The behavioural domain is defined as an individual taking responsibility and freely choosing to engage in physical activities on a regular basis, prioritising and sustaining these activities for personal challenge and meaning (Tremblay, Bartlett, et al., 2018). These behaviours form a 'positive feedback loop', where participating in physical activity will enhance the other aspects of the PL domains, leading to more engagement in PA (Edwards et al., 2017). Conversely, it could be argued that physical activity behaviour could also be the outcome of other domains. For instance, when looking at behaviour change models and theories, it is the inter-related nature of the domains of PL (including the Canadian version which includes behaviour as an important domain is evident). For example, self-efficacy is a critical piece of the affective domain and also integral to behaviour and behaviour change as indicated by theories and models such as the theory of planned behaviour and social cognitive theory. The theory of planned behaviour states that attitude, subjective norms and perceived behavioural control work together to shape an individual's behavioural intentions and subsequently their behaviours (Ajzen, 1991). Perceived behavioural control originated from self-efficacy theory (Bandura, 1997), creating a link between the affective domain and behaviour change. Similarly, the Fogg

behaviour model utilises self-efficacy, motivation and physical effort as central aspects that are required for successful behaviour change (Fogg, 2009).

These domains and the pragmatic approach to the definition provide a framework for the PL term, thus allowing the collection of data for the quantitative analysis of the PL journey (Edwards et al., 2017). Along with the IPLA definition, other organisations around the world have defined the term for their own specific use and within the context of their specific cultural milieu. International differences in the interpretation and operationalization of physical literacy exist and were expected based on the importance of creating meaning and cultural relevance within different contexts (Shearer, 2018). However, it has been argued that diversity in the definition has resulted in further inconsistencies and confusion for practitioners and policy makers (Dudley, Cairney, Wainwright, Kriellaars, & Mitchell, 2017; Jurbala, 2015). One variation of note is the integration of the social domain into the Australian definition (Shearer, 2018; Sport Australia, 2018). This particular domain connects well to some of the collaborative /cooperating learning strategies employed in physical education (Mosston & Ashworth, 2008) to be discussed later on.

1.2.5 Adoption of the PL construct across sectors

The uptake of PL in policy documents in Canada began in 2005 when it was included in the Long Term Athlete Development model as a foundational element in the development in children's motor competence (Canadian Sport for Life Society, 2005). Further to this the term was adopted in the education sector across Canada. The core components of PL were always desired outcomes of PE programs but now with a specific

overarching conceptual label, physical literacy, a term that encapsulates more than sport skills, provinces across the country have placed PL language in to their curriculum documents (Mandigo, Francis, Lodewyk, & Lopez, 2009). For example, it is embedded in the Province of British Columbia's K-10 PHE curriculum and the Ontario K-12 PHE curriculum (Government of British Columbia, 2018; Province of Ontario, 2019). This term has been used as education and other professionals can easily associate the development of knowledge and competencies related to basic concepts (like letters) in to more complex understanding and skills as age and brain development takes place (like words, sentences and paragraphs). Literacy is also a word that has become synonymous with understanding that knowledge development is a necessary component of one's education to be able to actively participate in society (Dudley et al., 2017). This evolution from viewing literacy as a simple process of acquiring basic skills to understanding how to use these skills in ways that contribute to developing the capacity for social awareness, socio-economic development and as a basis for social and personal development (UNESCO, 2006) has enabled health, recreation and education sectors to understand and integrate the concept in to their lexicon.

1.2.6 Quality physical education and its contribution to PL

Quality PE in school is important to children's acquisition of movement confidence, appropriate physical competencies for their developmental age and the knowledge and attitudes to be motivated to be active (Higgs, 2010). In alignment with this, the member states of UNESCO unanimously supported the enactment of the Kazan Action Plan which requires 'fostering quality physical education and active schools needs provision

that is varied, frequent, challenging, meaningful and inclusive' (UNESCO, 2015, p7-8.). The Kazan Action Plan was created to inform policymakers on "the provision of quality physical education across the full age range from early years through secondary education" as well as to "provide a framework to support policymakers reshape physical education policy to accelerate the development of several dimensions of human capital in a unique, comprehensive way" (UNESCO, 2015, p.7). A quality PE curriculum supports the development of critical, creative and innovative thinking, problem-solving, decision making, empathy, communication skills, movement competence, pro-social behaviours and many more characteristics that lead to self-confident and socially responsible citizens (UNESCO, 2015).Thus, the BC curriculum for Physical and Health Education provides a critical opportunity to educate children and youth on the benefits of physical activity and to develop PL as well as those elements mentioned above. The revised BC curriculum contains goals that include to 'develop an understanding of the many aspects of well-being, including physical, mental, and social' and to 'develop the movement knowledge, skills, and understandings needed for lifelong participation in a range of physical activities' (Government of British Columbia, 2018). As such, PL and its component parts are now a crucial piece of the curriculum goals within BC and teachers are expected to translate this curricula into practice, with the expectation that their students will have received the knowledge and skills to lead a healthy, active life (Decorby et al., 2005). However, without evidence about best-practices for developing PL and helping teachers translate best practices into classroom strategies and activities, current policies offer little guidance (Giblin et al., 2014) about how to implement them. Along with BC, many other facets of PL are being incorporated into other Canadian provincial school curricula with

the expectation that students will develop PL as a result of the curriculum being taught effectively (Mandigo et al., 2009). In order to be successful, the curriculum goals and objectives should include specific information about the content and context of physical activity and physical literacy formed from scientific evidence, with supplements targeted at specific groups and providing multiple persuasive messages (Brawley & Latimer, 2007).

1.2.7 Teacher Knowledge

Although PL is now stated within the curriculum as an expected outcome, this outcome can only be attained if teachers are able to teach the curriculum effectively (Stoddart & Humbert, 2017). Teachers are required to translate the curriculum into practice, with the expectation that students will exit the school system as physically educated people that are able and willing to lead a healthy, active lifestyle (Decorby et al., 2005). Yet it has been found that pre-service education for teachers focussed more on classroom management than curricula attainment, especially in the field of PE (Tristani & Fraser-Thomas, 2017). Coupled with this, teachers interviewed by Stoddart and Humbert (2017) were confused as to the meaning of PL, and their understanding of the term was simplistic. This could potentially lead to PL being limited in its scope of application and its effectiveness at encouraging lifelong value and engagement in PA (Pot et al., 2018). If the outcome of PE is to develop and foster PL within individuals, it is crucial that any confusion around the term and how it can be integrated into the classroom be minimised (Stoddart & Humbert, 2017). It is pertinent to mention here, the relationships among PA, PE and PL, which are reciprocal. For instance, lifelong engagement in PA is the ultimate outcome or aim of quality PE and an individual's PL. Conversely, PA is also a behaviour

through which PL is developed and a behaviour that occurs within PE, but is only one component of a quality PE curriculum. In schools PE is the primary vehicle for the equitable development of PL and consequently lifelong PA; using organised PA, fitness, dance and sport to develop and teach skills, motivate and enhance confidence and knowledge to be active for life. When considering the individual, PL can also be seen as a higher order or more comprehensive construct that encapsulates valuing and engaging in PA, sport, fitness, dance, recreation and all forms of movement with confidence, poise and skill with the knowledge that it will enhance social, mental and physical well-being. This lack of knowledge coincides with a larger, more significant barrier to providing quality PE programming that enhances PL. Classroom teachers recognise that a lack of knowledge stems from an absence of specialist training for PE, and uncertainty about what to do and how to do it (Decorby et al., 2005). Other barriers reported to influence implementation of PA policy and interventions within a school-based setting, which could also relate to PE and PL, are time, a supportive school environment and self-efficacy (Naylor et al., 2015). However, training and resources are consistently highlighted as an issue, and this gap in training is evident both in pre-service programs from post-secondary institutions and continuing professional development opportunities for qualified teachers (Naylor et al., 2015; Stoddart & Humbert, 2017; Tristani & Fraser-Thomas, 2017). Invoking long-term behaviour change in teachers extends beyond pre-service education and thus highlights a clear need for continuing professional development to promote ongoing learning and improve teaching practice (Lander, Eather, Morgan, Salmon, & Barnett, 2017). It has also been found that both PE teachers with specialist training and trained classroom teachers in PE (but not considered a specialist)

who implemented a specific curriculum they had received expertise on had more active students, provided more time for learning physical education content, and used more effective instructional behaviors than other classroom teachers (Sallis et al., 1997). Although evidence suggests that PE specialists provide more effective PE programs, it also suggests that generalist teachers are able to teach effective PE with the right support (Faucette et al., 2016). However, because of reported low self-efficacy of generalist teachers to teach PE, continued professional development specifically focussed on PE is required so that teachers are able to provide rich, authentic movement experiences that develop PL and result in lifelong participation in PA (Stoddart & Humbert, 2017).

1.3 Changing teacher practice

The issues of lack of teacher confidence and content knowledge that have arisen from the literature lead to the evidence about how to change teacher practice. One of the most promising and common ways to do this is professional development (PD) as it is considered an essential mechanism for deepening teachers content specific knowledge and their teaching practices (Desimone et al., 2002). Teachers are attracted to professional development as they believe it will expand their knowledge, skills and understanding of a subject, contribute to their growth and ultimately enhance their effectiveness with the students (Guskey, 2002). Gaining this knowledge should be embedded within pre-service education programs and supported throughout in-service instruction by continuing professional development that enhances teacher learning and instructional practices (Lander et al., 2017). In order to facilitate PD, an understanding of the process through which teachers grow professionally and conditions that both support

and develop this growth is necessary (Clarke & Hollingsworth, 2002). Professional development programs are a systematic attempt to bring about change in three key areas; change in classroom practices of teachers; change in attitudes and beliefs of teachers; and change in learning outcomes of students (Guskey, 1986). Guskey (1996, 2010) posited the Model of Teacher Change to provide an alternative to the assumption that a change in attitudes and beliefs comes before successful implementation of new practices and strategies. The Model of Teacher Change (MoTC) suggests that changes in attitudes and beliefs only come about once a change in student learning has been seen, which will happen after the teacher changes their teaching practices post professional development (Guskey, 2002). This is akin to observability highlighted as an important innovation characteristic in Roger's Diffusion of Innovation Model (2003).

'Change' or reform is open to multiple interpretations, and six differing perspectives on change were put forward by Clarke and Hollingsworth (2002):

- Change as training - change is something that is done to teachers; that is, teachers are 'changed'.
- Change as adaptation - teachers 'change' in response to something; they adapt their practices to changed conditions.
- Change as personal development - teachers 'seek to change' in an attempt to improve their performance or develop additional skills or strategies.
- Change as local reform - teachers 'change something' for reasons of personal growth.
- Change as systemic restructuring - teachers enact the 'change policies' of the system.

- Change as growth or learning - teachers ‘change inevitably through professional activity’; teachers are themselves learners who work in a learning community.

Current PD models are most closely aligned with ‘change as growth or learning’, which is a natural and expected component of teachers and schools (Clarke & Hollingsworth, 2002). It is also important to highlight that learning to be proficient in a new field, task or skill, while finding new meaning in practices, is a difficult process that takes time and effort from the teachers (Guskey, 1986). Understanding that change is a process with many factors is one criticism of the MoTC, as it is illustrated as a linear process. Guskey’s model provides useful insights in to teacher change however, and has formed the basis for the ‘Interconnected Model’ put forward by Clarke and Hollingsworth (2002). The Interconnected Model identifies domains in which change may happen, the mediating processes that help support this change, and the possible relationships between these elements that can form the creation of an effective professional development program (Clarke & Hollingsworth, 2002). The four distinct domains which encompass the teacher’s world are; personal, practice, consequence and external (Clarke & Hollingsworth, 2002). The personal domain relates to teacher knowledge, attitudes and beliefs; the practice domain utilises the element of professional experimentation within the classroom; the consequence domain discusses important outcomes; and finally the external domain relates to sources of information and support (Clarke & Hollingsworth, 2002). As the name suggests, these domains are interconnected and change occurs in any domain through the process of enactment and reflection (Clarke & Hollingsworth, 2002). The diversity of possible pathways in the Interconnected Model between the domains reflects the complexity of teachers’ professional development (Justi

& van Driel, 2006), and takes in to account the individuality of every teachers' learning and practice (Clarke & Hollingsworth, 2002). The Interconnected Model has been shown to both act as an effective framework for a professional development project and to analyse and understand the growth of teachers' knowledge within the context of the PD project (Justi & van Driel, 2006).

1.3.1 Quality professional development

With PD considered to be an essential mechanism for deepening teachers content specific knowledge and their teaching practices (Desimone et al., 2002) it is important to understand what constitutes quality PD. PD is defined by the Organisation for Economic Cooperation and Development (2009) as activities that develop an individual's skills, knowledge, expertise and other characteristics as a teacher. This broad definition recognises that PD can take many forms; formal or informal; peer-collaboration or expert-led; external workshops or internal mentorship (Organisation for Economic Cooperation and Development, 2009). Despite a broad definition, there is a consensus that there are particular characteristics that lead to effective and quality PD that are critical to increasing teacher knowledge and skills as well as improving practice (Desimone, 2009): content focus, active learning, coherence, adequate duration and collective participation.

1.3.2 Content focus

As the name suggests, this characteristic relates to the degree to which the PD focuses on improving and deepening teachers' specific content knowledge in the subject in question (Desimone et al., 2002). Focus on subject-matter content and the ways that

children learn that content are an important element of changing teacher practice (Garet, Porter, Desimone, Birman, & Yoon, 2001). This is because in order to teach effectively and give children the best opportunity to learn, teachers need knowledge of the subject so as to select the appropriate tasks for the student so that they are able to wrestle with the task at hand, while simultaneously linking that with students prior experiences and knowledge in an attempt to link the content to a context the student understands (Hiebert et al., 2007). The main hope of teachers taking part in PD is to leave with specific, concrete and practical ideas that directly relate to the day-to-day operation of their classrooms (Guskey, 1986). Specific to physical literacy, research supports the importance of content focus having shown that teachers with direct training in FMS have higher teacher proficiency to both teach and assess the movements and higher student proficiency in the movements (Breslin et al., 2012; Lander, Barnett, Brown, & Telford, 2015; Lander et al., 2017).

1.3.3 Active learning

Active learning relates to teachers being able to actively engage in meaningful discussion, planning and practice within the PD opportunity (Garet et al., 2001) and can include watching an expert in the field or being observed themselves (Desimone, 2009). This form of learning is in contrast to passive learning that is typically characterised by a didactic lecture format workshop, where information is directed at the learner and involves a process that allows individuals to construct knowledge and understanding through problem solving, decision making and critical thinking (Rovegno & Dolly, 2006). Active learning is built on a constructivist point of view, where knowledge must be constructed by the learner by linking the new information to that which they already

know (J. Michael, 2006). Active learning has been shown to be effective at engaging individuals with new content, and providing more confidence in the subject than passive learning (J. Michael, 2006; P. Michael, 2004).

1.3.4 Coherence

The third characteristic of quality PD, coherence, refers to how teachers perceive PD activities to be coherent to a wider program of teacher learning and development, with greater coherence associated with greater effectiveness (Garet et al., 2001). This means that PD should support experiences that are consistent with teachers' goals, align with school and provincial curriculum standards and encourage communication between professionals (Desimone, 2009).

1.3.5 Duration

Intellectual and pedagogical change requires PD activities to be of sufficient duration, in terms of both number of hours spent in an activity and span of time of entire PD (Supovitz & Turner, 2000). The more time teachers engage in professional development, the more likely their teaching practice is to improve (Hunzicker, 2011). Although no evidence has been found for a 'tipping point', recommendations are that PD takes place over a semester (Desimone, 2009)or several months (Hunzicker, 2011).

1.3.6 Collaborative participation

Collaborative participation can be achieved through participation of teachers in the same school, same district, grade or department, as opposed to individual teachers from many individual schools and varying contexts (Garet et al., 2001). These groups create interaction and discourse between professionals that share experiences and contexts,

forming communities that engage in constant knowledge translation and inquiry (Guskey, 1994). It is also suggested that collaborative participation may help sustain change over time due to the shared professional culture it can create. As new teachers arrive they are brought in to the culture, leading to a common understanding of instructional goals, methods, problems, solutions and cross-curricular student centred approaches (Garet et al., 2001).

Additionally, Hunzicker (2011) highlights the need to align PD with the need of adult learners, whereby efforts shift from a 'one shot' approach to embedding learning within a teacher's daily routine. Effective professional development is anything that engages teachers in learning activities that are supportive, job-embedded, instructionally focused, collaborative, and ongoing (Hunzicker, 2011). With these characteristics in place, teachers are more likely to consider professional development relevant and authentic, which makes teacher learning and improved teaching practice more likely (Hunzicker, 2011).

1.3.7 Job-embedded professional development

Taking in to account the MoTC factor that states student outcomes are the most important element for teacher change, the characteristics of quality PD and the reported lack of PD opportunities available for PE, job-embedded professional development has come to the forefront as a viable intervention to enhance the delivery of opportunities to develop quality PE that enhances PL. Job-embedded professional development (JEPD) has become the preferred method for knowledge translation in the educational setting (Croft, Coggshall, Dolan, Powers, & Killion, 2010). JEPD allows for the sharing of what

teachers know, what they want to learn and for them to connect new concepts, strategies and knowledge to their own unique context and classrooms (Darling-Hammond, 1995). JEPD is defined as 'teacher learning that is grounded in day-to-day teaching practice and is designed to enhance teachers' content-specific instructional practices with the intent of improving student learning (Darling-Hammond, 1995). Specifically, this means that the PD is delivered in the regular classroom with students. This in turn leads to observability of enhanced student outcomes, which for the vast majority of teachers is the motivation for becoming a better teacher (Guskey, 2002). Part of JEPD is also that it is relevant and authentic, meaning that it is connected to everyday responsibilities and seamlessly integrated into each school day (Hunzicker, 2011). These learning opportunities and activities should require teachers to consider the possibilities of their new knowledge, try new things and analyze the effectiveness of their actions (Hunzicker, 2011). Effective JEPD naturally aligns with the elements of quality PD mentioned previously. By being embedded within the classroom setting, the *content focus* will not only be on specific curriculum outcomes, but also on student contextual factors. *Active learning* takes place where the teacher is engaged with the content being taught and can observe an expert teach the content while simultaneously observing their specific students engage with the content. The content will be *coherent* to larger teacher learning and school policy as the JEPD facilitators will be within the school, therefore necessarily having to have formed a relationship with administrative authorities and offering the potential for a relationship of longer *duration. Collaborative participation* may develop while the facilitator is embedded within the school context has the opportunity to work with many teachers in the same grade or department. Teacher PD has much more meaningful impact when

situated within authentic environments, such as a classroom (Glazer & Hannafin, 2006). The provision of JEPD and support is important to learners solving problems in context, and providing opportunities for feedback and discussion on performance enhances the potential for implementation fidelity (Snyder, Hemmeter, & Fox, 2015). Because of all these characteristics, features and elements, JEPD constitutes a powerful potential lever to advance student learning and enhance teachers professional knowledge and skills (Croft et al., 2010). It is yet to be evaluated in the context of developing physical literacy through quality PE.

1.4 Measuring Physical Literacy

As PL emerges as a concept, comprehensive, objective, empirical, valid measurement protocols need to be created (Tremblay & Lloyd, 2010). Challenges surround the measurement of PL as debate continues around the conceptual underpinnings of the term (Longmuir & Tremblay, 2016), and regardless of the increase in conceptual work there is still a lack of empirical literature (Cairney, Clark, Dudley, & Kriellaars, 2019). There is still discussion as to whether PL can or should be operationalized and measured at all (Edwards et al., 2018; Jurbala, 2015) with philosophical proponents saying that by measuring the construct it loses its value, and with pragmatic measurement focussed primarily on easy to observe components (Pot et al., 2018) rather than embodiment, value and empowerment posited within the monistic approach to the term (Lundvall, 2015). Due to the complex nature of each individual, the many components of PL and the relatively new agreements over definitions, there are few comprehensive, valid and reliable measurement tools available (Longmuir & Tremblay, 2016). There are currently

three major measurement tools for monitoring physical literacy that have been developed by Canadian organisations and are being used in classrooms; Physical Literacy and Youth (PLAY) Tools from Sport for Life, the Canadian Assessment of Physical Literacy (CAPL) by the Canadian Society of Exercise Physiologists (CSEP), and Passport for Life by Physical and Health Education (PHE) Canada. All these tools are designed to be implemented by a wide range of professionals working in the realm of child development and physical activity, with the exception of Passport for Life which is specifically designed for teachers. These tools have emerged from the need to provide evidence relating to the impact of PL (Tremblay & Lloyd, 2010) and interventions to develop PL. The three measurement tools attempt to address the four domains of PL through observable physical testing of movement skills and questionnaires relating to knowledge, confidence and other cognitive attributes. Although these tools attempt to ascertain an insight in to all these domains, it is apparent that these tools and other research to date focuses almost exclusively on independently observable characteristics (Longmuir & Tremblay, 2016).

1.4.1 Passport for Life

Passport for Life supports the awareness, assessment, development and advancement of physical literacy among students and teachers (PHE Canada, 2013). The development of this tool involved an extensive consultation process with PE experts from across Canada to form the guiding principles and definition of PL addressed within the Passport (Lodewyk & Mandigo, 2017). This tool uses objective measures for fitness and movement skills assessed by teachers, and online student self-report measures for active participation and living skills (Robinson & Randall, 2017). Fitness skills are assessed

using a cardiovascular endurance circuit consisting of four stations (agility ladder, ball jumps, figure eights and scissors, each completed for 30 seconds until a total of 12 minutes has elapsed), a dynamic stability measure using a lateral bound and a core strength component consisting of a plank (PHE Canada, 2013). Movement skills are assessed in locomotor, object control and object manipulation areas using simple activities that are completed individually with the teacher (PHE Canada, 2013). Both the fitness and movement skill elements are assessed using a four stage rubric that breaks the skill in to four competency based stages; emerging, developing, acquired and accomplished. The self-report survey for active participation includes 22 questions that assess the application of PL through diverse behaviours and environments and is measured through a four stage rubric; hardly ever, some days, most days and every day (PHE Canada, 2013). Similarly, the self-report survey for living skills features 21 questions that assess skills including physical activity behaviours, motivation, self-regulation, awareness, and interpersonal skills that contribute to being active for the lifespan and is assessed on a four stage rubric; never, sometimes, most of the time, all of the time (PHE Canada, 2013). These four areas allow for teachers to use the tool as a formative assessment to support students in individual areas for improvement, as well as overall program goals to improve PL throughout the year (Canadian Sport for Life Society, 2014). There has been initial logical validity established in the form of an analysis based on the Standards for Educational and Psychological Testing to support the use of Passport for Life in schools, although more robust validation evidence is needed (Lodewyk & Mandigo, 2017).

1.4.2 Canadian Assessment of Physical Literacy

The CAPL tool offers a comprehensive research-grade protocol that can accurately and reliably assess a broad spectrum of skills and abilities that contribute to and characterize physical literacy (Green et al., 2018). CAPL was designed to combine assessments of motivation and confidence, physical competence (health-related fitness and motor skill), knowledge and understanding, and habitual engagement in physical activity (physical activity and sedentary behaviors) (Longmuir et al., 2015). These assessments are completed through a combination of physical and written testing including an obstacle-course style motor skill assessment tool (the Canadian Agility and Movement Skill Assessment [CAMSA]), using pedometers and other physical fitness measurement tools and a questionnaire that can be completed online or with pen and paper (Longmuir et al., 2015). Although intended for use in classroom settings, CAPL measures are to be performed by a CAPL examiner, requiring teachers or other practitioners to complete extra training. Another limitation to the practical application of this tool is the recommendation that two assessors are present (Robinson & Randall, 2017). Key strengths of CAPL are that it includes some previously validated measurement tools in its assessment battery, as well as having validity, feasibility and reliability confirmed through multiple cycles of data collection (Francis et al., 2016; Longmuir et al., 2015).

1.4.3 PLAY Tools

The PLAY Tools were initially designed for research purposes but have been found to have excellent fit within program evaluation due to the short time needed to complete

assessments, easily accessible equipment and minimal training necessary (Canadian Sport for Life Society, 2014). The PLAY Tools, similar to the CAPL also include a number of different tools that are meant to enable program evaluation and research in education or sport programs (Robinson & Randall, 2017). Specifically the PLAY Tools are a collection of workbooks, forms and score sheets comprising a battery of tests that assess physical literacy in children and youth (Canadian Sport for Life Society, 2013). Unique to this tool, resources and forms are provided not only for child self-report measures and observational assessments conducted by teachers/trained professionals, but also for parents and coaches to assess and record their perceptions of a child's PL (Canadian Sport for Life Society, 2013). The physical competence measures are process oriented, with the performance of the skill being placed along a continuum from 0-100, and at the same time advancing through stages labelled initial (a score of between 0 and 24), emerging (a score of between 25 and 49), competent (a score of between 50 and 74) and proficient (a score of between 75 and 100). The largest battery of movement skills (18 movements) is completed through use of the PLAYfun tool which looks at components of locomotor, object control and balance skills. Completing all 18 movement tasks takes approximately 20 minutes per child, culminating in a time consuming and thus less practical measurement for a classroom setting (Robinson & Randall, 2017). Through a subset of PLAYfun called PLAYbasic, the 18 tasks are reduced to 5 easy to administer movements that can be completed in approximately 2 minutes, making the use of PLAYbasic much more feasible (Canadian Sport for Life Society, 2013). Although PLAYbasic has not been the subject of any validation research, PLAYfun has convergent and construct validity established through two separate studies (Cairney et al., 2018;

Stearns, Wohlers, McHugh, Kuzik, & Spence, 2018). Cairney et al., (2018) and Stearns et al., (2018) also showed that two assessors improved the validity of the tool. Along with the measures of physical competence, the PLAYself questionnaire can be used to assess self-efficacy, competence and activity environments through self-reporting (Robinson & Randall, 2017). An exploratory and confirmatory factor analysis on PLAYself has recently been completed, showing both factors of physical activity self-efficacy and valuing are reliable and demonstrate discriminant validity (Lithopolous et al, in press).

When critiquing and reviewing all three measurement tools, there is a lack of common language across the tools for each stage of development, potentially leading to confusion and misunderstanding from a global perspective (Jurbala, 2015). Also, depending on the focus of the group that developed the tool they can be used to ascertain different outcomes (Robinson & Randall, 2017). Despite these challenges there are valid tools available for measuring the components of physical literacy as defined by Canada's PL Consensus Statement (Tremblay, Bartlett, et al., 2018), however significant constraints to their use in real world teaching contexts have been identified. This leads to a more thorough consideration of research designs that accommodate for pragmatic constraints within these real world contexts and how measurement is also affected by and reflects these constraints.

1.5 Pragmatic trials and measures

Pragmatic trials are designed to show real world effectiveness with a broad range of participants (Ford & Norrie, 2016). Pragmatic trials are in contrast to explanatory trials that answer the question if an intervention works under ideal conditions (Glasgow, 2013).

Explanatory trials pursue internal validity at the cost of external validity, whereas pragmatic trials emphasise external validity while maintaining as much internal validity as possible (Sox & Lewis, 2016). In pragmatic trials, it is important to also have pragmatic measures; measures that have relevance to all stakeholders involved and are also feasible to use in most real-world settings to assess progress (Glasgow & Riley, 2013). The importance to stakeholders, along with low respondent and staff burden, actionable and sensitive to change are necessary and desired characteristics for a measure to be considered pragmatic (Glasgow & Riley, 2013). While these components are necessary, other characteristics have also been highlighted to be desirable as measures in a pragmatic trial; broadly applicable, serve as a benchmark, unlikely to cause harm, psychometrically strong and related to theory or model (Glasgow & Riley, 2013). These characteristics are applicable to evaluation of a real world trial of professional development and provide the rationale for the use of a pragmatic design and measures when assessing the feasibility of the intervention.

1.6 Feasibility

Related to research design is study type; in particular where intervention approaches are new and the potential for implementation untested. Two types of studies are typically used in the early phases of intervention development and testing; feasibility and pilot studies. Feasibility studies are used to determine whether an intervention is appropriate for additional testing (Bowen et al., 2009a). Feasibility studies also enable researchers to assess whether or not the ideas and findings can be shaped to be relevant and sustainable in the target setting (Bowen et al., 2009a) and in terms of research are designed to build the foundation for a larger planned intervention study (Tickle-Degnen, 2013). Specific to

the research aim they are used to estimate important parameters that are needed to inform a larger study such as the standard deviation of the outcome measure used to calculate sample size, willingness of participants to be randomised, usability of proposed outcome measures and response rates or follow-up rates to questionnaires (Arain, Campbell, Cooper, & Lancaster, 2010). Studies labeled 'feasibility' tend to be conducted with more flexible methodology compared to those labeled 'pilot' (Arain et al., 2010). Pilot studies differ in that a feasibility study addresses components of a randomised control trial, whereas the pilot study incorporates all study pieces as they will be implemented in the planned randomised control trial (Tickle-Degnen, 2013).

When evaluating whether an intervention is feasible (relevant and potentially sustainable in the target setting), it is important to define intervention. Intervention can be described as any program, service, policy, or product that is intended to ultimately influence or change people's social, environmental, and organizational conditions as well as their choices, attitudes, beliefs, and behaviours (Bowen et al., 2009b). Evidence of intervention feasibility is needed when one of several factors outlined by Bowen et al (2009) exist including when; community partnerships need to established, increased, or sustained; there are few previously published studies or existing data using a specific intervention technique; prior studies of a specific intervention technique in a specific population were not guided by in-depth research or knowledge of the population's socio-cultural health beliefs; the population or intervention target has been shown empirically to need unique consideration of the topic; or previous interventions had positive outcomes but in different settings than the one of interest (Bowen et al., 2009b). These

authors also proposed that the assessment of feasibility study can incorporate and be judged against any of the following areas:

- Acceptability - how the intended individual recipients react to the intervention.
- Demand - gather data on estimated use or by actually documenting the use of selected intervention activities.
- Implementation - the extent, likelihood, and manner in which an intervention can be fully implemented as planned and proposed.
- Practicality - the extent to which an intervention can be delivered when resources, time, commitment, or some combination thereof are constrained in some way.
- Adaptation - changing program contents or procedures to be appropriate in a new situation.
- Integration - the level of system change needed to integrate a new program or process into an existing infrastructure or program.
- Expansion - the potential success of an already-successful intervention with a different population or in a different setting.
- Limited-efficacy testing - may be conducted in a convenience sample, with intermediate rather than final outcomes, with shorter follow-up periods, or with limited statistical power.

(Bowen et al., 2009b)

Using feasibility studies in the intervention-research process as a factor for accepting or discarding an intervention approach is an important way to advance only those interventions that are worth testing (Bowen et al., 2009b).

Based on the school environment being a key environment to provide opportunities for quality PA for all children, it is important that teachers are confident and knowledgeable in how to teach PE and therefore develop the PL of their students. If children are denied the opportunity to build self-confidence, knowledge, competence, value and understanding of PA through appropriate contextual and age dependant practices within a safe environment, they may be unable to reach their full potential. As such, quality PD is important to help generalist teachers build the skills and confidence they need to effectively translate the curriculum in to practice, with an embedded approach being seen as the most efficacious and contextual way to do this.

Thus, the primary purpose of this research was to examine how embedded professional development for elementary grade teachers (typically generalists) that focussed on quality instruction, adaptations to games and activities and success for students affected their knowledge, confidence and self-reported changes in practice related to facilitating a quality physical literacy environment within PE programming. A secondary aim was to see if the quality facilitation practices that the facilitators used during the professional development opportunity influenced the children's physical literacy, specifically their motor competence.

1.7 Assumptions

Assumptions were that teachers answered the questions truthfully and honestly in the questionnaires and interviews, and that each child performed each movement activity to the best of their ability during measurement and answered truthfully and honestly in their questionnaires.

1.8 Delimitations

The study is delimited to elementary grade children (Grades K-5; typically aged 5-11 years) in 3 schools selected by School District 62 (British Columbia, Canada) who were administrators for the intervention, and the teachers who were designated to teach these classes.

1.9 Limitations

Limitations of this study include the convenience sampling at the school level, potential bias introduced as only those teachers and students that volunteered to participate were measured, limited validity and reliability evidence for both the teaching efficacy and child-level instruments used, a short time frame between initial measurement and post intervention measurement and possible contamination and subsequent performance improvements among the usual practice PE condition classes because they were randomly assigned from the same school as intervention classrooms.

1.10 Operational Definitions

The following operational definitions were used in the study:

Job-embedded professional development

A teacher professional development opportunity that is delivered in the teacher's own classroom context over a prolonged period (8 classes) and based on everyday teaching practice that is designed to enhance teachers' content-specific instructional practices with the intent of improving student learning (adapted from Darling-Hammond, 1995)

Physical literacy

The motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life (International Physical Literacy Association, 2017).

Self-efficacy

An individual's belief in their capacity to execute behaviours necessary to produce specific performance attainments (Bandura, 1997). Specifically, in this study a teacher's belief in their capacity to provide physical literacy enhancing PE lessons.

Chapter Two: Manuscript

2.1 Introduction

The school setting is recognized as a key environment to provide opportunities for physical activity for all children, regardless of their socioeconomic status, culture or community (Faulkner et al., 2008). As such, quality physical education (QPE) in school is important to all children's acquisition of movement confidence, appropriate physical competencies for their developmental age and the knowledge and attitudes to be motivated to be active for life (Cairney et al., 2019). In conjunction with this, the member states of UNESCO unanimously supported the enactment of the Kazan Action Plan which states 'fostering QPE and active schools needs provision that is varied, frequent, challenging, meaningful and inclusive' (McLennan & Thompson, 2015). These are all key components of physical literacy (PL) and attributes that contribute to being an active citizen (McLennan & Thompson, 2015). PL is defined as "motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life' (Tremblay, Bartlett, et al., 2018). However, numerous studies have noted a gap in available PD support for PE, and therefore the generalist educators that teach the subject may lack the confidence and knowledge to effectively teach PE (Decorby et al., 2005; Law et al., 2018; Naylor et al., 2015; Silverman & Mercier, 2015; Stoddart & Humbert, 2017) and consequently their capacity to develop the PL of their students.

Elementary school classroom teachers recognize that a lack of knowledge stems from an absence of specialist training for PE, and uncertainty about what to do and how

to do it (Decorby et al., 2005). Adequate preparation and resources related to QPE facilitation are consistently highlighted as an issue, and this gap in preparation is reflected in a reported lack of continuing PD opportunities for qualified teachers related to PE (Naylor et al., 2015; Stoddart & Humbert, 2017; Tristani & Fraser-Thomas, 2017). Invoking long-term practice change in teachers extends beyond pre-service education and thus highlights a clear need for continuing PD for in-service teachers to promote ongoing learning and improve teaching practice (Lander et al., 2017). Although it is thought that PE specialists provide more effective PE programs, evidence suggests that generalist teachers, with the right support, can also teach effective PE that provides rich movement experiences that develop PL (Faucette et al., 2016; Stoddart & Humbert, 2017). If the outcome of PE is to develop and foster PL within students, it is crucial that effective PD focusing on the development of PL also occurs inside the context of a classroom setting in order to effectively help teachers operationalize PL concepts (Desimone et al., 2002; Edwards et al., 2019; Glazer & Hannafin, 2006; Guskey, 2002). PD can be used to help teachers understand how to use pedagogical models to create an environment within their class that fosters PL. This can be done through using games and activities to; create deliberate tasks that challenge and engage students at their own level to increase success and therefore confidence and motivation; spending sufficient time in intentional practice to acquire the physical competency being developed; maximise the number of practice opportunities by using small sided tasks and limited competition to increase competency development in a wide range of contexts and situations; planning for task extensions/refinements and modifying space and/or equipment to aid in individual success and therefore increasing confidence and motivation;, and finally by providing

assessments that track student learning and progress in order for the children to understand and develop knowledge of the benefits of physical activity and PE (Roetert & MacDonald, 2015). Effective PD consists of characteristics such as being supportive, job-embedded, instructionally focused, collaborative and ongoing in order to create an experience that is relevant and authentic for each teacher (Hunzicker, 2011). Effective PD supports teachers through considering not only their needs, concerns and interests, but that of the school and school district (Hunzicker, 2011).

PD becomes relevant to teachers when it connects to the responsibilities and practices of everyday activities (Hunzicker, 2011). As such, situating PD within the school day enables teachers to consider the possibilities of the implementation of what they have learned, try new things and analyze the effectiveness of their actions (Hunzicker, 2011). JEPD has become a preferred method for knowledge translation in the educational setting (Croft et al., 2010) because teachers can observe enhanced student outcomes, which is what the vast majority say is the motivation for becoming a better teacher (Guskey, 2002). A quality JEPD program allows for the sharing of what teachers know, what they want to learn and for teachers to connect new concepts, strategies and knowledge to their own unique context and classrooms (Darling-Hammond, 1995). The delivery of JEPD is important to learners being able to solve problems in context, and providing opportunities for feedback and discussion on performance enhances the potential for implementation fidelity (Snyder et al., 2015). The nature of JEPD aligns with the consensus on quality PD characteristics such as content focus, active learning, coherence, adequate duration and collective participation, all elements which are critical to increasing teacher knowledge, skills and improving practice (Desimone, 2009). Thus

JEPD constitutes a powerful potential lever to advance student learning and enhance teacher professional knowledge and skills (Croft et al., 2010).

JEPD research to date has examined its effect on teachers in non-PE subjects (Cavazos, Linan-Thompson, & Ortiz, 2018; Dennis & Hemmings, 2018; L'Allier, Elish-Piper, & Bean, 2010; Supovitz & Turner, 2000). Little PL research has focused on PD with an embedded approach, or it has predominantly focused on the acquisition of movement skills (Edwards et al., 2019; Lander et al., 2015; Naylor et al., 2015; Sum, Wallhead, Ha, & Sit, 2018). To our knowledge, research has not yet integrated the contextual learning of teachers from PD delivered by experts in PL embedded within a PE class and tested their impact. The primary aim of this study was to explore the feasibility of a novel PL focused JEPD program and its impact on teachers' capacity to deliver and implement PL enriched PE. A secondary aim was to conduct a preliminary exploration of the impact of self-reported changes in capacity and implementation on student PL (primarily motor skill competence).

2.2 Materials and Methods

2.2.1 JEPD Intervention

Teachers participated in 5 hours of JEPD over 10 sessions (1 term) of their PE class. Although some research has indicated that 5 hours is an appropriate length (Bridges, 2016) the length of JEPD was selected based on pragmatic constraints of the implementation setting including: available resources such as funding, facilitator availability, length of term and teacher PE class schedule. As such, 5 hours was the maximum amount of time available for each teacher in the school over a school year. The

JEPD was delivered during class time, approximately 30 minutes for 10 consecutive weeks, by local experts in PL enriched program delivery from the Pacific Institute for Sport Excellence (PISE). PISE has a reputation as one of the leading facilitators of activities that develop PL within British Columbia. The content of the sessions consisted of games and activities that developed competence in movement skills and built confidence, motivation and knowledge of physical activity in the children. Children's motivation and enjoyment has been shown to be higher when skills are learned in a games-based context, where the focus is not explicitly on the skill development itself (Harvey & Jarrett, 2014). Activities and skills covered included teaching cues for running, jumping, throwing and catching, as well as other movements such as galloping, hopping, striking and dribbling. The activities were based on various pedagogical models for QPE (Casey & Dyson, 2012; Mandigo, Lodewyk, & Tredway, 2018) and were used in order to demonstrate the rationale, theory and technique development in a practical way to the teachers. See Table 1 for the strategies and rationale used throughout each session. Two PISE staff members facilitated the JEPD and had different roles in the group, with one allocated to facilitate the games and activities and the other to engage the teacher in observation and discussion relating to the session. Different themes were used throughout the program to provide teachers with activities that could be easily replicated, such as sessions where no equipment was used, or activities that could easily be translated to other areas of the school. Each teacher experienced planned games and activities that were developmentally appropriate for their grade level. For example, the same activity may have been played, such as a balance game, but instruction, expectations, difficulty levels and task outcomes were all adapted to be age appropriate.

Additionally, within the JEPD, developmental level and ability levels were taken into account and adjusted for in class as necessary to create a student-centred, authentic and diverse experience for each individual. For example equipment modifications and game adaptations were demonstrated during the class relative to the children in that class. Moreover, the expert facilitators employed different teaching styles throughout the sessions, such as 'practice' and 'reciprocal' to develop the different domains within PL (Mosston & Ashworth, 2008). Teachers were also encouraged, but not required, to engage in the activities and games they were observing in order to gain a greater understanding of the activity. In addition, all teachers were provided with online resources to supplement the in-class activities and provide more information on PL and a QPE environment, including lesson plans and external documents from organizations such as PHE Canada and the Canadian Paralympic Committee, which all included activities and information for multiple grade levels.

Table 1. Strategies implemented in each session, their connection to physical literacy and the rationale provided to teachers for their use within a physical education setting.

Strategies highlighted in each session	**Connection to PL**	**Professional development rationale/purpose**
Transitions	Class management	Engaging children immediately during initial phases of lesson and maintaining engagement between activities
Expectations of session	Class management	Creating a clear understanding and expectation of behaviours within environment

Explain all games	QPE	Regardless of previous experience, explaining every activity, every time; creating clear understanding and expectations between all participants
Warm up	Motivation	Moving early to provide purpose for session
Skill development	Physical competence	Progressing skills using games and activities
Practice	Confidence	Allowing time without peer, audience or time pressure
Progressions	Motivation	Increasing or decreasing the difficulty of each activity
Challenge	Confidence	Increasing learning through appropriate amount of success and failure
Modifications	Confidence	Adjusting the activity to engage all students
Individualized	Motivation	Skill development, progressions and modifications are different for all individuals
Small-sided games	Confidence	Allowing for greater interaction with object and other players within a game-play context
Cooperative activities	Confidence	Providing opportunity to develop problem solving, decision making and communication skills
Spatial awareness	Knowledge and	Enhancing self-awareness and how to orient body within environment and context

	understanding	
Strategy	Knowledge and understanding	Developing decision making skills at speed in contextual practice
Choice	Motivation	Increasing motivation through autonomous decision making and ability to choose level of challenge
Variety	Motivation	Engaging students of varying experiences, ability levels and interests
Peer to peer feedback	Confidence	Allowing students to understand what movement to make and how the movement is formed and can be improved.

Table 2. Example of a Grade 2 throwing lesson, including components related to why each activity was chosen in relation to the knowledge development of the teacher and the connections to PL.

Example of Grade 2 Throwing lesson			
When	**What**	**How**	**Why**
On entry	Energizer	Touch all 4 walls 5 jumps (style of your choosing) at the circle Balance in any position on one foot and wait for	Allows students to be active and engaged as soon as they enter the gymnasium while the rest of the class arrives (motivation). Sets the expectation right away that this is a

		everyone to be ready	space for activity. The Energizer is consistent each week to allow children to engage without having to wait. Choice is embedded through choosing a style of jump (e.g. knee tucks, jumping jacks, burpees etc.) (motivation).
	Expectations	Ask students if they remember the class expectations: Be respectful Be safe Have fun!	Creates knowledge and understanding of expectations for the environment. Sets out learning goals and behaviours.
Warm up game	Tent tag	Remind students of running cues from previous week - Chip from hip to lip - Elbow the bad guy behind you If tagged, you must form a "tent" with your	Reminders of previous lesson to enhance knowledge. A fun, active game to create engagement in the lesson (motivation). Modifications are presented to create student centered activities should any individual be unable to perform initial task or want to challenge themselves (confidence and motivation). Cooperation is

		body (high plank). To be ‘free’ another person must crawl under your tent.	required in order to untag participants, as well as to trust the tent will stay standing while a person goes through (motivation).
		Modifications More difficult: Only 3 points of contact with the floor Easier: participants can be on their knees until someone tries to save them	
Skill development	Popcorn shooter	Demonstrate and explain throwing cues - Make a star with your body - Point at your target - Throwing arm all the way behind your ear - Step with front foot and throw!	Demonstrations and explanations of key components of throwing skill ensure all learners can see, hear and practice required movements (knowledge and confidence through modeling). Game is simple and involves many repetitions of the movement in order to complete (competence). Target should be large

	enough so all participants can have success (confidence). Modifications are presented to provide choice for individuals with more or less experience with task (confidence), providing autonomy within activity to challenge the individual (motivation).
Participants work as a team to get all of the beanbags or balls into a bucket in the middle of the space. Poly-spots are spread out at varying distances around the bucket which participants must stand on before throwing.	
Modifications: More difficult - change distance of poly-spots, balance on one foot, use opposite hand Easier - move polyspots closer, larger target to throw into, have multiple targets around the space	

Practice	Skittles	Have brief discussion with children around what made throwing easier/more difficult. Reinforce elements that made things easier. Two teams are on opposite sides. The blocks are set up in a line on either side. Cones are used to mark out a defending zone in front of the blocks. The object of the game is the knock down the other team's blocks before all of yours gets knocked down. *Modifications:* More difficult - move skittles further away,	Reinforces knowledge. Situates the skill in more game based context. Lots of balls and many targets create a small-sided activity where many people are throwing many objects at many targets (as opposed to many people trying to get one object at one target). Modifications increase or decrease challenge in order to create success (competence and confidence). Game based context enables decision making and strategy to be developed.

		use opposite hand Easier: move skittles closer	
Before transition to class	Calm Bodies	Have all participants find a quiet space on the gym floor, be sure to have their own space (away from walls and other participants). Once their body is calm one of the leaders taps them on the foot signaling they should quietly line up at the door.	Beginning the transition back to a more sedentary environment. Body and physiology awareness is developed by controlling breathing, while quiet reflection on activities provides opportunity to think about skills and games played (knowledge).

2.2.2 Design

A pragmatic, feasibility trial with mixed methods and a quasi-experimental design including baseline and follow-up questionnaires and post JEPD interviews was used to address the primary aim. The primary outcomes were changes in confidence of the teachers after the JEPD as well as reported teacher knowledge, satisfaction, intention to change their teaching practice and self-reported implementation at 3 months. Qualitative

interviews also explored facilitators and barriers to implementation. To examine the second aim, a quasi-experimental pre-post comparison trial was used. This assessed the impact of the JEPD on one component of children's PL, motor skill competence, compared to usual practice (UP) PE delivery (Fall Phase) and then whether any gains in motor skill competence were maintained or enhanced during a post JEPD teacher implementation phase. Assignment of classes to Fall JEPD intervention (experimental group) or Winter JEPD intervention (UP wait-list comparison) was performed by an administrator at each school based on scheduling and workload. The pre-test measurements occurred on week one, and post-test measurements took place on week ten between September and December (2018). Teacher implementation phase measures were completed with the experimental group after the 10 week period where the UP wait-list comparison group received the intervention in March 2019. The replication of the intervention allowed for comparison of outcomes across phases. Figure 1 shows the process of recruitment, consent, intervention, and analysis for both teacher and student participants, Table 3 introduces the timeline of the study. The study was approved by the University of Victoria Human Research Ethics Board under protocol # 17-110.

Table 3. Timeline of study from assignment of classes to data analysis.

Date	**Objective**
June 2018	Classes assigned to Fall or Winter intervention
September 2018	Baseline testing for all children and pre-intervention survey given to all teachers Beginning of intervention

December 2018	Follow-up testing on intervention group
	Post-intervention survey given to teachers finishing JEPD
January 2019	Follow-up testing on usual practice prior to receiving intervention
	Interviews with teachers that completed JEPD in Fall 2018
March 2019	Third and final assessment for all children (Fall and Winter JEPD intervention)
	Post-intervention survey given to teachers in usual practice after receiving intervention
April 2019	Interviews with teachers that completed JEPD in Winter 2019
	Data entry and cleaning
May-August 2019	Data analysis

2.2.3 Participant recruitment

All teachers in schools that were participating in the JEPD were asked to participate in the study. Out of 44 teachers, 23 consented to be involved in the data collection and returned signed consent forms (52%), with 15 returning both surveys (34%) and 12 participating in interviews (27%). Regardless of their involvement in the research, all teachers received the JEPD. For the child participants, consent forms were sent home to each child's parent or caregiver and verbal assent was obtained from the children prior to data collection. If the child did not return a signed consent form, or verbally agree to participate on the day of data collection, they were free to continue in the class without participating in the data collection process. Out of a possible 911 children, 631 returned signed consent forms (69%). The children's mean age was 7.8 years (range = 4.7- 11.0).

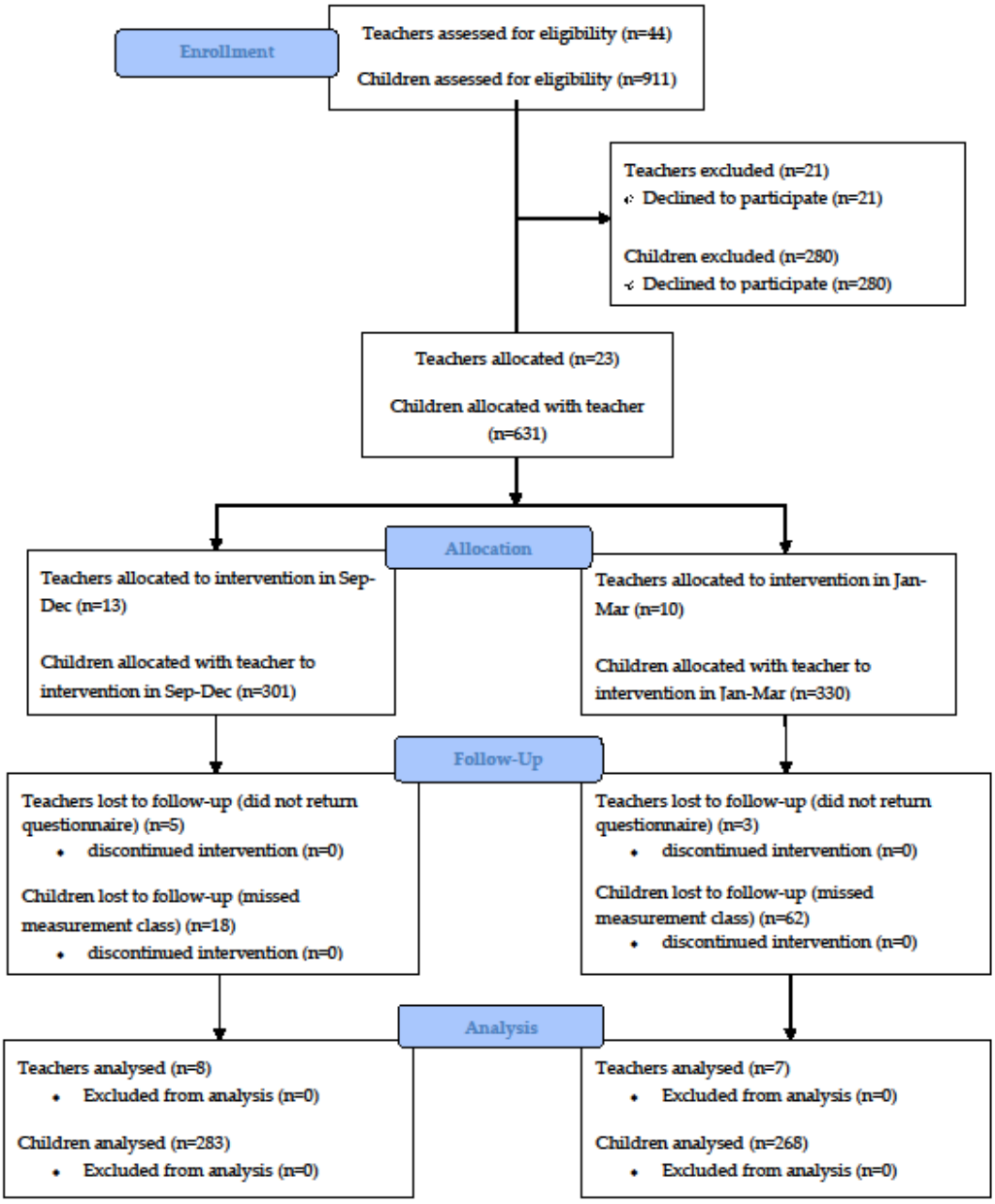

Figure 1. CONSORT table for process of teacher and child level recruitment, consent and analysis.

2.2.4 Data collection

Teachers (who were not blind to their allocation status; either Fall or Winter JEPD) were provided a questionnaire before the first JEPD date and asked to return it to the

school administrators office prior to the first JEPD session where a member of the research team picked them up. After the intervention this process was repeated. The pre-questionnaire consisted of 10 questions, with questions about knowledge and confidence each having their own subset of questions relating to more specific areas of physical literacy. Each question was answered on a 5-point Likert type scale, from ‘no confidence/knowledge’ to ‘a lot of confidence/knowledge.’ Post-questionnaires contained similar confidence questions, as well as additional questions regarding teachers’ post-JEPD confidence to apply what was learned and to promote PL specific concepts with students, their intention to integrate PL into their practice and their satisfaction with the JEPD experience. We adapted items from other physical activity tools (Rhodes & Rebar, 2017; Rhodes et al., 2019), and those implemented in past training initiatives to measure physical literacy knowledge and confidence with demonstrated ability to detect changes (Hassani et al., 2020; Naylor & Temple, 2013). The post-workshop survey measured perceived access to resources and intention strength, a construct based on previous work by Rhodes and colleagues (Rhodes & Rebar, 2017; Rhodes et al., 2019). Intention strength was measured by three items (see Table 5) using 5-point Likert scales and anchored to a three month time frame. Internal consistency for the questions was established by Hassani et al. (2020) and validity for a single intention item by Rhodes et al (Rhodes et al., 2019). Due to the pragmatic nature of the project and related timelines we could not establish the reliability and validity of the ‘adapted’ tools or confidence measures.

Post-program interviews (n=12) were arranged and data were collected in-person by a member of the research team using a semi-structured interview guide that provided

structure across participants while allowing for unanticipated responses. Questions investigated their experience in the JEPD intervention specific to this analysis. Extensive hand-written notes captured the exact terminology, colloquialisms, and labels used by the teachers. The notes were shared with the interviewee to check for completeness and accuracy.

Child level motor skill competence was assessed during the first and last class of the intervention in the gymnasium where the class was taking place. This allowed for participants to take part in the data collection and then return to their PE lesson. Two trained individuals assessed the children as they performed the tasks outlined in the PLAYbasic tool (Sport for Life Society, 2013), namely; run there and back, hop, overhand throw, kick ball and balance walk backwards. Raters, both with previous experience in motor skill analysis, completed 3 hours of classroom training using standard videos and live demonstrations to practice rating, compare scores and adjust where necessary. Agreement was then assessed qualitatively in a 1 hour live in-school testing situation where PLAYbasic scoring was reviewed for discrepancies and discussed. During data collection the trained individuals recording the scores stood in different positions, and completed all pre and post data collection from these positions for all children (see Figure 2). Only one rater was blind to classroom intervention allocation. Scores were recorded using paper versions of the PLAYbasic scoresheet and the mean of the two rater's scores were analyzed.

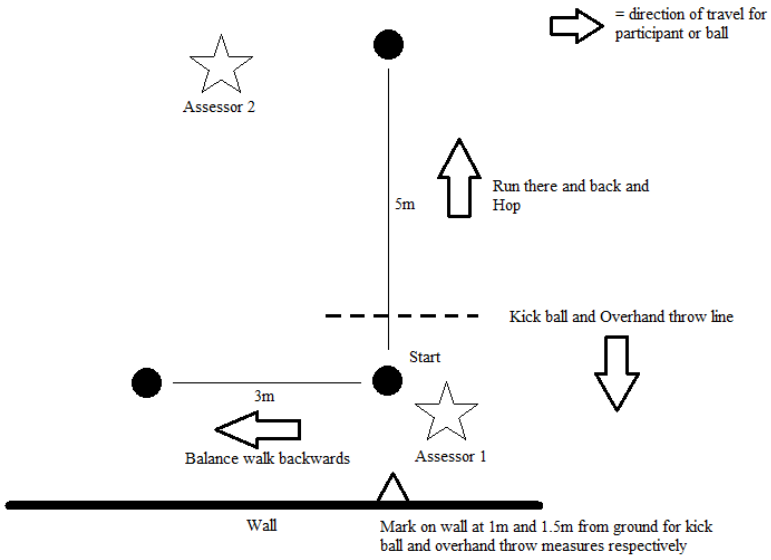

Figure 2. Layout of PLAYbasic assessment protocol for child level data collection.

2.2.5 Data analysis

Data were analyzed using SPSS version 24. Descriptives and related samples t-tests were used for the teacher data and child data between follow-up and teacher implementation phase. A repeated measures ANOVA was used for child level data to explore time and time by condition effects from baseline to follow-up (Fall phase).

The interview notes were transcribed verbatim into typed pages for the purpose of analysis and data were categorized into codes and categories independently by two members of the research team experienced in qualitative research methods (Elo & Kyngas, 2007). Conventional inductive content analysis was used, as existing theory and research literature on embedded PD addressing PL in an elementary PE setting were limited (Graneheim & Lundman, 2004; Shannon & Hsieh, 2005; Yin, 2016). It provided a systematic and objective method to classify directly from the text into discrete groups (Elo & Kyngas, 2007; Shannon & Hsieh, 2005). Subsequent to independent coding, the

researchers met to discuss similarities and nuances amongst the initial codes to solidify and strengthen the categories. If there was divergence on categories, discussion was initiated to reach agreement. Repeated review and discussion occurred as categories emerged and developed (Lincoln & Guba., 1985; McLellan, MacQueen, & Neidig, 2003). The categorization of the data using inductive analysis and constant comparison ensured the reliability of the coding.

The trustworthiness of the data was established using several methods. First, the handwritten interview notes were reviewed by the teachers in order to strengthen trustworthiness through member verification. Then, each member of the coding team also provided peer debriefing by questioning assumptions and ensuring evidence for decision making was thorough (Lincoln & Guba., 1985). Triangulation was incorporated three ways; analysis of themes and categorization by two researchers; across participants with various levels of experience; utilizing multiple data collection methods (pre and post surveys and face-to-face interviews). Finally, trustworthiness was enhanced by reviewing the data and actively looking for negative evidence (Cresswell & Miller, 2000).

2.3 Results

2.3.1 Teacher data

2.3.1.1 Demographics

Of the 15 teachers that participated in the survey 13 (87%) were female with 67% between 25 and 44 years of age and 33% between 45-64 years of age. Their average years of teaching was 14 years (range 2 – 30 years). Eighty percent had training on physical activity, 40% on PL, 60% on fundamental movement skills, 20 % sedentary

behaviours and 13% other activities related to PL (globally or other movement skills specifically such as dance). Eighty-seven percent (87%) of the teachers received their preparation through a University course and 13% from ongoing PD. Only two teachers reported no PA preparation. Teachers in the selection taught a variety of grades from Kindergarten through to Grade 5.

2.3.1.2 Capacity to deliver PL enhanced programming

Teachers' overall PE teaching skill confidence increased significantly between baseline and follow-up but as illustrated in Table 4 their confidence in being able to adapt activities for different ages, abilities and cultures did not. Teachers perception of whether they had the resources they needed to promote PL through their programming was also not significantly different.

Table 4**.** Changes in PL related teaching skills confidence and perceptions of resource availability between baseline and follow-up after JEPD.

Variable	**n**	**Pretest M (SD)**	**Posttest M (SD)**	**Statistic**	**Sig.**
Perception of availability of resources to support their PL programming	15	3.40 (.63)	3.87 (.64)	t(14)=-1.71	p=.110
Confidence in ability to:					
Provide opportunities for exploration and free play	15	3.87 (.52)	4.40 (.74)	t(14)=-2.78	p<0.05
Adapt PA for different ages,	15	3.40	3.87	t(14)=-	P=0.089

abilities and cultures		(.49)	(.63)	1.83	
Create an environment that promotes PA engagement	15	3.63 (.40)	4.28 (.46)	t(14)=-5.87	p<0.01
Total Confidence[1]	15	10.93 (1.33)	12.80 (1.61)	t(14)=-3.84	p<0.01

[1]A sum of all items

At follow-up teachers' confidence in their ability to program activities that promoted key components of PL was high (see Table 5). Ninety-three percent (93%) were confident to very confident they could use what they had learned to improve and sustain PL concepts in their programming. Ninety-three percent (93%) were confident they could find resources to assist them with PL implementation.

The strength of teacher intentions to integrate PL into their PE programming was high. On average the teachers' overall intention to implement PL principles in the next three months was 4.09 (range = 10-15).

Table 5**.** Post JEPD teacher confidence in their ability and intentions to promote key PL concepts.

Variable	**Mean**	**Mode**	**Range (min-max)**
Confidence in ability to promote:			
(score range 1-5)			
Locomotor skills	4.13	4.00	3-5
Manipulative skills	4.20	4.00	1-4

Balance/stability skills	4.33	4.00	2-4
Moderate/Vigorous PA	4.53	5.00	1-5
Children's confidence	4.00	4.00	3-4
Children's motivation	4.13	4.00	2-4
Intention to integrate PL:			
(score range 1-5)			
I will use PL principles (5=strongly agree)	4.00	4.00	3-5
It will be difficult to include (5=strongly disagree)	3.93	4.00	2-5
I am motivated to include PL (5=strongly agree)	4.33	4.00	4-5
Total Strength of intention (score out of 15(SD))	12.27(1.62)	N/A	10-15

2.3.1.3 Self-reported practice changes

Post-program interviews (n=12/15) showed a variety of changes in practice. Categories of responses included: more intentional/planned inclusion of games and activities into lesson plans and drawing upon activities they observed during the JEPD, increased variety and skill development, student-focused discussion of, and reflections on, the games and skills, changing introduction and closing games and activities that enhance transitions, and adapting equipment to meet the needs of the children.

Table 6. Response categories and illustrative quotes from teacher interview content analysis[1].

Response category	**Illustrative quotes**
More intentional/planned inclusion of games and activities	"…started to put 2-3 activities together into a short time period"*T4S2* "divided kids into groups more often to use more activities"*T6S1* "having more of a lesson format…better plan…more cohesive, things that work together"*T5S1* "making sure I follow my schedule"*T1S2*
Increased variety and skill development	"now more familiar with skill development"*T8S2* "I copied some of their activities"*T5S1* "Learned a different vocabulary"*T6S1* "incorporated the game part…skills [are now] game oriented*T1S2* "resource is helpful…["referred back"… to pdf of lessons and games… to remind me"*T6S1* "less sport based, more skill based"*T5S1*
Student focused discussions/reflections	"I let children choose"*T11S2* "involved children … [using] silent thumbs up, thumbs down system' [that was modeled])"*T6S1* "trying to add more skill specific discussion

	before playing game"*T9S1* "more reflecting on games – trying to do a better job of giving back to the students"*T4S2*
Enhancing transitions with intro, closing and transition activities	"learned a lot of new warm-up and cool down"*T12S3* "the games are great way to round up kids"*T10S1* "all elements have a closer…I could see how important it is when I saw it…"*T1S2*
Adapting equipment to meet needs	"I know how to adapt equipment"*T8S2* "using more equipment that I had not considered before"*T6S1*

[1]Interviews were identified with this system: T# = teacher (# denotes which teacher) and S# = school (code)

2.3.2 Implementation

2.3.2.1 Post program satisfaction

Teachers' overall satisfaction with the JEPD was high; on average 4.67/5 (mode=5/5; range = 3-5), with 93% satisfied or extremely satisfied. 80% felt that the JEPD helped them to construct solutions for their practical situation quite a bit to a lot (range 3-5/5).

2.3.2.2 Benefits of JEPD

The most consistently cited benefit of the JEPD across the teachers was the observability. As T4S2 described it "…it is invaluable seeing it in action" while T5S1

said "seeing it in my own space, with my own students so I know exactly what it looks like."T4S2 emphasized that it was "not just theory"… [it was] "practical" … and "showed how to do it". T9S1 highlighted that because they were observing "they got to see who could actually skip". Related further to observability was student enjoyment which was highlighted in a third of the interviews and illustrated by T2S3 who said "kids loved it… were keen…". Several teachers also mentioned qualities of the workshop globally describing it as "organized really well"- *T8S2,* "fantastic"- *T2S3* and "tailor made for your class…it doesn't get any better than this…"- *T7S3.* Specific qualities included the benefits of prolonged engagement and the ability to build the lessons over time compared to just having a one-off workshop. For instance, T6S1 emphasized that "PISE built the program gradually – it was doable" while *T5S1* said "time… a workshop would never be that amount of time" and *T6S1* and *T10S1* said "liked the length (long-term)…" and 10 weeks was "the right amount" respectively. Several teachers mentioned the resources; on-line access to the lessons and games (google doc links sent via email). Other less consistently mentioned, but important benefits highlighted the ability to ask questions and discuss with the leader (e.g. "getting to ask questions as game is being played" -*T3S2* and *the* "person was available to chat with" - *T1S2*). T11S2 highlighted the connection to the PE curriculum saying, "it touched on all of the curriculum". Not really a benefit but a possible facilitator were qualities of the delivery team. In 9/12 interviews positive attributes of the leaders were mentioned saying "they were - "good with kids" – *T10S1* and *T12S3*, "professional knew what they were doing" -*T9S1* and "prepared" -*T10S1 and T11S2.*

2.3.2.3 Challenges with JEPD

Although one half of the interviewees indicated they did not find it challenging to implement what they learned and some indicated they preferred the JEPD method, others highlighted some challenges. Some of these challenges related to the JEPD delivery and included: lack of time to incorporate the theory ("classroom management may detract from theory development"-*T3S2*), one teacher's preference for more time discussing with the mentor and another's need for the mentor to be respectfully aware of the existing experience and knowledge of teachers. A further comment addressed leader limitations in their understanding of different age groups of children. Other challenges occurred at the teacher implementation level, regarding the volume of new ideas and activities to integrate ("so much new to me.. remembering it all"-*T12S3* and "emails were too much"-*T10S1*), scheduling PE activities in an ever changing school environment ("you have a weekly plan but it seldom goes according to it-something usually comes up"-*T9S1*), timing of changes ("changed mid-year rather than at the beginning in September when you plan term"-*T9S1*), "meeting the needs of children that are developmentally challenged -*T8S2* and assessing at the individual level while [managing delivery in a large group]" –*T3S2*.

2.4 Child outcomes

Of the sample of 551 children who were eligible to take part in the study, 283 were allocated to the intervention group and 268 were allocated to the UP PE condition. The total sample consisted of 295 males (53.4%) and 253 females (45.8%) with a mean age of 7.8 years (range = 4.7- 11.0). Because of time constraints within the class, 257 children

were tested at baseline in the intervention group and 261 in the UP group. Table 7 shows that the distribution of age and sex and overhand throwing skill level did not differ between groups but that run there and back, hop, kick ball and balance walk backwards were significantly higher in the intervention condition compared to controls at baseline.

Table 7. Baseline demographics and motor skills differences between conditions.

Demographic Measures	**Intervention**			**Usual Practice**			**Sig.**
	N	**M (SD) or N (%)**	**Range**	**N**	**M (SD) or N (%)**	**Range**	
Age (in years)	277	7.9 (1.7)	4.7-10.8	259	7.6 (1.6)	4.8-11.0	p=.12
Sex (Females)	284	133 (47%)		268	120 (45%)		p=.89
Motor skill							
Run there and back	257	47.4 (12.4)	15.5-77.5	261	42.1 (10.5)	14.5-65.5	p<.05
Hop	257	47.6 (12.1)	15.5-77.0	261	42.5 (10.2)	0.0-65.0	p<.05
Overhand throw	257	48.6 (12.0)	9.5-82.0	261	47.5 (8.5)	23.5-80.5	p=.19
Kick Ball	257	45.7 (12.7)	12.0-71.0	261	43.4 (9.6)	20.5-71.5	p<.05
Balance walk backwards	257	45.9 (15.1)	14.5-75.0	261	43.0 (13.2)	0.0-68.5	p<.05

Table 8 shows that the motor skills of all children (JEPD and UP) improved over time during the fall phase. However, only overhand throw showed significantly greater improvement in the JEPD intervention group compared to the UP PE condition. Interestingly, once UP children were involved in JEPD in the wait-list comparison phase the overhand throw improvement was replicated but the improvement in other motor skills was not (see Table 8). During the teacher implementation phase (Students in fall intervention classrooms were re-measured at the same time as the wait-list JEPD intervention), the related samples t-test showed movement competency scores were significantly lower at follow-up (See Table 9).

Table 8**.** Results of the repeated measures ANOVA examining changes in motor skills among children involved in the Fall JEPD compared to those in the UP wait-list condition.

Motor Skill	**Condition**		**Initial**	**Post Intervention**	**Time by condition**	**Sig.**	**Effect size**	**Time effect**
		n	**M (SD)**	**M (SD)**	**F**	**P**		**P**
Run there and back	JEPD	233	47.6 (12.4)	55.8 (8.0)	0.243	p =.622	0.091	p <.05
	UP	240	42.1 (10.5)	50.8 (6.5)				
Hop	JEPD	233	48.0 (12.1)	54.8 (7.6)	0.509	p =.476	0.095	p <.05
	UP	240	42.4 (10.3)	49.9 (6.1)				
Overhand throw	JEPD	233	48.7 (11.5)	55.1 (8.3)	19.083	p <.05	0.032	p <.05
	UP	240	47.5 (8.5)	50.6 (6.2)				

Kick ball	JEPD	233	45.8 (12.7)	51.2 (8.6)	0.39	p =.532	0.022	p <.05
	UP	240	43.4 (9.6)	48.3 (7.4)				
Balance walk backwards	JEPD	233	46.1 (15.2)	54.1 (12.0)	0.35	p =.554	0.023	p <.05
	UP	240	43.0 (13.3)	50.3 (9.9)				

Table 9. Paired samples t-test between baseline and follow-up for usual practice that received JEPD and for the teacher implementation phase.

Motor skill	**Condition**	**Baseline M (SD)**	**Follow-up M (SD)**	**t (df)**	**Sig. (2-tailed**
Run there and back	UP receives JEPD	50.8 (6.6)	51.1 (5.3)	-0.85 (221)	p =.395
	Teacher implementation	56.0 (7.9)	51.7 (5.3)	10.41 (203)	p <.05
Hop	UP receives JEPD	50.0 (6.2)	50.4 (5.2)	-1.00 (221)	p =.318
	Teacher implementation	54.8 (7.5)	51.1 (4.7)	9.64 (203)	p <.05
Overhand throw	UP receives JEPD	50.5 (6.2)	51.4 (5.3)	-2.61 (221)	p <.05
	Teacher implementation	55.2 (8.5)	51.8 (4.7)	7.03 (203)	p <.05
Kick ball	UP receives JEPD	48.3 (7.5)	47.8 (6.7)	1.70 (221)	p =.090
	Teacher implementation	51.5 (7.8)	49.5 (5.8)	4.95 (203)	p <.05
Balance walk backwards	UP receives JEPD	50.6 (10.0)	47.6 (9.5)	6.57 (221)	p <.05
	Teacher implementation	54.2 (11.8)	49.7 (8.9)	8.00 (203)	p <.05

2.5 Discussion

The primary aim of this pragmatic study was to explore the feasibility of a novel PL focused JEPD program and its impact on teachers' capacity to deliver and implement PL enriched PE. Based on evidence of acceptability, implementation, practicality and changes in a limited set of intermediate short-term outcomes (Bowen et al., 2009b) we

conclude that it was feasible. Teachers were highly satisfied with the training; they indicated preferring the delivery method and most reported few barriers to integrating what they learned. In terms of practicality, the embedded nature of the intervention reduced known barriers to PD such as availability and time (Naylor et al., 2015; Stoddart & Humbert, 2017; Tristani & Fraser-Thomas, 2017). The intervention was practical within the resources of one School District but this may vary by jurisdiction. Finally, the JEPD appeared to have an impact on teacher PL related confidence, their intention to change their practice and subsequent self-reported practice changes. Our secondary aim to explore student level motor skill outcomes showed significant changes in a manipulative skill during the expert led JEPD were not sustained during a teacher implementation phase. However, neither the intervention nor the teacher focused solely on motor skills (competence) as physical literacy encompasses a more holistic set of components. The JEPD incorporated QPE classroom management practices and a variety of strategies and activities to address student confidence, motivation and knowledge and understanding. Nor did the research design account for confounders like seasonality. We discuss our findings in the context of the literature and highlight strengths and limitations.

Similar to previous research (Mandigo et al., 2018; Silverman & Mercier, 2015) teachers in our study had a ‘moderate’ level of confidence in their PE teaching abilities at the outset and it improved. At follow-up their confidence in their ability to create PE programming that specifically promoted motor skills, confidence, competence and moderate vigorous physical activity was high. This is important as previous research has highlighted that teachers did not have an accurate understanding of PL, and only 31% of teachers they interviewed could clearly articulate the concept (Stoddart & Humbert,

2017). It has also been highlighted that teachers were seeking ways to interpret the curriculum in to effective practice, as well as the need for continued PD (Stoddart & Humbert, 2017). The high confidence and intention to change following the JEPD and the improvement in PE teaching skill confidence seen over time supports the use of embedded PD as an effective way to develop teachers' knowledge and skillset and to interpret the curriculum into practice. Previous research has also shown that given the right supports generalist teachers are able to deliver a quality PE program (Faucette et al., 2016) and that JEPD provides teachers with knowledge and skills within the context of their classroom; thus having the potential to increase implementation fidelity (Croft et al., 2010; Snyder et al., 2015). This research aligns with other studies that have shown that PD implemented outside of the classroom context was effective (Edwards et al., 2019; Kulinna, 2012; McKenzie et al., 1997; Mitchell et al., 2013; Sum et al., 2018).

Interestingly, after 5 hours of JEPD intervention teacher confidence in their ability to adapt physical activities for age, ability and culture was not significantly higher. This may reflect their awareness of the challenges and complexity associated with adapting in a real-world PE class with 20-30 children. In fact, some of the qualitative data highlighted the challenge of incorporating children with diverse needs into games, and this has been highlighted in other studies in Canada and around the world (Hutchinson, Minnes, Burbidge, Dods, & Pyle, 2015; Jenkinson & Benson, 2010; Luíza et al., 2017; Van de Putte & De Schauwer, 2013). Conversely it may also suggest that 5 hours was not enough intervention dose or that JEPD needed to be enhanced in some way to achieve this outcome (e.g. in situ mentoring).

The child level data showed that the expert facilitation within the JEPD intervention phase had a significant effect on one of the manipulative skills measured. This was seen in both the quasi-experimental comparison phase and replication period when the waitlist teachers participated in the intervention. The positive impact of interventions led by skilled facilitators on fundamental movement skills is consistent with previous research (Breslin et al., 2012; Lander et al., 2015; Mitchell et al., 2013; Wick et al., 2017). It should be noted that in the fall most of the motor skills improved independent of condition, without true randomization we could not control for outside of school physical activity (recreational or competitive sport activity). Although declines in children's movement skills during the teacher implementation phase are concerning, we did not have a control condition in place that might have highlighted the impact of seasonal participation in physical activity (Atkin, Sharp, Harrison, Brage, & Van Sluijs, 2016; Silva, Welk, & Mota, 2011). We also know from the qualitative data that some of the practice changes were focused on enhancing engagement and motivation, more intentional planning and smooth and engaging activities to transition children rather than solely on skill development. These attributes and characteristics within a PE class and the intentional instructional design by the teacher are understood to ultimately develop PL within students (Silverman & Mercier, 2015). Additionally, the limited range of movement skills measured by the PLAYbasic tool may not capture the development of the children beyond those 5 narrow competencies. More extensive research is needed to evaluate if teachers self-reported changes are measurable in practice and to understand how implementation looks over longer time periods.

Beyond the issues already highlighted, the research findings need to be placed in the context of both the strengths and limitations of the study. First and foremost this was a pragmatic trial where a school district invested in an intervention model that reduced the barriers that are consistently identified as a hindrance to the development of teacher knowledge in PE, namely time and lack of opportunity (Naylor et al., 2015; Weatherson, McKay, Gainforth & Jung, 2017). Conversely, school district, health and recreation stakeholders leveraged health promotion funding to support the initiative. Although teachers were highly satisfied with the delivery model, this may not be feasible in other jurisdictions. Importantly, the intervention and evaluation were designed to reflect the organizational context in which implementation occurs and this may contribute to enhanced scalability if efficacious (Milat, King, Bauman, & Redman, 2012). The pragmatic nature of the trial however, also introduced limitations in that the measurement had to fit into the context of day-to-day school operations (brief teacher surveys, 30-minute PE classes located in the gym; interviews conducted on-site during prep periods or lunch). Based on the small gap (2 months) between the School District decision to implement the PL oriented JEPD and baseline measurement and initial intervention we adopted and adapted questions for the teacher survey with either: Established reliability and/or validity from previous research on PA or training (Hassani et al., 2020; Rhodes et al., 2019), or a PL focus and demonstrated sensitivity to changes in knowledge and confidence (Naylor & Temple, 2013). We did not establish validity and reliability and this is important to a future efficacy trial and further research on PL related PD. In terms of the children's data we used PLAYbasic as a short form motor skills assessment because more time consuming, comprehensive, previously validated assessment

instruments like PLAYfun (Cairney et al., 2018; Stearns et al., 2018), TGMD-II (Ulrich, 2000) or CAPL(Francis et al., 2016; Longmuir et al., 2018) were not possible. We did use two raters to enhance validity as per Stearns et al (2018) and the five skills are part of the validated 12 skill PLAYfun tool. We could not control or adjust for confounders and our findings may not be free from sampling bias based on how groups were assigned. Finally, the use of mixed methods was strength, allowing us to comprehensively explore the feasibility of the JEPD using quasi-experimental, qualitative and replication approaches.

2.6 Conclusions

A novel PL oriented JEPD was highly acceptable to and preferred by teachers with few implementation barriers and many benefits. At the teacher and School District level it was practical and in a limited test of its efficacy enhanced generalist teachers' PL related confidence, knowledge and intention/motivation to integrate PL concepts. Thus a real world PL oriented JEPD was feasible, allowing generalist teachers to deliver a PL enriched PE program. The next steps in research are to establish the reliability and validity of the PL oriented JEPD outcome measures and progress to a full randomized controlled efficacy trial. If possible the efficacy trial should also explore teacher implementation of PL concepts and changes in practice after JEPD and their impact on children more thoroughly. Practical implications emerging from the study include the importance of incorporating JEPD into efforts to integrate PL into professional practice and the ongoing importance of teaching supports (e.g. practical resources, intentional planning tools) and focusing on class management skills for active spaces. With possible school and district level pragmatic limitations on PD time and resources, we recommend

an additional focus on embedding PL concepts in the pre-service/teacher preparation learning environment.

Chapter Three: Conclusions and recommendations

This study explored a novel approach to professional development for teachers related to the implementation of the PE curriculum through specific, contextual learning delivered by local experts. The manuscript presented previously shows that this format of professional development is efficacious in developing the confidence, knowledge and intent to change practices for teaching PE within in-service teachers of elementary grade children. This research adds to the growing field of professional development for teachers directly concerned with physical literacy (Castelli, Centeio, Beighle, Carson, & Nicksic, 2014; Durden-Myers & Keegan, 2019; Edwards et al., 2019; Law et al., 2018), and is unique in the job-embedded approach.

While the outcomes of this study are positive, there are recommendations to consider in future research that may enhance teachers' ability to increase their knowledge and confidence further, along with creating an environment for sustained implementation of quality practices. Rovegno and Dolly (2006) highlight learning as an active process that allows individuals to construct knowledge and understanding through problem solving, decision making and critical thinking. Active learning can include observing skilled facilitators and teaching practices, planning new curriculum materials and engaging in discussion on specific content matter (Garet et al., 2001). Another key component to active learning is being observed in teaching practices and contexts (Garet et al., 2001). While teachers in this study were able to ask questions and discuss observations with the expert facilitators, actual teacher implementation and observation and feedback about their teaching practice during the sessions was limited in accordance with School District

Board recommendations related to the Provincial Collective Agreement 2013-2019 (agreed to and monitored by BC Public Schools Employer's Association, Board of Education of School District No.62 and British Columbia Teachers' Federation and Sooke Teachers' Association 2013-2019) guidance that ensures that actions don't infringe on the rights of the teacher. Recommendations for future implementation of a similar model of JEPD would be to gain support from the relevant authoritative bodies for having external experts engage in a dynamic informal assessment process where they observe and assess the teacher's facilitation practices in order to provide context specific feedback that would aid the teacher in implementing change. Evaluating a teacher in practice and providing feedback can take many forms, such as videotaping lessons, in-person observation or reflective discussions on content, tasks and outcomes with the expert facilitators (Garet et al., 2001). For researchers, the addition of this more in-depth practice will enable the study of knowledge transfer to actual change, rather than the intent to change as seen in our study. This phenomenon is known as the intention-behaviour gap (Sheeran, 2002), which describes the failure to translate intentions into action (Faries, 2016). Current evidence shows that 50% of people fail to enact any behaviour change after stating their intent to do so (Sheeran & Webb, 2016). In our study, this would translate to 22 of the 44 teachers overall, and 7.5 of the 15 who participated in the research component. The intention-behaviour gap is underpinned by difficulties such as underestimating the effort that is need to enact change, a lack of planning the activities that are required for change, or forgetting to act when one is occupied with other activities (de Ridder, 2015). While these components are currently researched in terms of healthy behaviours, many of the same attributes that are noted as increasing difficulty in

behaviour change are the same as what has been noted in a lack of confidence or ability to teach a quality PE session. Namely, these are knowledge of content (and therefore unaware of the time it may take to plan lessons) and time (for both planning the activities and being occupied by other activities) (Decorby et al., 2005; Naylor et al., 2015). Future research focussing on these elements would lead to advances in knowledge in a multitude of subjects, including physical literacy, professional development, teacher practice and psychology.

The added elements of providing teacher feedback on their teaching practice within the context of their classroom delivery and follow-up beyond the intervention timeframe would provide a future randomised control trial (RCT) the ability to assess sustained teacher change in practice and therefore the effect on the PL of the children in their class. This would require the study to be completed over a much longer period of time, such as a whole school year, rather than the 10 weeks in our study. The prolonged period of time would mitigate factors such as seasonality, but the confounding variable of external physical activity programs would be more influential and therefore need to be taken in to account in greater detail. Additionally, it is recommended to document teacher questions and feedback throughout the intervention. Doing this would enable researchers to track knowledge transfer and confidence more thoroughly throughout the research period, allowing a more comprehensive qualitative analysis of changes (positive and negative) during the learning process. Incorporating these elements is an important step in using the results of this pragmatic feasibility study to inform future RCT's in the field of JEPD for elementary grade teachers.

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Appendix A

SCHOOL DISTRICT NO. 62 (SOOKE)
3143 JACKLIN ROAD,
VICTORIA, BRITISH COLUMBIA • V9B 5R1
TELEPHONE: 250-474-9800 FAX: 474-9825
WEBSITE: WWW.SD62.BC.CA

September 10, 2018

Re: **Invitation to Participate: in a UVic/Pacific Institute of Sport Excellence (PISE) Evaluation study called**

"An Evaluation of PISE's Physical Literacy Program in SD 62 Elementary Schools

Dear families,

We are providing the following information to inform you of a new opportunity in your child's school. Your child will be asked to participate because they are in the Sooke school district and enrolled in a school that is participating in the PISE physical literacy program as one part of a School District wide physical literacy initiative (see infographic). This year all of the students in their school will be participating in the physical literacy program through their physical education class (either in the fall or January). An evaluation of the program is being conducted in partnership with the University of Victoria (Graduate students under the supervision of Dr. PJ Naylor).The aim of this evaluation/study is to evaluate how the physical literacy program changed children's physical literacy and their perceptions of their physical literacy.

Attached you will find more information and a consent form for your signature and return to your child's teacher. Choosing not to participate in this evaluation study will in no way effect your child's class time or grades. All children both consented and not consented will partake in the physical literacy skills from the PLAY toolkit as it is part of the PISE physical literacy lessons and part of a scheduled Physical Education Lesson, but only the data from consented children will be used for study and publication purposes. The Sooke School District is interested in the results of the study because it can guide our decisions about further school district activities related to physical literacy.

Please note that Dr. Naylor and her research team (Buxcey, Barrette and Wright), and the University of Victoria do not have any personal information about you or your child and the district will not be sharing such information as part of this study. We are disseminating this information on behalf of the university research team, to inform you of the opportunity to participate.

Should you be interested in participating, please review the attached letter, which contains specific information about the evaluation study, how to contact the researchers and how to indicate your interest. If you have more questions, please feel free to contact Dr. Naylor at [redacted] or pjnaylor@uvic.ca.

Sincerely,

DStrange

David Strange
Assistant Superintendent
SD#62(Sooke)

Appendix B

University of Victoria | School of Exercise Science, Physical & Health Education

PISE

An Evaluation of PISE's Physical Literacy Training Mentoring Program in Elementary Schools

Your child is being invited to participate in a study entitled "Physical Literacy and Play an Evaluation of PISE's Physical Literacy Program in SD 62 Elementary Schools. This study is being conducted by graduate students John Buxcey, Michelle Barrette and Chris Wright under the supervision of Dr Patti-Jean Naylor, Professor from the School of Exercise Science, Physical and Health Education at the University of Victoria, in collaboration with School District 62, the Pacific Institute of Sport Excellence (PISE) and the Sport for Life Society. If you have further questions you may contact Dr. Patti Jean Naylor at (or pjnaylor@uvic.ca; Chris Wright at cwright@pise.ca; or John Buxcey at (or jbuxcey@uvic.ca

Aim and Objectives

The aim of this research is to evaluate the physical literacy program on children's physical literacy and their perception of their physical literacy.

Importance of this Research

Less than 15% of children in British Columbia meet Canada's physical activity guidelines for children and a study published entitled the *Fitness of Canadian Children and Youth* indicates that the fitness levels of children have declined since 1981, regardless of age or sex. These statistics are alarming and point to an urgent need to help children's stay engaged in physical activity.

Research suggests that children are delayed in their motor skill development and not progressing to becoming motor skill proficient. This delay in motor skill proficiency can inhibit children from developing more advanced skills needed to participate in complex sport and physically active activities and result in a decrease in physical activity participation.

This research will be one of the first to evaluate the impact of a school physical literacy program. Ultimately, our intent is to help schools, school districts, and communities enhance children's physical literacy.

Participant Selection

Your child is being asked to participate in this study because she/he is in the Sooke school district and is enrolled in a school that is participating in the PISE physical literacy program.

What is involved

Physical Education Time

During scheduled physical education times on three separate occasions (Early fall, late fall and once in spring) children will participate in activities to assess their physical literacy skills. These skills are derived from the Physical Literacy Assessment for Youth (PLAY) toolkit, specifically PLAYbasic and PLAYfun. and the Canadian Assessment of Motor Skills and Abilities. They will also complete a short survey called PLAYself which assesses their perceptions of their own physical literacy skills. All children both consented and non-consented will be partaking in these activities, however only those that consent will have their data used for the evaluation/study.

Inconvenience

Approximately 120 minutes (40 minutes in Fall, 40 minutes early winter and 40 minutes in April) of your child's total educational time will be devoted to this project. This time is split between three 30 minute physical education classes and two 10 minute classroom slots (to complete the survey).

Risks
There are no known additional risks to your child's participation in this study

Benefits

Your child's participation in this research will help us evaluate the impact a physical literacy school intervention can have on children in improving their physical literacy to potentially help reverse the decline in fitness/physical activity among Canadian children.

Voluntary Participation

Your child's participation in this research must be completely voluntary. Choosing not to participate in this study will in no way effect your **child's class time or** grades. All children both consented and not consented will partake in the physical literacy skills from the PLAY toolkit as it is part of the PISE physical literacy lessons and part of a Physical Education Lesson, but only the data from consented children will be used for research and publication purposes. If your child does participate, they may withdraw at any time without any consequences or any explanation. If they do withdraw from the study their data will not be used in this study or for publication and will only be used by PISE for their own internal evaluation of their program.

On-going Consent

One of the goals of this project is to track how children's physical literacy skills change through their participation in PISE physical literacy program and compared to those that are not partaking in the program. Therefore, it is assumed that your ongoing consent will be given for the duration of this study (Fall 2018 – April 2019). If the project is required to go beyond this date an updated consent will be distributed to ensure your consent and your child's consent is still given. Before each measurement session, we will ask your child verbally if they still wish to take part in the study activities.

Anonymity and Confidentiality

Your child's participation will not be anonymous as the physical literacy data will be collected during your child's physical education classes and children will go to varying stations in small groups. However as children will be in small groups your child will only be performing in front of a few children. If they are not comfortable performing the skills in front of their peers they will be provided the opportunity to do the skills at another time. Your child's data however, will remain confidential. The scores will not be communicated verbally to the children only recorded by research staff. The data we collect will be entered

into the computer without names, all children will be given a code, and all presentations will refer only to group data.

Dissemination of Results

Aggregated data from this project will be sent out to participating families, presented to School District 62, and at other professional and academic meetings. Additionally, articles will be published and the physical literacy skills data will also be provided to PISE for their own internal evaluation.

Storage and Disposal of Data

Surveys data will be stored in a locked data cabinet and data storage room in Dr. Naylor's research lab which is also locked. Electronic data files will be stored on a password protected directory on a dedicated research local area network. The paper files will be shredded five years after the final dissemination of results. The computer files will be erased by a University of Victoria information technology professional and surveys will be shredded after the dissemination of results have been completed in the areas noted above. Specifically all computer files (without names) will be kept in a secure database for 15 years.

Contacts

Individuals that may be contacted regarding this study include: Dr. Patti-Jean Naylor – PH: (1) [redacted] or email: pjnaylor@uvic.ca, John Buxcey – PH: (or email: jbuxcey@uvic.ca; or Chris Wright – PH: [redacted] Email: [redacted]

In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Your signature below indicates that you understand the above conditions of your child's participation in this study and that you have had the opportunity to have your questions answered by the researchers. We also ask that your child "signs" below to indicate that he or she is happy to be involved in the study.

_____ _____

Child's Name *Child's Signature*

_____ _____ _____

Parent Name *Parent/Guardian Signature* *Date*

_____

Parent Contact (e-mail or phone number)

To help us assess PISE's physical program more effectively we ask that you provide the following information about your child:

Date of Birth: _____ 2. Sex: Male ❑ Female ❑ Other ❑

(day/month/year)

PLEASE COMPLETE THE INFORMATION ON THIS PAGE AND RETURN IT TO SCHOOL IN THE ENVELOPE PROVIDED.

FOR YOUR RECORDS

University of Victoria | School of Exercise Science, Physical & Health Education

Physical Literacy and Play an Evaluation of PISE's Physical Literacy Program in Elementary Schools

If you have any questions you may call or email the following individual in the School of Exercise Science, Physical and Health Education at the University of Victoria and Pacific Institute of Sport Excellence

Dr. Patti-Jean Naylor PH: [redacted] pjnaylor@uvic.ca

John Buxcey PH: [redacted] jbuxcey@uvic.ca

Chris Wright PH: [redacted]

In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

PLAY*basic*

Physical Literacy Assessment for Youth

PLAY*basic* is intended for children aged seven and up.

canadiansportforlife.ca
play.physicalliteracy.ca

Participant's Name _____ Gender: M F Age: ____

Place a mark in the box that best represents the child's ability. Indicate if the child had low confidence, or needed a prompt, mimic, description, or demonstration for each task.

	Competence				Confidence	Comprehension			
	Developing		Acquired						
Task	Initial	Emerging	Competent	Proficient	Confidence	Prompt	Mimic	Describe	Demo
1. Run there and back									
2. Hop									
3. Overhand throw									
4. Kick ball									
5. Balance walk (toe-to-heel) backward									

You can score and track your assessment online at play.physicalliteracy.ca. There you'll be able to create groups and input PLAY*basic* scores for any number of children.

Appendix D

PLAYself

Physical Literacy Assessment for Youth

Your Name _____ Gender: M F Age: _____

I am most active in (check all that apply): ○ summer ○ winter ○ active in both

How good are you at doing sports and activities?	Never tried	Not so good	OK	Very good	Excellent
1. In the gym?					
2. In and on the water?					
3. On the ice?					
4. On snow?					
5. Outdoors?					
6. On the playground?					

What do you think about doing sports and activities?	Not true at all	Not usually true	True	Very true
7. It doesn't take me long to learn new skills, sports or activities				
8. I think I have enough skills to participate in all the sports and activities I want				
9. I think being active is important for my health and well-being				
10. I think being active makes me happier				
11. I think I can take part in any sport/physical activity that I choose				
12. My body allows me to participate in any activity I choose				
13. I worry about trying a new sport or activity				
14. I understand the words that coaches and PE teachers use				
15. I'm confident when doing physical activities				
16. I can't wait to try new activities or sports				
17. I'm usually the best in my class at doing an activity				
18. I don't really need to practice my skills, I'm naturally good				

19. Reading and writing are very important	Do you agree or disagree with this statement?			
	Strongly disagree	Disagree	Agree	Strongly agree
In school				
At home with family				
With friends				

20. Math and numbers are very important	Do you agree or disagree with this statement?			
	Strongly disagree	Disagree	Agree	Strongly agree
In school				
At home with family				
With friends				

21. Movement, activities and sports are very important	Do you agree or disagree with this statement?			
	Strongly disagree	Disagree	Agree	Strongly agree
In school				
At home with family				
With friends				

22. My fitness is good enough to let me do all the activities I choose	Disagree	Agree

canadiansportforlife.ca
physicalliteracy.ca/PLAY

Appendix E

Pre-intervention survey

Questions taken from larger study and used in this research

DEMOGRAPHICS

1. What is your present age?
15-24 25-44 45-64 65+

2. Are you female or male? (Please mark X in one)
Female Male Prefer not to disclose Other

3. How many children do you work with in a typical week? _____

4. How many years of experience do you have as an Elementary School Teacher? _____

5. What are the age ranges of the children you interact with and number per week?
(Please mark X in appropriate boxes)
5-8 year olds # _____
9-10 # _____
11-12 # _____

6. Have you had previous training in the following areas? (If YES, check all that apply)
□ Physical Activity: (please describe) _____
□ Physical Literacy: (please describe) _____
□ Fundamental Movement Skills: (please describe) _____
□ Sedentary Behaviours: (please describe) _____

KNOWLEDGE AND CONFIDENCE

7. Circle the statement that best describes your KNOWLEDGE about the following areas.

	No knowledge	Very little knowledge	Some knowledge	Quite a bit of knowledge	A lot of knowledge
Locomotor skills	1	2	3	4	5
Manipulative skills (hitting, throwing)	1	2	3	4	5
Children's movement confidence	1	2	3	4	5
Balance and stability activities	1	2	3	4	5
Moderate to vigorous physical activity	1	2	3	4	5
Frequent short burst, intermittent activity	1	2	3	4	5
Children's motivation to move	1	2	3	4	5

8. Circle the statement that best describes your level of CONFIDENCE in your ability to program activities for children that promote/include:

	No confidence	Very little confidence	Some confidence	Quite a bit of confidence	A lot of confidence
Provide opportunities for exploration and free play	1	2	3	4	5
Adapt physical activities for different ages, abilities and cultures	1	2	3	4	5
Create an environment that promotes engaged physical activity	1	2	3	4	5

9. Circle the statement that best describes your level of CONFIDENCE in your ability to:

	No confidence	Very little confidence	Some confidence	Quite a bit of confidence	A lot of confidence
Provide opportunities for exploration and free play	1	2	3	4	5
Adapt physical activities for different ages and abilities	1	2	3	4	5
Create an environment that promotes physical activity	1	2	3	4	5

10. Do you feel you have the resources or tools needed to promote physical activity and physical literacy in your programming? *(Check the appropriate box)*

Yes, I have all the tools I need
No, I don't have
I have a few of the tools I need
I have some of the tools I need
I have most of the tools I need

Appendix F

Post-intervention survey

Questions taken from larger study and used in this research

MENTORSHIP EXPERIENCE

Choose the response that best represents your situation

1. Rate your overall level of satisfaction with the mentorship

1	2	3	4	5
Not Satisfied		Somewhat Satisfied		Extremely Satisfied

2. I felt comfortable working with the mentor

1	2	3	4	5
Not at all		Somewhat		Extremely

3. I felt my point of view and situation was acknowledged by the mentor

1	2	3	4	5
Not at all		Somewhat		A lot

KNOWLEDGE AND CONFIDENCE

4. I am confident I can apply the knowledge I learned through being mentored in my work or related activities.

1	2	3	4	5
Not at all		Somewhat		Very

5. The mentorship helped me construct solutions for my practical situation.

1	2	3	4	5
Not at all		Somewhat		A lot

6. I am confident that I can find resources that can assist with the implementation of Physical Literacy in my programming.

1	2	3	4	5
Not at all		Somewhat		Extremely Confident

7. After being mentored, how CONFIDENT are you that you can use what you learned to improve and sustain physical literacy concepts in your programming?

1	2	3	4	5
Not Confident		Somewhat Confident		Extremely Confident

8. Circle the statement that

best describes your level of CONFIDENCE in your ability to program activities for children that promote/include:

	No confidence	Very little confidence	Some confidence	Quite a bit of confidence	A lot of confidence
Locomotor skills	1	2	3	4	5
Manipulative skills (hitting, throwing)	1	2	3	4	5
Children's movement confidence	1	2	3	4	5
Balance and stability activities	1	2	3	4	5
Moderate to vigorous physical activity	1	2	3	4	5
Frequent short burst, intermittent activity	1	2	3	4	5
Children's motivation to move	1	2	3	4	5

9. Circle the statement that best describes your level of CONFIDENCE in your ability to:

	No confidence	Very little confidence	Some confidence	Quite a bit of confidence	A lot of confidence
Provide opportunities for exploration and free play	1	2	3	4	5
Adapt physical activities for different ages, abilities and cultures	1	2	3	4	5
Create an environment that promotes engaged physical activity	1	2	3	4	5

10. Do you feel you have the resources or tools needed to promote physical literacy in your programming? *(Check the appropriate box)*

Yes, I have all the tools I need
No, I don't have
I have a few of the tools I need

I have some of the tools I need
I have most of the tools I need

INTENTIONS

11. Circle the statement that best describes your level of INTENTION to integrate physical literacy principles into your programming over the next three months?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Over the next three months, I will use physical literacy principles to change my program activities	1	2	3	4	5
It will be difficult for me to include physical literacy principles in my programs	1	2	3	4	5
I am motivated to include physical literacy concepts over the next three months	1	2	3	4	5

12. What do think will make it easy for you to include the principles you learned through the physical literacy mentorship in your programming?

13. What do think will make it hard for you to include the principles you learned through the physical literacy mentorship in your programming?

Appendix G

Interview questions

Q. At the beginning of the mentoring intervention, what did you feel needed to be worked on?

Q. What were the areas of focus in the mentoring sessions?

Q. Describe any changes you made in your programming after participating in the mentoring initiative?

Q. What changes were easy to make?

Q. What changes were challenging?

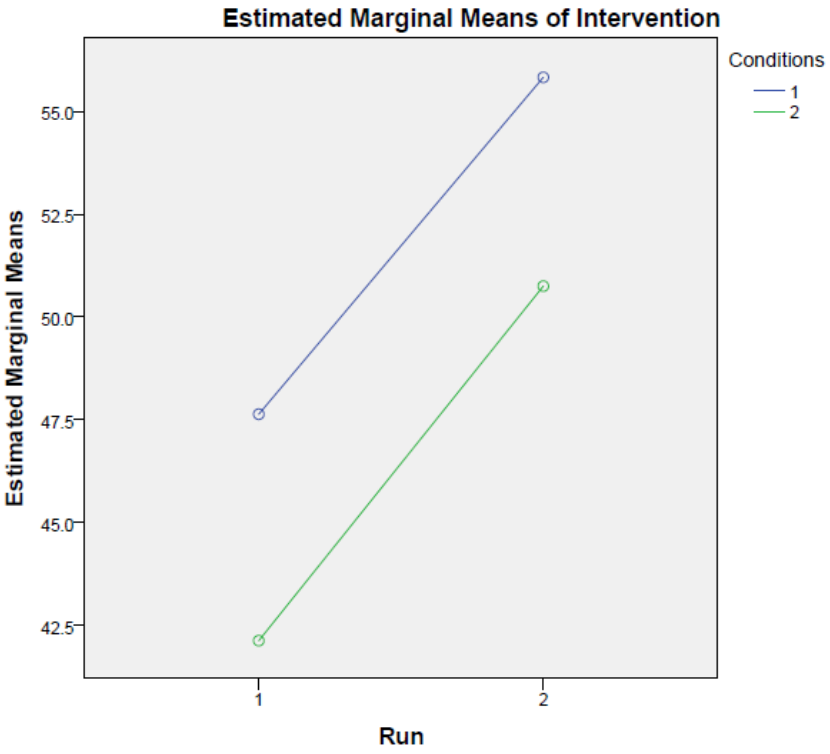
Q. What do you see as the benefits of participating in a mentoring initiative compared to other approaches like training workshops?

Q. What do you see as the challenges of participating in a mentoring initiative compared to other approaches like training workshops?

Q. In what way did mentoring connect you to the resources necessary to assist with the implementation of physical literacy principles in future programming?

Q. Any other comments or recommendations?

Appendix H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Conditions
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2
Estimated Marginal Means
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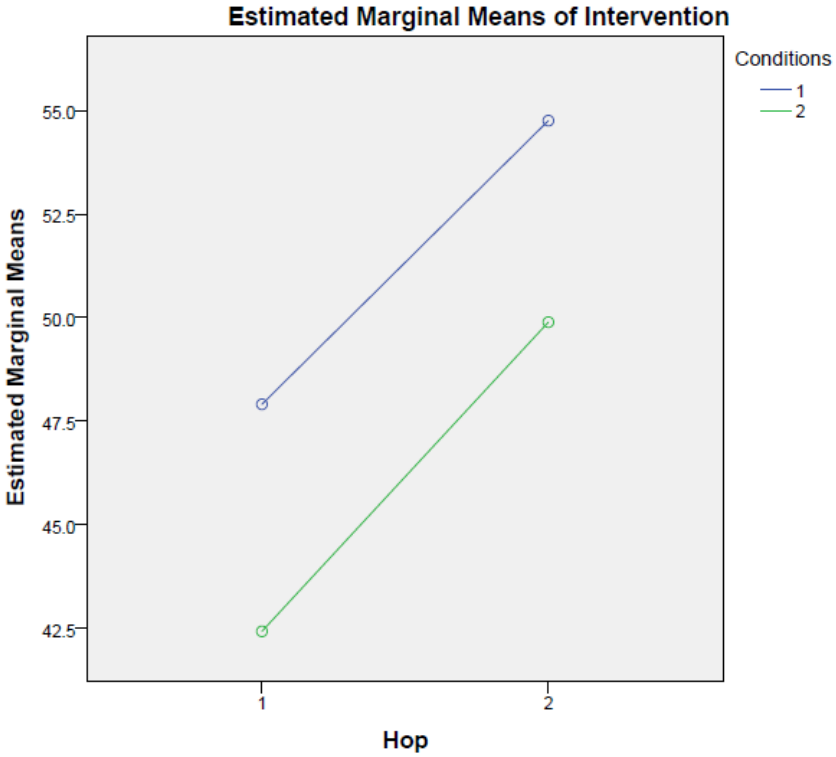
52.5
50.0
47.5
45.0
42.5
1
2
Run


Estimated Marginal Means of Intervention
Conditions
1
2
Estimated Marginal Means
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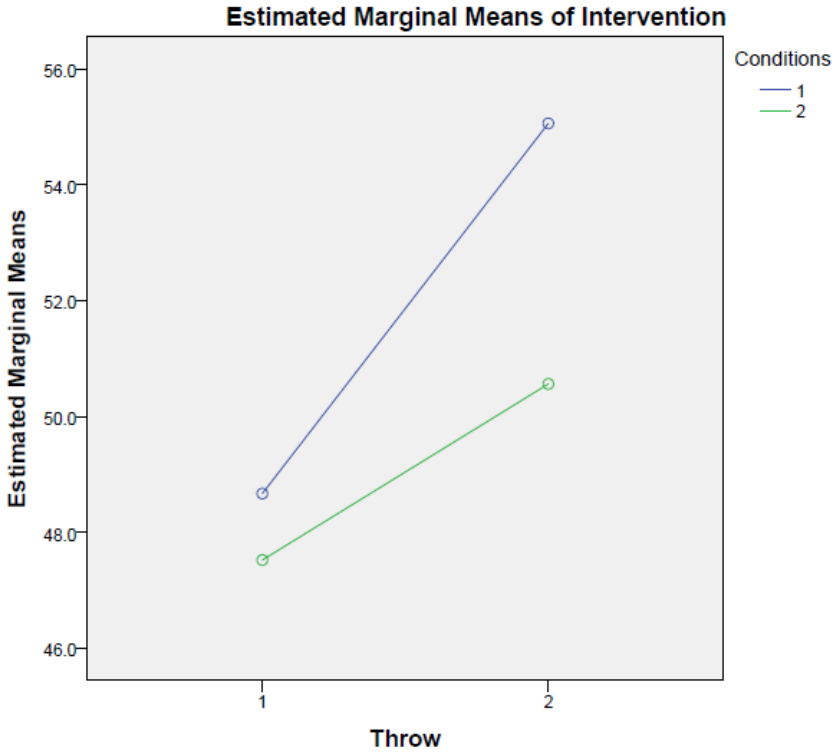
52.5
50.0
47.5
45.0
42.5
1
2
Hop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Conditions
1
2
Estimated Marginal Means
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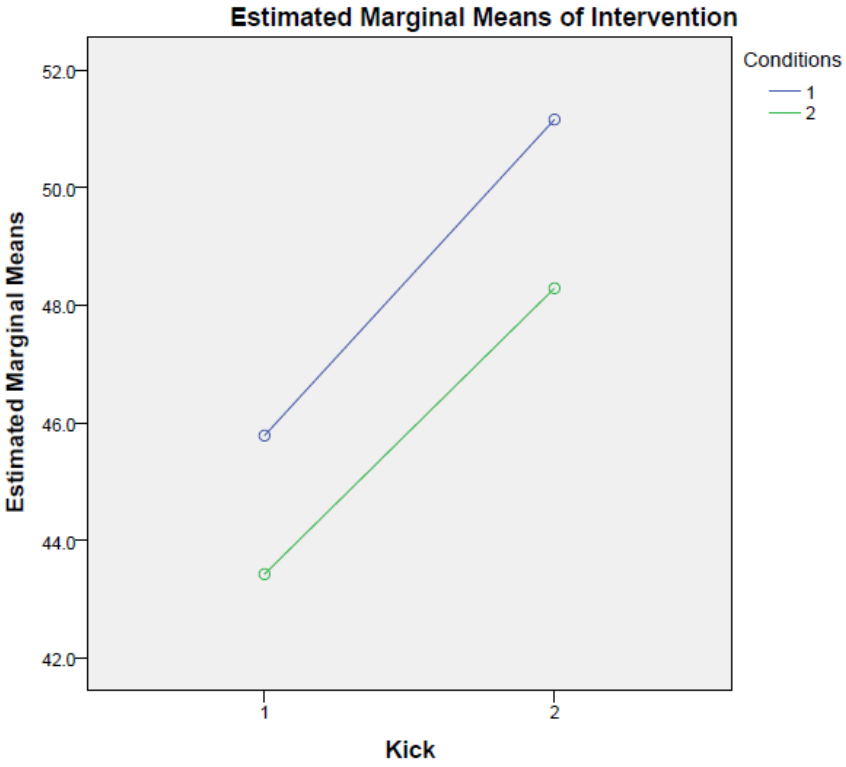
54.0
52.0
50.0
48.0
46.0
1
2
Throw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Conditions
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2
Estimated Marginal Means
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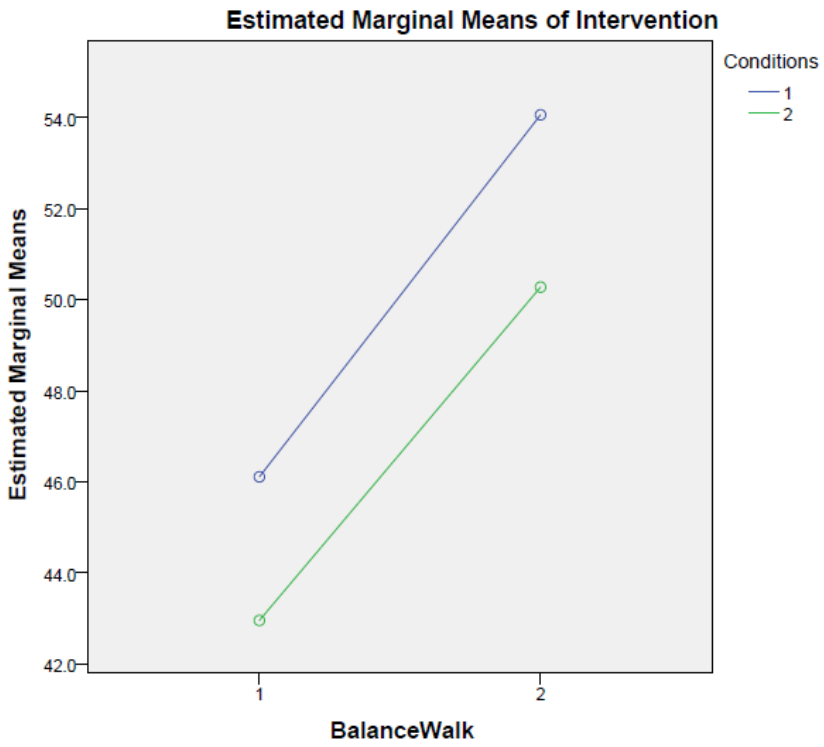
50.0
48.0
46.0
44.0
42.0
1
2
Kick


Estimated Marginal Means of Intervention
Conditions
1
2
Estimated Marginal Means
54.0
52.0
50.0
48.0
46.0
44.0
42.0
1
2
BalanceWalk