

The Feasibility and Potential Efficacy of a Physical Activity
Programme in Early Childhood Centres in Aotearoa, New
Zealand

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Table of Contents.....	ii-iv
Attestation of Authorship	v
Co-authored Works	vi-vii
Research Outputs	viii
List of Tables	ix
List of Figures	x
Acknowledgements	xi
Abstract	xii-xiii
Introduction	
Overview	xiv-xv
Thesis Organisation	xvii
Chapter 1 – Literature Review	
Background.....	1-2
Literature Review Approach.....	2
New Zealand	2-6
New Zealand Government Initiatives	6-8
Physical Activity Programmes	8-13
Participation in Early Childhood Education.....	13
Physical Activity in Early Childhood Education.....	13-15
Early Childhood Teachers/ Kaiako.....	15
Teacher Perceptions of Physical Activity.....	16-17
Teacher-Led Physical Activity.....	17-18
Physical Activity Policy.....	18-19
Fundamental Movement Skills.....	20
Conclusion.....	21-22

Chapter 2 – Teaching Practices, Self-Efficacy and the Physical Activity Environment in Aotearoa, New Zealand Early Childhood Education Centres.

Prelude.....	23
Abstract	24
Introduction	25-28
Methods	29-31
Results	31-33
Discussion	34-38
Conclusion	38

Chapter 3 – Movement-Active-Physical-Play (M.A.P.P)

Prelude.....	39
Refining Movement-Active-Physical-Play (M.A.P.P)	40-62
Introducing Movement-Active-Physical-Play (M.A.P.P)	63-69
Addendum.....	70-172

Chapter 4 – The Feasibility and Potential Efficacy of a Physical Activity Programme in New Zealand Early Childhood Centres: A Pilot Cluster-Randomised Controlled Trial

Prelude.....	173
Abstract	174
Introduction	175-176
Methods	176-181
Results	181-185
Discussion	185-187
Conclusion.....	187-188
Supplementary data.....	189-190

Chapter 5 – General Discussion

Summary.....	191-195
Significance of Findings	196-198
Limitations	198-199

Future Directions/ Implications	199-201
Conclusions	201
References	202-217
Appendix A: Ministry of Education consultation.....	218
Appendix B: Sport New Zealand consultation.....	219
Appendix C: Onward Consultants consultation.....	220
Appendix D: Māori parent/ Strength & Conditioning Coach consultation.....	221
Appendix E: Literature Review Tables.....	222-254
Appendix F: Ethics approval letter.....	255-256
Appendix G: Ethics amendment approval letter.....	257-258
Appendix H: Child participant information sheet and assent form (Chapter 4)	259-260
Appendix I: Participant information sheets (Chapter 2-4)	261-275
Appendix J: Participant consent forms (Chapter 2-4)	276-278
Appendix K: ECE-COMPASS questionnaire (Chapter 2)	279-280
Appendix L: MOVERS observation tool (Chapter 2)	281
Appendix M: ASPA conference poster (Chapter 2)	282
Appendix N: Clinical Trial Registration ACTRN12624000754549 (Chapter 4)	283

Attestation of Authorship

" I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning".

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Co-Authored Works

Chapters 2-4 of this thesis are comprised of manuscripts that are under review or published in a trade journal.

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Research Outputs

Listed below are the manuscripts submitted to peer-reviewed journals, trade journal publication and conference presentation that have resulted from this thesis.

Peer-reviewed submissions

Pirie, W., Gibbons, A., Duncan, S., Jones, R., Bruijns, B., Tucker, P., Harris, N. Teaching Practices, Self-Efficacy and the Physical Activity Environment in Aotearoa, New Zealand Early Childhood Education Centres. *Australasia Journal of Early Childhood*. In press..

Pirie, W., Duncan S., Gibbons, A., Jones, R., Stewart, T., Harris, N. Feasibility and potential efficacy of a physical activity programme in New Zealand Early Childhood Education: A pilot cluster-randomised controlled trial. *Australia and New Zealand Journal of Public Health*. Second Review.

Trade journal article

Pirie, W. (2024). Introducing Movement-Active-Physical-Play (M.A.P.P) Programme and Teaching Resource. Retrieved July 31, 2024, from <https://digitalpublications.online/waterfordpress/swings-roundabouts-winter-24/18/>

Conference Presentations

Pirie, W., Gibbons, A., Duncan, S., Jones, R., Bruijns, B., Tucker, P., Harris, N (2023). *The Physical activity environment in Aotearoa, New Zealand Early Childhood Education*. Poster presented at the Asia-Pacific Society for Physical Activity Conference, Wellington, New Zealand. Volume 7, Issue 4 Proceedings of the 2023 Annual Conference of Sport and Exercise Science New Zealand, pg. 18

Pirie, W., Duncan, S., Gibbons, A., Jones, R., Stewart, T., Harris, N (2025, June 11 - 14). *Feasibility and potential efficacy of a physical activity programme in New Zealand Early Childhood Education: A pilot cluster-randomised controlled trial*. [Oral presentation]. ISBNPA conference, Auckland, New Zealand.

List of Tables

Table 1.1 Early childhood teacher priorities in early childhood centres.....	4
Table 1.2 Physical nourishment in early childhood education space.....	8
Table 1.3 Physical activity programmes.....	9-13
Table 2.1. ECE and EC teacher demographic information	31
Table 2.2 ECE-COMPASS moderately confident scores, ECE-COMPASS and MOVERS content overlap.....	33
Table 3.1 Interview schedule of questions	44
Table 3.2 Study participant characteristics	45
Table 3.3 M.A.P. P characters and characteristics	39 & 66
Table 3.4 M.A.P. P professional development (week 1-3)	49-50
Table 3.5 M.A.P. P Motivator (Active Teacher) role.....	50
Table 3.6 M.A.P. P activities week	51-53
Table 3.7 M.A.P. P professional development week 1	67
Table 3.8 M.A.P. P Monday activity week 1	67-68
Table 4.1 Overall participant descriptives.....	177
Table 4.2 Child interview questions	180
Table 4.3 ECE leader/ teacher interview questions.....	181
Table 4.4 Baseline to postintervention physical activity results.....	182-183
Table 4.5 MOVERS baseline to follow-up results	183-184
Table 4.6 MOVERS Tool – M.A.P.P Professional Development.	190

List of Figures

Figure 1. Thesis organisation.....	xvii
Figure 3.1 M.A.P.P infographic.....	37
Figure 3.2 M.A.P.P back pack	57
Figure 3.3 ECE parent noticeboard	57
Figure 4.2. Flow of participants through the M.A.P.P study.....	189

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Abstract

Physical activity during the first five years of life is fundamental to the health and future well-being of children, and physical activity habits begin to develop in early childhood. The World Health Organisation Global Action Plan for Physical Activity (GAPPA) to reduce physical inactivity by 15% by 2030 recommends that children aged (3-5) years should engage in 180 minutes of total physical activity, including 60 minutes of moderate-to-vigorous intensity physical activity (MVPA) per day. However, children under five are not meeting these physical activity recommendations, evidently spending much of their day in sedentary behaviour.

Significantly, approximately 87% of New Zealand (NZ) children under five attend an early childhood setting such as a licensed early childhood education (ECE) centre, therefore this setting is a key stakeholder in the physical activity levels of children. Within this setting, studies suggest teachers serve as the primary daytime role models, but teachers report needing greater guidance on how to promote physical activity and reduce sedentary behaviour. Therefore, my study sought to determine the feasibility and potential efficacy of a teacher-led, online physical activity programme in ECE to improve child physical activity levels during the childcare day via teacher provision.

First, a cross-sectional study to determine teaching practices, self-efficacy and the physical activity environment in Aotearoa, New Zealand Early Childhood Education Centres was conducted. The Early Childhood Educator Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen Behaviours (ECE-COMPASS) questionnaire was delivered online. The quality of the ECE movement environment was assessed from 11-items that form four subscales and overall score of the Movement Environment Rating Scale (MOVERS) tool. In a sample of teachers ($n = 42$) results demonstrated above moderate ratings for task (7.2 ± 2.3 [mean $\pm$ SD]) and barrier (7.0 ± 2.5) self-efficacy (out of 10). The on-location environmental observation of ECE ($n = 6$) determined the structure and process quality (out of 7) of curriculum, environment and resources for physical development (4.0 ± 1.1), pedagogy for physical development (4.0 ± 0.4), supporting physical activity and critical thinking (3.8 ± 0.6), and parents/ carers and staff (4.0 ± 0.3) were adequate. Thus, teachers rate themselves as self-efficacious in delivering physical activity opportunities in ECE and the quality of the movement environment was adequate.

The determination of the ECE environment established the opportunity to develop and refine the physical activity intervention Movement-Active-Physical-Play (M.A.P.P) with ECE ($n = 2$) and teachers ($n = 4$) over a three-week period. The final version of M.A.P.P was introduced to the ECE community via an article in a trade journal and the final version utilised as the

intervention in the next component of the subsequent study in this thesis.

The impact of the 10-week physical activity programme M.A.P.P was examined in the pilot cluster-randomised controlled trial that took place in ECE ($n = 4$), two participating in the 10-week intervention and two control, maintaining standard physical activity practice. The sample of children ($n = 46$) aged 3-5 years was made up of 47.8% male and ethnically diverse, with 39.1% NZ European, 32.6% Māori, and 28.2% from other ethnicities. Teachers were 100% female, qualified and either fully or provisionally registered.

Potential efficacy was determined by quantitative (physical activity measures) outcomes for five days (9am to 3pm) at baseline and for five days following intervention (9am to 3pm). Axivity AX3 accelerometers attached to a wrist-worn strap were used. Results determined no overall intervention effect; however, a significant interaction effect was signaled in moderate-intensity physical activity ($P = 0.031$) and moderate-to-vigorous intensity physical activity ($P = 0.013$) where girls scores increased, and boys scores reduced.

The quality of the ECE movement environment was assessed from 11-items that form four subscales and overall score of the Movement Environment Rating Scale (MOVERS) at baseline and follow-up. Total scores increased for intervention (baseline 3.6; follow-up 4.3) and total score reduced for control (baseline 4.0; follow-up 3.9), however this was not statistically tested due to a small sample size.

Feasibility was determined with fidelity and acceptability assessments. Fidelity was determined by physical activity sessions delivered (80%) by teachers, professional development carried out (100%), and activity session observations revealed programme adherence. Acceptability was examined via semi-structured interviews with leaders, teachers and children, with interview data transcribed and thematically analysed. Children described M.A.P.P as enjoyable and fun, teachers and leaders reported M.A.P.P worked well.

This thesis contributed to research and practice alike to determine that a potentially sustainable and scalable physical activity programme was feasible and increased the physical activity levels of girls during the childcare day through ongoing teacher provision.

Introduction

Overview

Current global guidelines recommend that young children aged (3-5) years should engage in at least 180 minutes of physical activity including 60 minutes of moderate-to-vigorous intensity physical activity (MVPA) each day, made up of both structured and unstructured play (Mak et al., 2021; World Health Organization, 2021). To reduce inactivity in New Zealand (NZ) the Ministry of Health (MOH) has developed the Active Play initiative, which is based around the principles of sit less, move more, sleep well. Remarkably, approximately 50% of young children do not meet the recommended levels of physical activity during the childcare day, therefore spending 50% of their time in sedentary activities (Jones et al., 2019).

As such, to reach this cohort the Organisation for Economic Co-operation and Development (OECD) noted that an average of 71% of children access and participate in an early childhood education (ECE) setting across the globe (OECD, 2015). In NZ, approximately 87% of young children participate in ECE (Vaughn et al., 2021), thus ECE represents a setting of impact for a physical activity intervention. Due to the complex nature and variability of ECE settings in NZ, a Ministry of Education (MOE) licensed ECE centre was selected as the study location. This was also an environment that I was very familiar with, due to previously (2019) designing, building, owning and operating an MOE licensed ECE based on the philosophical cornerstones of belonging, movement, nature, and discovery education on two acres of wilderness. Designing and building both an indoor and outdoor environment to support physical activity opportunities for children and providing extensive professional development (PD) opportunities for teachers to create a place and space for children, whānau (family), Kaiako (teachers) and community to flourish underpinned my practice.

Creating this place and space was directly connected to what I had been observing anecdotally over many years, and literature confirmed that children were becoming more sedentary, some ECE do not have space and time for children to be physically active, and teachers lacked the self-efficacy to notice, recognise and respond to physical activity as learning.

I was fortunate that this experience provided me with in-depth knowledge of the challenges faced by ECE in terms of licensing criteria, where ECE in NZ are governed by MOE regulations in relation to indoor and outdoor space and teacher/child ratio which affect opportunities for physical activity (Ministry of Education, 2008a, 2008b). Additionally, Foley (2016) reported that teachers and leaders in ECE lack training in physical activity implementation, and according to Liggett et al. (2012) and Finch et al. (2016) there are a

lack of published studies to accurately measure moderate-to-vigorous intensity physical activity (MVPA) for children under five. Therefore, my focus was on connecting evidence to practice for quality physical activity experiences and positive health outcomes for young children via teacher provision.

Consequently, the outline of my doctorate involved a sequential process towards a coherent thesis seeking to contribute to evidence-based practice in ECE. First, I examined literature both globally and nationally. Second, I determined a cohort of NZ teachers' self-efficacy and teaching practice of physical activity in licensed ECE via self-reporting and determined the quality of the movement environment by independent observation through carrying out a cross-sectional study. Third, I developed and refined a potentially scalable and sustainable online physical activity programme, M.A.P.P. Developing this resource has been a work in progress over many years however the opportunity to refine M.A.P.P through a participatory process that included the end users, ECE, leaders and teachers provided invaluable insight and feedback to include in the final version of M.A.P.P. Finally, and the primary outcome of my study, I determined the feasibility and potential efficacy of M.A.P.P on child physical activity levels, and the quality of the ECE movement environment.

It is envisaged that findings from my study will assist in transferring evidence into practice by contributing to teacher training on physical activity behaviours, both in the formative years (undergraduate training) and ongoing PD.

Therefore, the aim of this thesis is to examine teacher self-efficacy, teacher practice and the physical activity environment in ECE in Hawkes Bay, NZ, and to determine the feasibility and potential efficacy of M.A.P.P.

Thesis Organisation

This thesis consists of five interrelated chapters, two of which have been submitted as scientific papers, and one published as an article in a trade journal. Figure 1 summarises the overall organisation of the thesis. A literature review for the thesis is presented in Chapter 1. The data for Chapter 2 were obtained from a cross-sectional study, made up of a teacher online questionnaire to self-report self-efficacy in physical activity during the childcare day and an independent observation of the quality of the ECE movement environment. These findings present a moment in time scope of ECE industry practice in NZ on which to determine a sample of teacher self-efficacy regarding physical activity behaviours and the quality of the ECE movement environment.

Chapter 3 is comprised of a pre-pilot with end-users to refine the physical activity intervention M.A.P.P to a final version. A trade journal article was also published to

introduce the final M.A.P.P programme to the ECE community in NZ.

Chapter 4 is made up of the final version of M.A.P.P that was utilised as the intervention to determine the primary outcome of my study. This outcome is to investigate the impact of M.A.P.P through a pilot cluster randomised-controlled trial on the physical activity levels of young children (n = 46) aged (3-5) years, across ECE (n = 4) during the childcare day. Chapter 4 of my study has also been retrospectively registered as a clinical trial, for more information please refer to ACTRN12624000754549. Finally, chapter 5 concludes with a general discussion.

Chapters 2-4 are made up of two scientific papers and one trade journal article, hence some duplication in the introductions. The general discussion in chapter 5 provides a summary of the main points in each chapter while noting the limitations and implications for future research. References are compiled at the conclusion of chapter 5 and in APA (7th) style throughout.

Figure 1. Thesis Organisation

Chapter 1 Introduction and Literature Review
Chapter 2 Teaching Practices, Self-Efficacy and the Physical Activity Environment in Aotearoa, New Zealand Early Childhood Education centres.
Chapter 3 Movement-Active-Physical-Play (M.A.P.P)
Chapter 4 The Feasibility and Potential Efficacy of a Physical Activity Programme in New Zealand Early Childhood Centres: A Pilot Cluster-Randomised Controlled Trial
Chapter 5 General Discussion

Chapter 1

Literature Review

Background

Over a quarter of the global population are insufficiently active, with a greater, and increasing prevalence of physical inactivity in high income countries (Mizdrak et al., 2021). The prevalence of childhood obesity increasing dramatically in recent years is '*one of the most serious public health challenges of the 21st century*' (World Health Organization, 2021). The World Health Organisation's Global Action Plan for Physical Activity (GAPPA) has set a target to reduce physical inactivity by 15% by 2030.

Physical inactivity caused 5.3 million deaths worldwide in 2008, and in 2016, the global prevalence of physical inactivity was at 27.5% (Bull et al., 2020). The mortality estimates for physical inactivity are similar to those observed for tobacco smoking. However, unlike tobacco control programmes, the promotion of physical activity globally has largely been unsuccessful due to poor coordination, ambiguous messaging, and a general absence of recognition of physical activity as a fundamental human right and public health priority (Hallal & Pratt, 2020).

So, how do we consider the health and sport framework in an educational setting when an estimated 42 million children globally under the age of five suffer from being overweight and obese (Coleman & Dymont, 2013)? Anthes (2020) maintains that being physically active has many benefits for children including reducing obesity risk, improving overall physical and mental health, fostering social and emotional development, all the while boosting academic performance.

In the context of the national, and international problem of physical inactivity, childhood obesity and its growing prevalence in young children, experts have identified early childhood education (ECE) as an ideal setting for early intervention in childhood obesity (Coe, 2020). However, many ECE struggle to successfully implement physical activity programs, particularly those organised and led by teachers, who were found to be less effective than external experts (Finch et al., 2016; Wicks et al., 2022). Further, the healthy weight environment of ECE influenced by the quality of foods served, the time children spend being physically active, caregiver/ teacher behaviours, and the presence of nutrition, wellness, and physical activity policies (Lyn et al., 2013).

Despite evidence of young children spending much of their time in sedentary activities, few physical activity interventions have focused on children under five years (Finch et al., 2016;

Howie et al., 2014; Okely et al., 2020; Simpson et al., 2023; Tucker et al., 2017). In addition, Bower et al. (2008) suggests that there is growing evidence supporting environmental determinants of physical activity behaviour such as nearly 50% of the variation in physical activity during ECE hours attributed to the ECE setting and Estevan et al. (2021) provides further confirmation that global data demonstrates few children are achieving the recommended sufficient levels of physical activity, with rates of participation declining each year across childhood and adolescence (Bourke et al., 2023; Jerebine et al., 2024; World Health Organization, 2019). A further consideration suggested by Brown and Kaye (2017) is that the rigors of the regulatory and licensing environment of ECE impact physical activity delivery to children. Immediate action is required to change behaviour.

Literature Review Approach

As the concept of my study was developed into a conceptual framework it was underpinned by social cognitive theory and focused on the personal, behavioral and environmental factors that influence physical activity participation in ECE (Bandura, 1986). To contribute to the concept and design of my study initial discussions were held with stakeholders such as representatives from the Ministry of Education, Sport New Zealand, an education consultant and an indigenous parent, the feedback from these discussions can be found in Appendix A, B, C and D. A narrative literature review was selected as being particularly useful in my field of young child physical activity during the childcare day as the literature is diverse, complex, evolving and a holistic approach is needed to make sense of the research landscape. This review was carried out to provide a comprehensive summary and analysis of the current research. A narrative literature review approach is more flexible than a systematic review approach allowing for a broader and more interpretive discussion of literature (Baker, 2016). However, a systematic approach was taken to identify trends and gaps. Given the evolving work in this field, liberal criteria were used that allowed for inclusion of studies with diverse outcomes such as (physical activity, early childhood education, early childhood teachers) and a variety of research designs (randomised controlled trials, reviews, descriptive studies, longitudinal studies). These literature tables can be found in Appendix E.

New Zealand

The worsening of scores in NZ's Report Card on physical activity for Children and Youth aged (5–18) years from 2014 to 2018 is concerning (Maddison et al., 2014; Maddison et al., 2016; Smith et al., 2018). However, 2022 shows an improvement with a smaller proportion of girls meeting the threshold than boys or children and youth of another gender (Wilson et al., 2023).

2014 **B (61% - 81%)** of children and youth are carrying out sufficient levels of physical activity, however, high sedentary behaviour was noted.

2016 **B- (40% - 60%)**, with one third of NZ children and youth not meeting the recommendation of more than 60 minutes physical activity per day

2018 **D- (less than 20%)** of children and youth are carrying out sufficient levels of physical activity. These reports show low levels of physical activity and high levels of screen time.

2022 **C+ (58.1%)** of children and youth physical are carrying out 420 min/week of moderate-to-vigorous intensity physical activity.

McLachlan et al. (2017) argue that NZ's standing in child health has been slipping dramatically over recent years. They highlighted the 2009 report by the Organisation for Economic Co-operation and Development (OECD) *Doing Better for Children* where NZ ranked 29th out of 30 OECD countries and suggested that NZ needs a stronger policy focus on child health during the early years when it is potentially simpler to make a difference (OECD, 2015). Gath et al. (2023) report children who spent more time on screens throughout early childhood (age 9 months through age 5 years) scored lower on measures of language and educational ability and higher on a parent-reported measure of peer problems. Children with high levels of screen exposure were less likely to be engaging in more socially and sensory-rich types of childhood activities (Gath et al., 2023). Consequently, interventions for children and youth to encourage physical activity, active transport, active play and family and peer support, and to reduce screen time need engagement now.

In a parent-reported item about how four-year-old children in NZ choose to spend their free time (n = 1568, 26%) chose to do active things whereas (n = 1859, 30%) regularly chose inactive things (Butler et al., 2021). The remainder (n = 2725, 44%) were just as likely to choose an active as inactive thing to do. This investigation further suggests that being healthy in the early years period generally sets children up for wellbeing across their life course. Worryingly, Ali, McLachlan, McLaughlin, et al. (2021) describes children aged (3-5) years as primarily inactive (78.3%) of the time during the childcare day in NZ.

In a report by Mizdrak et al. (2021), modelling projects the health and economic gains that would be attained if NZ were to meet the World Health Organisation GAPPA action plan, which set the target of a 15% reduction in physical inactivity by 2030, i.e., 15% increase in physical activity. Mizdrak et al. (2021) developed two different approaches by which NZ could reach the target:

“(1) an equal shift approach where physical activity increases by the same absolute amount for everyone; (2) a proportional shift approach where physical activity increases proportionally to current activity levels.”

While significant gains would be made using either approach (the first being the ideal), a key point is that different population-level approaches to increasing physical activity have differing impacts on health gains and healthcare system costs. Approaches that are equally effective at increasing activity across the entire population are likely to bring greater health improvements than approaches that are more effective among the already active. Further, there is general agreement that being healthy in the early years generally sets children up for wellbeing across their life course (World Health Organization, 2019).

In the context of physical inactivity and its growing prevalence in young children, experts have confirmed ECE as a setting of impact for early intervention to improve physical activity behaviours and positive outcomes for young children (Coe, 2020). Within ECE, the NZ early years bi-cultural curriculum known as Te Whāriki considers aspirations for all children to grow up as competent and confident learners and communicators, healthy in mind, body and spirit with the knowledge that they make a valuable contribution to society (Braithwaite, 2014; Ministry of Education, 2017b). However, teachers juggle priorities in daily practice that are governed by various agencies, as identified in Table 1.1.

Table 1.1: Early childhood teacher priorities in ECE.

Ministry of Education (MOE)	Ministry of Health (MOH)	Teaching Council	Education Review Office (ERO)	ECE Philosophy
Te Whāriki Curriculum (Ministry of Education, 2017b)	Active Play initiative (Ministry of Health, 2017a)	Teacher Registration (Teaching Council of Aotearoa New Zealand)	Quality framework for evaluation and improvement in ECE (Education Review Office)	Physical Activity policy
He Māpuna te Tamaiti (Ministry of Education, 2019a)				
National Education and Learning Priorities (NELP) (Ministry of Education, 2020b)				

These competing priorities are underpinned by the Te Whāriki curriculum framework, which

is organised in terms of four fundamental principles, empowerment; whakamana, holistic development; kotahitanga, family and communication; whānau tangata and relationships; ngā hongonga, interwoven in the principles are five strands with associated goals and learning outcomes (Ministry of Education, 2017a). He Māpuna te Tamaiti (a child is a mother) is a resource designed for teachers in ECE to promote proactive, intentional approaches to supporting the development of children's social and emotional competence and the National Education and Learning Priorities (NELP) set out the Government's priorities for education that will ensure the success and wellbeing of all learners (Ministry of Education, 2019a, 2020b).

Sitting less, moving more, and sleeping well are important for healthy weight gain, mental health, behaviour, improved movement, competence skills and brain development including communication skills, higher emotional and social functioning, and the ability to make good decisions. It is vital for the development of physical movement skills that will provide a platform for learning more complicated skills in the future (Ministry of Health, 2017a).

The Teaching Council has developed a set of values which underpin the code of professional responsibility and standards for the teaching profession. These values, code and standards are core attributes of the role of a teacher in NZ (Education Council New Zealand, 2017). The Education Review Office (ERO) evaluates and reports publicly on the quality and effectiveness of education provided in ECE (Education Review Office).

NZ has a reputation for being a world leader in early childhood education, built on the development of innovative policies, high participation rates, high levels of teacher education, and the implementation of a national curriculum Te Whāriki (Blaiklock, 2010). However, Blaiklock (2017) suggest there is no support for the 'world leading' claims, as this reputation may lead to complacency in early childhood education and a lack of willingness towards making evidence-based changes that could improve the wellbeing and learning of young children. Further, in a compelling article Gibbons (2015) discussed child health as woven into the strands and principles of Te Whāriki, however reflecting on whether health is a marginal consideration in the curriculum considering the poverty of health information and tensions between education and health. In addition, Oliver et al. (2007) discusses the opportunity for collaborative link between health and education providers, and physical activity and health researchers to promote consistent physical activity messages as there is limited information regarding the activity profiles of early years children.

Within an ECE, teacher practice, and learning outcomes for children are guided by Te Whāriki which meets the social/ emotional, cognitive and physical elements of child development feature. Worryingly, teachers report needing greater guidance on how to promote physical

activity, manage appropriate levels of sedentary behaviour and reduce long periods of sitting (Ministry of Education, 2017b; World Health Organization, 2021). Additionally, teachers' physical activity knowledge and teaching practices influence young children's early uptake of physical activity behaviours in childcare settings, and they serve as important daytime role models (Tonge et al., 2016). Notably, Aadland et al. (2020) found that there is a lack of high-quality evidence on effective, sustainable and scalable interventions to increase physical activity levels for young children during the childcare day.

ECE in NZ are governed, regulated and licensed by the MOE. To operate as a licensed ECE in NZ, minimum MOE standards, licensing criteria and regulations must be met. (Ministry of Education, 2008a, 2008b). These relate to teacher-child ratios, space for children to move, health & safety, and delivery of the legislated curriculum Te Whāriki, where teachers are responsible for decision making about curriculum opportunities such as physical activity (Ministry of Education, 2017). Of interest, 50% of the variation in physical activity during ECE hours is attributed to the ECE setting, supporting evidence that environmental determinates of physical activity behaviour are important (Estevan et al., 2021).

Often PD for teachers is carried out after work hours or at the weekends due to meeting regulations during licensed hours, and teacher non-contact time is not regulated but is at the discretion of ECE leadership. New thinking and success around e-Learning PD delivery such as a recent study in Canada (Bourke et al., 2024), tested the impact of an online four-week professional learning programme TEACH e-Learning, which was found to be efficacious at improving all the examined outcomes, self-efficacy, knowledge, intentions, and perceived behavioral control.

Regardless of PD for teachers, physical activity curriculum opportunities may be constrained by management decisions, fear, perception of risk, litigation, lack of knowledge or strong discourses about the types of physical activity that could and should be offered to children (McLachlan et al., 2017; Razak et al., 2020). Further potential limiting factors may be linked to the physical size of the ECE space for children to move. Licensed ECE minimum indoor space is 2.5 m² per child, and the outdoor space is 5 m² per child (Education Early Childhood Services Regulations 2008 schedule 4). Therefore, the ECE environment and teacher self-efficacy and practice in promoting physical activity behaviours during the childcare day may impact child physical activity levels.

New Zealand Government Initiatives

To achieve the World Health Organisation GAPPA action plan target of a 15% reduction in physical inactivity by 2030, a 24-hour physical activity, sedentary behaviour, and sleep guideline for children under 5 years of age was developed (Willumsen & Bull, 2020; World

Health Organization, 2019). It states that children aged (3-5) years should, in a 24-hour period:

- Spend at least 180 minutes in physical activity
- Spend at least 60 of those minutes in moderate-to-vigorous intensity physical activity
- Limit sedentary screen time to no more than 60 minutes
- Achieve good quality sleep for 10–13 hours

In response to this action plan the MOH developed Active Play recommendations for children birth to five years in NZ (Ministry of Health, 2017a). Active Play is made up of three components; sit less, move more and sleep well. From birth to five years children develop and move most through their play. Active play encourages this development and helps children to develop the skills to be active throughout their lives (Dutton, 2017).

The Active Play for Under 5 Guidelines 4.11, in relation to the NZ Health Strategy states that ECE is to ensure that physical activity is incorporated into daily routine and curriculum in formal childcare settings or institutions (Dutton, 2017). However, Oliver et al. (2007) reviewed NZ literature of physical activity within ECE which indicated rising obesity levels and high TV watching was associated with fatness. They also concluded that the quality of the ECE impact physical activity, parental physical activity correlation with child physical activity, boys are more active than girls and physical activity is associated with time spent outdoors.

The physical literacy approach by Sport NZ emphasises that play is the foundation of physical literacy for children (Laurie, 2019). Play is defined by Sport New Zealand as:

“Play is intrinsically motivated, spontaneous and will happen anywhere, personally directed – it has limited or no adult involvement, freely chosen – it is self-determined and has no pre-determined outcome, fun, accessible, challenging, social and repeatable”.

Concerningly, nowhere in this Sport NZ document definition of play is there mention of being physically active, and as we move into the digital age and live through pandemics, Goodyear et al. (2021) commented that the influence and approach of online physical activity programmes may hold a critical role for effective delivery of physical activity in an educational setting.

Physical activity guidelines for young children include both structured and unstructured activities of various intensities, limitations on sedentary behaviors, fundamental motor skill competence, and the inclusion of caregivers to facilitate activity (Ward et al., 2015). Notably, these physical activity guidelines in ECE do not distinguish between physical activity and

MVPA, children do not attain or sustain high levels of physical activity for extended periods and overall there is an insufficient degree of any level of physical activity in ECE (Andersen et al., 2020).

Physical nourishment, such as physical activity is defined in multiple ways by education, health and sport agencies as shown in Table 1.2 (Caspersen et al., 1985; Piggin, 2020). These multiple definitions create challenges and confusion for teachers regarding what they are implementing in their ECE based on their existing body of knowledge and experience. Furthermore, Te Whāriki does not use the word ‘play’ when referring to learning outcomes for physical activity (Foley, 2016). Table 1.2 presents physical nourishment descriptions in ECE.

Table 1.2: Physical nourishment descriptions in ECE.

Movement	An act of moving.
Active Movement	Regular physical activity
Active Play	Moving more, sitting less, sleeping well
Physical activity	Any body movement produced by skeletal muscles that require energy expenditure
Physical Fitness	A state of health and wellbeing
Motor Competency	Gross movements that involve large muscle groups
Fundamental Movement Skills	Gross movement abilities that allow children to move in different ways
Physical Literacy	A combination of motivation, confidence, and competence to be active
Physical Education	Education through the physical
Sport	An activity involving physical exertion and skill in which an individual or team competes against another or others

Physical Activity Programmes

Internationally and nationally, there are many physical activity programmes, interventions, and Government initiatives. The vast majority have an external provider and requisite on-going resourcing, such as in Queensland, Australia, Eat Well, Be Active—Healthy Kids for Life which states that health and wellbeing underpin the economic, social, and cultural structures of society and contribute to the prosperity and growth of the whole community (Leow et al., 2014). In contrast, the Kids Active programme in Ireland was developed with the aim of

increasing physical activity and fundamental movement skills (FMS) levels of children in preschool services through training educators to encourage active play opportunities (Razak et al., 2020).

Many of these physical activity programme interventions across the globe and in NZ have either been specifically developed for ECE or simply adapted from a school age-appropriate programme for younger children, such as Sports, Play and Active Recreation for Kids (SPARK), ECE version (Alhassan et al., 2013), and Supporting Physical Activity in the Childcare Environment (SPACE), (Tucker et al., 2017). Several systematic reviews have been inconclusive in showing that ECE interventions are effective in increasing physical activity levels among children during the childcare day (Finch et al., 2016; Metcalf et al., 2012). This may be due to poor study quality, and low levels of implementation fidelity, especially when interventions are being delivered by ECE teachers (Ward et al., 2010; Wicks et al., 2022). Additionally, external provision of programmes might be perceived as an expedient option for busy teachers, but a lack of alignment to the curriculum paradoxically also disenfranchises teachers and may negatively influence curriculum achievement objectives (Harris et al., 2021).

A positive collaboration between external providers with content specific knowledge working in partnership with teachers to develop and deliver a curriculum inclusive programme is arguably more likely to be permanently implemented (Dyson et al., 2018). Furthermore, to ensure scalability strategies to underscore the importance of physical activity in children and address any misperceptions that children are currently sufficiently active in care are therefore likely to be an important part of efforts to scale up such interventions (Grady et al., 2024). Table 1.3 presents physical activity programmes in both ECE and primary school settings globally that provide an intervention to increase child physical activity levels.

Table 1.3: Physical activity programmes

Physical Literacy in the Early Years (PLEY) (Houser et al., 2019)	Canada	Ministry of Sport	Curriculum tools Loose parts kit Teacher full-day professional learning Teacher mentoring
Healthy Living Habits in Preschool Children	Canada	Health Link British Columbia	Advice for building good, lifelong habits in four areas:

(Healthy Habits) (Jakobovich et al., 2023)			1. Healthy eating. 2. Regular physical activity. 3. Staying safe and healthy. 4. Healthy thinking.
Jumping Beans (McLachlan et al., 2017)	New Zealand	Private	Curriculum tools Music and movement programme
Healthy Me, Healthy We (Neelon et al., 2016)	North Carolina USA	Health	Curriculum tools Physical activity and nutrition framework and policies
Active Movement (Sport New Zealand, 2006)	New Zealand	Sport NZ	Curriculum tools 15 brochures in English and Te Reo Māori, paper and electronic versions
Active Play (Dutton, 2017)	New Zealand	Ministry of Health	Curriculum tools Framework and recommendations for sit less, move more, sleep well
Jump Start (Okely et al., 2020)	Australia	Private Company	Curriculum tools
Project Energize (Rush et al., 2016)	New Zealand	Sport Waikato	Curriculum tools Physical activity and Nutrition and PLD framework
Smart State, Healthy Weight (Leow et al., 2014)	Australia	Government Initiative	Curriculum tools Physical activity and Nutrition framework
Wriggle & Rhyme	New Zealand	Library	Curriculum tools Music and movement session
Sydney Playground Project (Bundy, 2009)	Australia	University Research	Curriculum tools Loose parts in the playground, teacher PLD on re-framing risk
Kids Active (Duff et al., 2019)	Ireland	Government Initiative	Curriculum tools Frameworks and recommendations
Supporting Physical Activity in the Childcare Environment (SPACE)	Canada	Government Initiative	Curriculum tools Portable play equipment Staff professional learning

(Tucker et al., 2017)			Modified outdoor playtime.
Sports, Play and Active Recreation for Kids (SPARK) (Alhassan et al., 2013)	USA	PE classes 3 times/week in school to promote PA (15 mins) and teach exercise skills (15 mins)	Specialist led, teacher led, standard practice. Progression: Intensity Duration Complexity
Healthy Active Pre-school and Primary Years Study (HAPPY) (Hinkley et al., 2020)	Australia (Deakin University)	Longitudinal Research Initiative 3-5 years 6 – 8 years 9-11 years	ECE Policy ECE environments Neighborhood Characteristics Home environments Social Factors Parental Influencers 85% of children spent waking time sedentary (sitting or standing still) 2.5% were meeting national guidelines of 3 hours physical activity/ day. 63% exceeded the guidelines of 1-hour screen time/ day.
Active Learning Norwegian Preschool(er)s (ACTNOW) – Design of a Cluster Randomized Controlled Trial of Staff Professional Development to Promote Physical Activity, Motor Skills, and Cognition in Preschoolers (Aadland et al., 2020)	Western Norway University of Applied Sciences, Bergen	Norway 2019-2022 Two arm RCT with 7 and 18-month follow-ups 60 preschools 1200 (3-5) year old children	7-month PLD/ education module for preschool staff Child level PA, physical fitness, adiposity, motor skills, socioemotional health, self-regulation, executive functioning, learning Preschool level Implementation Adaptation processes

Training pre-service early childhood educators in physical activity (TEACH) (Bourke et al., 2024)	Western University Canada	Research Initiative 209 Educators	Online 4-module, 5-hour e-Learning course. Module 1. Introduction to physical activity and sedentary behaviours in early childhood Module 2. Factors influencing physical activity and sedentary time in the childcare environment, the importance of outdoor play, and how to encourage risky play. Module 3. Strategies to promote physical activity and reduce sedentary time in childcare, such as goal setting and programming structured activities. Module 4. Additional PLD and resource library
Transform-Us! transformus@deakin.edu.au	Australia (Deakin University) 2.5 years	Research Initiative 20 Primary Schools 220 Teachers 1600 children and parents	Teachers were provided with PLD to run physical activity sessions & reduce sedentary behaviours. Lessons focused on raising awareness, self-monitoring, goal setting, social support, active homework with parents. Active curriculum strategies (standing lessons, short active breaks.

			Schools were provided with line markings, signage, sport & circus activity to encourage physical activity in recess and lunch. Physical activity significantly increased, recess and lunch 33 minutes/ week. Sitting time reduced by 196 minutes/ week. Low cost – average \$30.08/ child, (.08 child/day).
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Participation in Early Childhood Education

We know that education now begins for most children well before they are five. Enrolment in ECE continues to rise, and ECE are where young children spend many of their waking hours, both in NZ and globally, with the OECD average at 71% (OECD, 2015). Approximately 87% of NZ children aged (3-5) years access and participate in ECE, well above the OECD average, identifying an opportunity to provide quality physical activity experiences for young children in a licensed teacher- led ECE in NZ.

Physical Activity in Early Childhood Education

Specific actions call for the strengthening of physical activity opportunities in pre-primary education institutions, and for the strengthening of policy frameworks, governance systems and leadership to support implementation of actions to increase physical activity and reduce sedentary behaviours for all ages (World Health Organization, 2019). Thus, ECE plays a significant role as a key stakeholder in children's daily physical activity opportunities and participation. Yet aside from recess or free time, physical activity is often not recognised as integral to the curriculum because ECE often see this time as taking away from instructional time (Carroll et al., 2021).

Some years ago, Wurdinger (1996) stressed the idea that knowledge is not static or readymade and requires children and teachers to construct their own meaning from their own experiences. Consequently, to enrich children's knowledge in relation to movement we need to provide children with varied experiences and opportunities for physical activity, both

structured and unstructured. Wurdiner (1996) goes on to state that fun is an important element in the learning process for both children and teachers, and effective facilitation is more apt to occur when teachers can be spontaneous and can laugh at themselves. Additional factors associated with physical activity levels within ECE include the influence of caregivers, environment, outdoor play, motor skill development and competence (Coe, 2020). Oliver et al. (2007) and Ali, McLachlan, McLaughlin, et al. (2021) agree with this and comment that significant differences in physical activity can already be observed in children younger than five years, reporting a positive relationship between quality of the ECE setting, rigid playground regulations, male sex, full term birth, outdoor play time and the family and neighborhood environment. Confirming boys are typically more active than girls and the quality of the ECE movement environment, teacher knowledge, experience and confidence in physical activity delivery impact physical activity opportunities for children during the childcare day (Tonge et al., 2020; Tonge et al., 2021; Tonge et al., 2017).

Importantly, physical activity is an essential thread in Te Whāriki curriculum as it describes children's ability to make sense of experiences as working theories whereby physically active experiences provide the opportunity for children to evolve ideas and understandings using their existing knowledge to try and make sense of new experiences (May & Carr, 1997; Ministry of Education, 2017a). Braithwaite (2014) comments that in the context of the exploration strand of Te Whāriki, Kei Tua O Te Pai (behind the good), children will achieve a range of milestones on their way to gaining control over their bodies and highlight the motivation and curiosity associated with physical explorations which in turn develops a positive identity as a learner (Ministry of Education, 2004).

While taking part in physical activity children are having to experientially learn social norms such as turn taking, transitions and routines of conversations; these skills can be developed through a collaborative-play approach where children's interests can then promote active learning and engagement through active play (Taylor & Boyer, 2020). In Te Whāriki, Ministry of Education (2017a), the curriculum states that

“When children have chosen their own activities, or when they have come to “own” an activity or find personal meaning in it, they are more likely to be closely involved in the activity and to ask and follow up on their own questions or questions that interest them”.

Taylor and Boyer (2020) phrase play-based learning as adult guided collaborative-play that transpires as a middle ground on the play continuum between free play and direct instruction. Children still have the freedom and choice to direct their own play, however the teacher's role is then to facilitate conversation, play along, offer questions to consider different perspectives,

and provide ways in which to continue the play or how to use available materials to extend the play.

The quality of ECE movement environments impact both physical activity opportunities and delivery. Tonge et al. (2020) state that outdoor environments are important for children's physical activity levels and have the potential to be a valuable space for learning. In support of this view Sumiya and Nonaka (2021) found that the spatial layout of the playground affects the pattern of play and increases the physical activity levels of young children. Features of play spaces, both inside and out, are influenced not only by regulations but also types of play equipment available and size. Ajoke et al. (2019) argue these have been linked to physical activity levels and a variety of play behaviours among pre-school children. Further, Wishart and Rouse (2019), comment that providing space for children to move, both indoors and outdoors is also an important factor impacting on delivery of quality physical activity experiences for children.

Over time, teacher-led physical activity interventions in ECE have shown mixed results with most interventions only reporting moderate effects on physical activity outcomes, with limited sustainability (Finch et al., 2016; Wicks et al., 2022) . Several factors may be contributing to these modest changes, such as study duration, length of follow up, intervention approach and level of intervention fidelity (Strooband et al., 2018). Given the combination of ECE contexts being noteworthy sites of impact, and the escalating attendance of children in ECE, it makes sense that strategic approaches are focused on supporting teachers, and key stakeholders for young children (Brown et al., 2023). According to Kurka et al. (2015), ECE is a key stakeholder where children frequently spend time and are potential influencers on their physical activity and sedentary behaviour. Furthermore, targeting the childcare environment to support the physical activity levels of young children, particularly higher-intensity energetic play so that physical health and mental wellbeing of this population may be positively affected (Driediger et al., 2018).

Early Childhood Teachers/ Kaiako

The role of a qualified, provisional, or fully registered ECE teacher in NZ is varied and governed by the MOE, Te Whāriki curriculum, Teaching Council and ECE centre philosophy they work in (Ministry of Education, 2017b, 2020a; Teaching Council of Aotearoa New Zealand). The Ministry of Education (2017) states the role of the teacher is to plan, prepare and present lessons, teach a wide range of subjects such as arts, English, maths and science, keep up to date with curriculum changes, assessment methods, assess and record learning and development of each child. Furthermore, teachers delivering quality physical activity in ECE plays a key role in identity formation for children (Braithwaite, 2014). Te Whāriki

clarifies the roles and responsibilities of teachers, emphasizing the need for collaborative approaches, critical enquiry and reflection, and the use of evidence to inform practice. It also highlights the important role of intentional teaching in supporting and promoting learning (He Māpuna te Tamaiti, pg20).

The Teaching Council of Aotearoa, NZ is a professional body for teachers. The Teaching Council's purpose is to ensure safe and high-quality leadership, teaching and learning for children and young people and to protect the safety of children and high quality of teacher practice by ensuring teachers continue their professional learning and maintain and enhance their competence to practice (Education Council New Zealand, 2017).

Each ECE has its own philosophy, values and cornerstones that are influenced by the Education Review Office (ERO) statement and compliance model, *what matters here* and *what matters most*. This includes evidenced connections to children, family (whānau) and community (Education Review Office).

Previous research has addressed levels of physical activity and correlates of physical activity in young children, but the physical activity behaviours and characteristics of teachers and the associations between children and teachers' physical activity, are rarely investigated (Finch et al., 2016). Studies carried out by Nilsen et al. (2023) and Tonge et al. (2021) report that teacher and child physical activity during the childcare day are related, and increasing teachers' physical activity, of at least moderate intensity, may favorably influence children's physical activity levels. Additionally, Coleman and Dymont (2013) described how teachers recognised that a lack of PD in delivering physical activity limited their confidence and ability.

Teacher Perceptions of Physical Activity

Interestingly, focus groups carried out by J. Gehris et al. (2015) to determine teachers' perceptions about children's movement and learning in ECE had four major themes: how movement influences learning; what types of movement experiences are most beneficial for children, and what settings best support children's movement and challenges related to children's movement. These findings concluded that more PD for teachers on physical activity is required. Teacher perceptions of physical activity behaviours may create a barrier to utilising the outdoors and may impact physical activity delivery in ECE (J. Gehris et al., 2015). As such, children are conditioned to remain calm and often cautioned for engaging in too much activity or being too loud whilst indoors (Alhassan et al., 2016). Remarkably, teachers perceive physical activity not to be an issue, potentially due to the misconception

that 'children are active and full of energy' (Grady et al., 2024). To clarify this further Coleman and Dymont (2013) indicate that teachers' positive perceptions of children's physical activity may be indirectly affecting the provision of physical activity opportunities in childcare, when children are in fact nearly 50% of the time engaged in sedentary behaviours. Taylor and Boyer (2020) confirmed that teachers personal belief systems influenced how play was implemented, the purpose of play and their conception of their role during play throughout the childcare day.

Teacher-Led Physical Activity

In contrast to a systematic review and meta-analysis carried out by Finch et al. (2016) teacher-led physical activity sessions have been determined as an effective way to promote high levels of physical activity in children aged (3-6) years (Duff et al., 2019). Carroll et al. (2021) agrees, stating that a teacher-led ECE physical activity intervention is a feasible approach to acutely benefit children's physical activity behaviours. However, according to Wright et al. (2020) there is a gap in physical literacy (PL) orientated PD for generalist teachers and thus their capacity to develop PL and maximize student health is potentially limited. Coleman and Dymont (2013) agree that teacher knowledge and skills in delivering physical activity may be limited due to lack of PD and limited teacher knowledge on formative assessment practices that help illuminate and illustrate children's learning in and through physical activity. Therefore, the provision of teacher training and on-going PD on physical activity may be a viable means of increasing children's physical activity levels in ECE.

Gibbons (2015) also noted that there appears to be a concerning lack of collaboration regarding what teachers should know and do about health in the early childhood curriculum; or about how knowledge of health could and should be evident in the early childhood curriculum, indicating that curriculum practice does not match curriculum purpose in relation to health. Tonge et al. (2017) reinforces the importance of supporting centres to achieve high levels of fidelity and overcome barriers to implementation, as it can take time in these settings for changes to be embedded into everyday routines and ongoing PD is critical given the dynamic nature of these environments (Aadland et al., 2020). Therefore, ECE that support physical activity with strong policy, teacher PD, curriculum connections and adequate space indoors and out for physical activity are likely to provide an environment to achieve high quality physical activity behaviours.

Interestingly, Norway promotes risky play in an ECE whereas NZ and Australia environments are risk adverse, perhaps, due to the current regulatory and licensing requirements (Obee et al., 2021). Braithwaite (2014) suggests that countries such as Australia and the United States

of America (US) do not have mandated physical activity in their early years curriculum whereas Belgium has specialist physical activity teachers and physical activity delivery in their early years' curriculum from three years old. Furthermore, Brian et al. (2018) states that Belgium children scored higher on both locomotor and object control skills than US children, demonstrating that early provision of quality physical activity delivery and active play opportunities in ECE may positively impact physical activity levels and fundamental movement skills (FMS) acquisition.

Additionally, play or sports equipment that children have had experience within a structured teacher-led physical activity approach should be made available to children in recess or free play time (Volmut & Šlmunič, 2021). This availability of equipment during non-structured active play has shown to be an effective way to promote high levels of physical activity and increase time spent in MVPA where teachers are encouraged to incorporate a range of different sports equipment to encourage children to play freely. Coleman and Dymont (2013) agree with the significant role of the teacher as a positive role model for physical activity delivery, suggesting that 50% of teachers believe supervision impacts on their ability to provide quality physical activity, and individual centre policy and practices regarding safety and supervision limit physical activity opportunities. Veldman et al. (2020) agree with the impact of active supervision, where teachers take an active participatory role rather than a passive role confirming the importance of intentional teaching practices in relation to physical activity. Further, Tonge et al. (2017) state that 61% of teachers in ECE spent their workday in sedentary behaviour and identified a significant association between teachers' sedentary behaviour and children's sedentary behaviour (Tonge et al., 2021). Consequently, reducing sedentary behaviour of teachers has the potential to improve children's physical activity levels.

Physical Activity Policy

A study carried out by Lyn et al. (2013), found that ECE significantly improved their physical activity environments by introducing physical activity policy to enhance active play and reduce sedentary behaviour opportunities for children and teachers. Additionally, adding portable play equipment to the ECE environment, physical activity teacher training and education improved physical activity staff behaviours (Taylor et al., 2024).

Thus, ECE are well placed to influence children's physical activity levels, and centre policies in these settings need to provide specific recommendations on the amount and type of physical activity children should do in care (Wenden et al., 2023). However, in contrast to this finding, both Jago et al. (2023) and Jerebine et al. (2024) comment that a wider lens would be of value, such as all stakeholders (including families) in the development of evidence-

based physical activity policy and the context of the learning environment such as ECE or school is needed.

Despite the influence of ECE and teachers on children's physical activity levels there is clearly a need to support and promote the development of policy and capacity building in this setting. Further, policy is necessary to implement sustainable change in ECE to achieve high levels of fidelity and overcome barriers to implementation (Tonge et al., 2017). These findings illustrate the requirement for a whole ECE approach to physical activity promotion during the childcare day supported by strong physical activity policy, professional development and training. Therefore, coupling the implementation of policy with capacity building can improve teachers practice (Bourke et al., 2024).

In an ECE routines describe what we do during our shared daily activities such as washing hands before eating, and after toileting, providing a reassuring rhythm to the day and support attachment and confidence with a view to learning to trust and a sense of belonging. For young children the provision of consistent routines and a level of predictability for their day help them to manage their day and prepare for what is going to happen next. This is key to developing a sense of belonging/ mana whenua which is a key learning outcome within Te Whāriki (He Māpuna te Tamaiti, pg 28). Behaviours that result from strong policy ensure that teachers can support children develop fluency of routines by modelling and practicing them and providing positive feedback and flexibility. Therefore, an ECE policy ensuring physical activity is a daily routine may be an opportunity to increase physical activity quantity and quality during the childcare day.

Fundamental Movement Skills

Motor competency is defined by Estevan et al. (2021) as the degree of proficiency in performing a wide range of motor skills such as jumping, catching, and balancing as well as the underlying mechanisms such as coordination that is required in daily life and in performing and participating in more complex physical activities. Barnett, Salmon, et al. (2016) agree and further state that movement and motor competency or movement quality can be reflected in the performance of FMS. These are classified into three categories, locomotion, object control and stability skills.

Motor competence in children has gained credence in the last decade as an important correlate of physical activity and other health related behaviours and outcomes, including higher cardiorespiratory fitness and healthier weight status (Barnett, Salmon, et al., 2016). Further studies have been carried out with young children to determine the influence of

perceived motor competence on actual motor competence confirming there is a body of literature to support the association between children's motor competence and physical activity behaviours (Brian et al., 2018). Yet, associations between FMS and physical activity in young children are far from clear and may be affected by several biological, psychological, and environmental factors such as perceptions of competence and opportunities to practice motor skills (Iivonen et al., 2016). However, Logan et al. (2018) described FMS as foundational movements that lead to the specialized and more complex skills required in physical activity, recreation, games and sport. Nonetheless, Haugland et al. (2023) report that FMS is vital to enable young children to participate in physically active play. Interestingly, in a study carried out by Engel et al. (2022) they found that increases in FMS competence had significant associations with physical activity in girls, but not in boys or the total group.

Therefore, actual motor competence, perceived motor competence and physical fitness may be the connector to engaging in physical activity and increased participation in sports. There is now convincing evidence that physical activity and actual motor skill competence are associated in children (Iivonen et al., 2013). However, there is conflicting evidence on the order of the relationship between the quantity of physical activity and motor competency, what comes first moving more or moving better?

Estevan et al. (2021) conclude that children who had high perceived motor competence and high actual motor competence had a tendency for higher physical activity participation. To add more compelling data, Duncan et al. (2021) suggest that FMS are a precursor to physical activity, as learning to move is necessary for participation in physical activity. Estevan et al. (2021) agree, stating that high perceptions of physical competence contributed to increased physical activity in children. Furthermore, the development of FMS begins from birth, through the acquisition of locomotor, object manipulation and stability skills before becoming a central pillar of early years education (Barnett, Stodden, et al., 2016).

Interestingly, Brian et al. (2018) noted there are differences in motor competency skills in children related to the level of physical activity opportunities in ECE, with results showing that when physical activity is a part of the early childhood curriculum for children from three years, FMS and MC are improved over time (Downing et al., 2021). However, according to Iivonen et al. (2013) more evidence is required to determine whether physical activity is the cause rather than the consequence of FMS. Nonetheless, increasing physical activity within an ECE setting has the potential for public health benefits to our young population.

Conclusion

A narrative literature review was carried out given the evolving work in this field, liberal criteria were used that allowed for inclusion of studies with diverse outcomes such as (physical activity, early childhood education, early childhood teachers) and a variety of research designs (randomised controlled trials, reviews, descriptive studies, longitudinal studies).

Literature has confirmed that children aged (3-5) years spend considerable time in complex and dynamic ECE, within these settings teachers are important daytime role models, but recommended physical activity levels are regrettably not being met. Factors that contribute to determining physical activity in ECE are multi-faceted, such as teachers' self-efficacy regarding PA behaviours, regulation restrictions and quality of the ECE movement environment. Interestingly, capacity building via teacher professional development to support physical activity during the childcare day was reported as being of value.

In the NZ context there is little evidence of physical activity being noticed, recognised or responded to as an assessment for learning, even though the early years Te Whāriki curriculum recognises its importance. This finding was further supported by teachers reporting a need for greater guidance on how to promote physical activity, manage appropriate levels of sedentary behaviour and reduce long periods of sitting (World Health Organization, 2021).

Physical activity interventions in ECE delivered by both teachers and external providers have shown mixed results with most interventions only reporting moderate effects on physical activity outcomes (Engel et al., 2022; Okely et al., 2020; Pate et al., 2016). Several factors may be contributing to these modest changes such as, study duration, length of follow-up, intervention approach and level of intervention fidelity (Strooband et al., 2018). Notably, Aadland et al. (2020) found that there is a lack of high-quality evidence on effective, sustainable and scalable interventions to increase physical activity levels for young children during the childcare day.

Thus, my study is planned with inter-relating chapters investigating personal factors (children and teachers), environmental influences (ECE) and behavioral patterns (physical activity levels and acceptability). My research investigating the feasibility and potential efficacy of a physical activity programme in early childhood centres in Aotearoa, New Zealand will provide an original contribution to an existing body of knowledge. This contribution can be translated into practice with potential to be scalable and sustainable in ECE to improve child physical activity levels via teacher provision, particularly in a NZ

context.

Chapter 2

Teaching Practices, Self-Efficacy and the Physical Activity Environment in Aotearoa, New Zealand Early Childhood Education Centres.

Prelude

Chapter two was designed to gain an insight into current practices regarding physical activity provision in Ministry of Education licensed, teacher-led ECE in Hawke's Bay, Aotearoa, New Zealand. Surprisingly, there is limited literature that describes teacher self-efficacy, practice and the quality of the movement environment in ECE in relation to the promotion and delivery of physical activity during the childcare day, particularly in a New Zealand context.

Therefore, the aim of this chapter is to determine a moment in time scope of industry practice to determine teachers' self-efficacy and practice in the delivery of physical activity during the childcare day and the quality of the ECE movement environment.

Title

Teaching Practices, Self-Efficacy and the Physical Activity Environment in Aotearoa, New Zealand Early Childhood Education Centres.

Abstract

Early Childhood Education (ECE) has potential to influence physical activity levels and participation among children. Factors include early childhood educator's teaching practices, self-efficacy and quality of the movement environment.

A cross-sectional study of early childhood teachers' self-reported, self-efficacy using online Early Childhood Educator Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen Behaviours (ECECOMPASS) Questionnaire and ECE movement environment from Movement Environment Rating Scale (MOVERS) was assessed. Descriptive statistics were conducted to analyse data.

Early childhood teachers ($n = 42$) rated (means [SD]) for task (7.2 ± 2.3) and barrier (7.0 ± 2.5) self-efficacy (out of 10). ECE ($n = 6$) movement environment quality (out of 7); 1 (4.0 ± 1.1), 2 (4.0 ± 0.4), 3 (3.8 ± 0.6), 4 (4.0 ± 0.6) and overall total score (4.0 ± 0.3). Early childhood teachers rate themselves as self-efficacious in delivering physical activity and quality of the movement environment was adequate.

Introduction

Physical activity during the first five years of life is fundamental to the health and future wellbeing of children, and physical activity habits begin to develop in early childhood (Dutton, 2017; Scott et al., 2020). Physical activity within the physical domain of child development is interdependent, inter-related, and overlaps other domains (social/emotional and cognitive/language). It is often referred to as active play during the first five years of life (B. Bruijns et al., 2023). Compositional data analyses demonstrate that relative time spent engaging in physical activity throughout the day, especially moderate-to vigorous-intensity physical activity (MVPA), may be the most beneficial for improving bone and skeletal health, increasing fitness, and developing fundamental movement skills in young children (Bourke et al., 2023). Therefore, engaging in sufficient levels of physical activity early in life may help develop physically active children, adolescents, and adults (Carson et al., 2020).

The World Health Organization's (WHO) Global Action Plan for Physical Activity (GAPPA) has set a target to reduce physical inactivity by 15% by 2030 (World Health Organization, 2019). GAPPA applies to children of all ability levels worldwide and is intended to be culturally and contextually sensitive. It recommends that children aged (3-5) years should engage in 180 minutes of total physical activity, including 60 minutes of MVPA, each day (World Health Organization, 2019). Unfortunately, children under five are not meeting physical activity recommendations, evidently spending much of their day in sedentary behaviour (Butler et al., 2021; Carroll et al., 2021). In New Zealand (NZ) the rates of overweight and obesity emerging in children four years old reflect the increasing obesity rates seen in the NZ child population overall (Morton et al., 2017). Moreover, the results from the 2022 Aotearoa NZ physical activity report card (children and youth 5-18 years) conclude overall, 58.1% (score of C+) participated in 420 min/week of MVPA, with a smaller proportion of girls meeting the threshold than boys or children and youth of another gender (Wilson et al., 2023).

To increase physical activity levels the NZ Ministry of Health developed Active Play resources as a result of a review of the physical activity guidelines and resources for under-fives in NZ (Ministry of Health, 2016, 2017b). Gibbons (2015), questioned whether teachers and student teachers in NZ are attuned to what it means to have health as a key part of the curriculum, and explored whether health is a marginal consideration in the ECE curriculum, Te Whāriki. Notably, WHO Global Standards for ECE are designed to align with the primary goal of ECE to support a child's learning and development to their full potential (World Health Organization, 2021). Standard one refers to building children's knowledge and skills. The intent of Standard one is also to respond to the needs of early childhood (EC) teachers, as they reported needing greater guidance on how to promote physical activity, manage appropriate levels of sedentary

behaviour (including screen time), and reduce long periods of sitting among children in their care (World Health Organization, 2021).

Significantly, EC teachers' physical activity knowledge and teaching practices influence young children's early uptake of physical activity behaviours in childcare settings, and they serve as important daytime role models (Nilsen et al., 2023; Tonge et al., 2016). Therefore, to support EC teachers in taking an active teaching role in facilitation of quality physical activity, further understanding of their self-efficacy in the promotion of physical activity behaviours during the childcare day is needed (Copeland et al., 2012; J. S. Gehris et al., 2015; Tucker et al., 2022). Qualified teachers undertake at least three years of Initial Teacher Education (ITE) or equivalent, and registered teachers must hold a current practising certificate (registered) to be employed in a teaching position in NZ. A practising certificate shows satisfactory recent teaching experience, have undertaken professional development, and are fit to be a teacher. These must be renewed every three years and are not sector-specific. (Teaching Council of Aotearoa New Zealand).

To measure EC teacher self-efficacy the Early Childhood Educators' Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen Behaviours (ECE-COMPASS) Questionnaire was developed by Western University in Canada (B. Bruijns et al., 2023). To our knowledge, this instrument has not been used to assess EC teacher self-efficacy in NZ licensed ECE. According to Bandura's Social Cognitive Theory, Bandura (1986), self-efficacy is belief in the capability to carry out desired courses of action in the service of valued goals, and is one of the most important and robust determinants of behaviour (Bandura, 2004). In support of this theory, Klassen and Tze (2014) revealed that task self-efficacy was the strongest psychological predictor of teaching performance. As such, to effectively prepare undergraduate EC teachers for their work post-graduation, it is critical that their ITE scaffolds development of self-efficacy in relation to a wide range of teaching contexts, including facilitating physical activity and children's development of physical literacy (Tucker et al., 2022). Sadly, in NZ it is of concern that ITE programmes may allocate only a minimum number of hours to address childhood physical activity (and nutrition) because domain-specific knowledge (e.g. subject content) is not always taught in-depth to ECE teachers (McLachlan et al., 2017).

ECE have potential for early intervention in improving children's physical activity participation, and to positively influence holistic child development (Kazmierska-Kowalewska et al., 2021). Importantly, Bower et al. (2008) noted that nearly 50% of the variation in physical activity during ECE hours was attributed to the ECE setting, supporting evidence that environmental

determinants of physical activity behaviour are important (Estevan et al., 2021; Howie et al., 2014). Furthermore, in NZ, ECE are required to meet both legislative and regulatory measures to operate, these measures have potential to impact variations in physical activity. (Education Review Office; Hanrahan, 2018; Ministry of Education, 2017b; Stover, 2020).

To evaluate structural and process quality factors of ECE associated with physical activity, Archer and Siraj (2017) developed the Movement Environment Rating Scale (MOVERS). MOVERS is a comprehensive tool designed specifically to assess the pedagogy and provision of the physical domain in ECE. To our knowledge, this instrument has not been used to assess the quality of the movement environment in NZ licensed ECE. Many young children attend ECE and the Organisation for Economic Cooperation and Development (OECD) state that 71% of children access and participate internationally; with a higher percentage in NZ where 87% of children aged (3 to 5) years attend ECE (Coe, 2020; Vaughn et al., 2021).

NZ has an internationally unique approach to ECE, which includes a bicultural early childhood curriculum, a robust infrastructure of organisation and management overseen by the NZ Ministry of Education, and a growing reputation for innovation in early childhood teaching and learning (McLachlan, 2011). ECE in NZ is a mix of community-based and privately owned services Kamenarac et al. (2024), and the government funding scheme is equitably accessible to all, provided they meet the regulatory standards and licensing criteria including teacher-child ratios, space and health and safety (Ministry of Education, 2008a, 2008b). A component of the NZ Government early learning action plan (2019-2029) specifies that teaching staff and leaders are well qualified, diverse, culturally competent and valued. Furthermore, objective (3.5) is to improve ITE to ensure that teachers are well-qualified to implement the curriculum in collaboration with other professionals (Ministry of Education, 2019b).

The NZ bi-cultural early childhood curriculum Te Whāriki provides teachers with a framework for justifying responsive and relational teaching (Hohaia-Rollinson et al., 2021; Ministry of Education, 2017a, 2017b). There is also a suite of resources designed to support EC teachers deliver Te Whāriki such as He Māpuna te Tamaiti (a child is a mother) Ministry of Education (2019a), Kia kori tahi (physical wellbeing in early learning) Ministry of Education (2022) and Kōwhiri whakapae (strengthening progress through practice), (Ministry of Education, 2023). EC teachers are responsible for the delivery of Te Whāriki and decision making about curriculum opportunities.(Ministry of Education, 2017a, 2017b). These curriculum decisions relating to physical activity, as suggested by Razak et al. (2020) may be constrained by management decisions, fear of risk and litigation, lack of knowledge or strong discourses about the types of physical activity that should be offered to children.

In NZ the ECE sector expects ITE providers to foster among students and graduates an equity disposition, which includes a commitment to engage with new knowledges, understandings, opportunities and challenges with positivity and resourcefulness (Education Council, 2017; Ministry of Education, 2017; Teaching Council of Aotearoa New Zealand, 2019). However, the Education Review Office (ERO) reports, and research, related to quality and equity in education continues to find that some EC teachers lack the dispositions, knowledge, and skills to meet their key teaching responsibilities and are ill-prepared to facilitate the learning of diverse children and to support their family (Education Review Office; Hohaia-Rollinson et al., 2021). Furthermore, according to Ali et al. (2021) in NZ there is a concerning gap in ECE teacher and teacher education programmes, whereby nil to few hours may be allocated to cover physical activity. As such, there is opportunity to improve ITE for EC teachers to ensure preparedness to facilitate the learning of diverse children.

Therefore, given the combination of ECE being noteworthy sites of impact, the escalating attendance of children in ECE and gap in EC teacher ITE, it makes sense that strategic approaches are focussed on supporting EC teachers, and key stakeholders for young children (Brown et al., 2023). According to Kurka et al. (2015), ECE is a key stakeholder where children frequently spend time and are potential influencers on their physical activity and sedentary behaviour. Furthermore, Driediger et al. (2018) suggested targeting ECE to support physical activity levels of young children, particularly higher-intensity energetic play so that physical health and mental wellbeing of this population may be positively affected.

Studies, such as a recent one by Tonge et al. (2020), have reported significant relationships between children's physical activity, sedentary behaviour, sex, and environmental factors such as routine and size of the outdoor ECE environment. For example, boys were more active and more likely to meet physical activity recommendations compared with girls (Tonge et al., 2020). Therefore, consideration of quality of the ECE movement environment in promotion of physical activity behaviours is important. Against this background, there is a need for more knowledge about EC teaching practices, self-efficacy and the physical activity environment in ECE in NZ. Hence, in this study, research methodology is explained, findings from the questionnaire (ECE-COMPASS) and assessments (MOVERS) are presented and the implications for physical activity in ECE and directions for further research are considered.

Methods

A cross-sectional study, made up of two parts was undertaken in 2022 when the effects of COVID-19 were still evident. In NZ the national lockdown and continued disruption caused by COVID-19 instigated a dramatic shift in the way that ECE operate. These changes have the potential to impact on the learning and wellbeing of children in ECE (Education Review Office, 2021). Part one comprised of EC teachers self-reporting their self-efficacy in outdoor movement, physical activity, sedentary and screen behaviours via an online questionnaire (ECE-COMPASS) 42 EC teachers from 225 ECE (18.66% response rate) completed the questionnaire within the distribution timeframe. Participants were provided with a study information sheet with consent documentation. The questionnaire was distributed from April 2022 to September 2022 via the Qualtrics (Qualtrics, Provo, UT) online platform, allowing confidential responses and geographic reach (Brandon, Long, Loraas, Mueller-Phillips, & Vansant, 2014). The questionnaire required 20 to 25 minutes to complete. Inclusion criteria was qualified and either fully or provisionally registered EC teachers.

Part two was an assessment examining the quality of the ECE movement environment (MOVERS). The primary author participated in a two day interactive, evidence-based professional development assessor program on MOVERS in 2022 in Australia. (The Victorian Government, Updated 2024). MOVERS observations were carried out at each ECE on the same day of the week and for the same duration for a full day (9am to 4pm) between May 2022 and September 2022. Recruitment continued until the intended sample of six ECE volunteered to participate (2.66% response rate). Inclusion criteria was that ECE were licensed and located within the Ministry of Education region of Hawkes Bay, NZ. Ethics for this study was provided by the Auckland University of Technology Ethics Committee.

Measures:

Early Childhood Educator Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen behaviours (ECE-COMPASS) Questionnaire

The Early Childhood Educator Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen behaviours (ECE-COMPASS) Questionnaire (B. Bruijns et al., 2023) was used to determine EC teacher self-efficacy to promote physical activity, outdoor play and minimise sedentary behaviour in childcare settings. ECE-COMPASS provides a validated theory driven framework to measure teachers' self-efficacy, behavioural intention and perceived control over physical activity promotion. The tool comprises 31 questions, including 21 task self-efficacy and 10 barrier self-efficacy items (scored as unique composites), since task and barrier self-efficacy are recognized as distinct types of self-efficacy, producing composite scores for these subscales is appropriate (B. Bruijns et al., 2023). Scores are rated on a scale from 0 (not

confident at all), 5 (moderately confident) to 10 (completely confident). Task self-efficacy refers to one's confidence in ability to complete a task, while barrier self-efficacy refers to one's confidence in ability to complete a task in the face of challenges or barriers (Bandura, 1986). ECE-COMPASS was developed via expert consensus, and showed high internal consistency (Cronbach's $\alpha > 0.90$ across subscales) and modest temporal stability (test-retest statistics > 0.62 ; (B. Bruijns et al., 2023).

Movement Environment Rating Scale (MOVERS)

To determine environmental movement quality of ECE in our study, the MOVERS scale (Archer & Siraj, 2017) was used. MOVERS rating scale assesses the environment supporting children's physical development and movement, with focuses on process and structure quality, including pedagogy, children's physical experience and EC teacher's practices. MOVERS evaluates the quality of the physical and pedagogical environment of an ECE for physical activity. The scale comprises 11 items, which are distributed into four subscales: subscale 1 curriculum, environment, and resources for physical development (items 1-4); subscale 2 pedagogy for physical development (items 5-7); subscale 3 supporting physical activity and critical thinking (items 8-10), and subscale 4 parents/ carers and staff (item 11). Each item consists of several indicators that describe practice. Items are rated on a 7-point scale: 1 = inadequate; 3 = minimal; 5 = good; and 7 = excellent, with midpoint scores of 2, 4 and 6.

MOVERS assessment of each ECE required an observation by a trained assessor, followed by a discussion with an ECE leader, such as a Head Teacher, Director, or Manager. The observation was supplemented by a review of documentation in relation to certain items, such as ECE policies and learning stories. MOVERS test-retest reliability has been determined (intraclass correlation coefficient 0.959; $p < 0.001$), percentage agreement and weighted Kappa, demonstrating excellent reliability (0.904; $p = 0.001$). Internal consistency of the scale has been determined using Cronbach's alpha, producing $\alpha = 0.94$ for the first MOVERS observations and $\alpha = 0.89$ for the second MOVERS observations (Kazmierska-Kowalewska et al., 2021).

Data Analysis

Descriptive statistics, including means and standard deviations ($M \pm SD$), and median and interquartile range (IQR) were calculated in Microsoft Excel (Microsoft Corporation, Redmond, WA) for the ECE-COMPASS questionnaire and MOVERS. These data are presented in the form of composite (ECE-COMPASS task and barrier self-efficacy) scores and composite (MOVERS subscales) overall score. Although almost all questions scores were not normally

distributed, both mean and standard deviation ($M \pm SD$) or median and interquartile range (IQR) are presented to enable comparison to previous literature. ECE-COMPASS moderately confident scores and ECE-COMPASS content overlap with MOVERS items are presented.

Results

Participant demographics

Table 2.1. EC teacher and ECE Characteristics.

Characteristic	EC teacher [%] n=42	ECE [%] n=6
Qualified	100	
Registered	100	
Ministry of Education licensed		100
At minimum standard outdoor space		50
Above minimum outdoor space		50
Shared outdoor space		50
Physical activity policy		50

Note. The Ministry of Education uses licensing criteria to determine if a service meets the requirements set out in the Education Act and corresponding regulations. To operate, a licensed ECE must meet or exceed the rules governing early childhood education. At minimum outdoor space = 5m²/ child. Shared outdoor space refers to the outdoor space being shared by children of various ages.

ECE and EC teachers represented Hawkes Bay, (population 185,000, socio-economic deprivation index 5.6) NZ (Ministry for Business Innovation and Employment, 2023). EC teachers (n = 42) completed the self-report online questionnaire. ECE (n = 6) environments were independently assessed.

The composite score, average of all questions for EC teachers' task self-efficacy was above moderately confident at 7.2 ± 2.3 , and 7.0 ± 2.5 for barrier self-efficacy. The lowest rated item was 4.6 ± 4.1 for question 14 (develop organisational policies for screen time), the highest rated item was 8.4 ± 1.9 for question 5 (support children's motivation to move through verbal encouragement). Median (IQR) scores for each item ranged between 4.0 (1.0 – 7.0) for question 14 (develop organisational policies for screen time), 9.0 (8.0 – 10) for question 19 (avoid children's use of screen-based technology during childcare hours). See Table 2 for moderately confidently self-efficacy results.

MOVERS subscale ($M \pm SD$) scores ranged from 3.8 ± 0.6 to 4.0 ± 1.0 . The lowest rated item being subscale 3 (supporting physical activity and critical thinking), the highest rated item being subscale 2 (pedagogy for physical development). The overall total score was 4.0 ± 0.3 . Median (IQR) scores ranged between lowest rated item 3.7 (3.3 – 4.2) subscale 3 (supporting

physical activity and critical thinking), highest rated item 4.1 (3.1 – 4.8) subscale 1 (curriculum, and resources for physical development). See Table 2 for MOVERS scale ratings and MOVERS, ECE-COMPASS content overlap.

Table 2.2 ECE-COMPASS moderately confident scores, ECE-COMPASS and MOVERS content overlap .

ECE-COMPASS (<i>0 not confident at all, 5 moderately confident, 10 completely confident</i>) Task Self-Efficacy (21 questions) Barrier Self-Efficacy(10 questions)	Mean±SD	Median (IQR)	MOVERS (1 = inadequate, 3 = minimal, 5 = good, 7 = excellent) Subscales	MOVERS Items (11 item scale)	Mean±SD	Median (IQR)
Overall Task Self-Efficacy Score	7.2 ± 2.3			Overall MOVERS subscales score	4.0 ± 0.3	
Overall Barrier Self-Efficacy Score	7.0 ± 2.5					
<i>Q9. Create an environment that supports children's active play. n=39</i>	8.2 ± 1.9	8.0 (7.0-10)	Subscale 1. Curriculum, environment & resources for physical development n=6.	<i>(1) arranging environmental space to promote physical activity, (2) providing resource including portable and / or fixed equipment, (3) gross motor skill, and (4) body movement to support fine motor skills.</i>	4.0 ± 1.1	4.1 (3.1–4.8)
<i>Q13. Serve as a positive role model for children's physical activity by participating in movement-based activities. n=37</i>	7.8 ± 2.2	8.0 (7.0-10)				
Q2. Facilitate higher intensity PA (activities that include sweating and heavy breathing) for children in my care every day. n=40	5.7 ± 2.4	5.0 (4.0-7.0)	Subscale 2. Pedagogy for physical development n=6.	<i>(5) staff engaging in movement with children indoors and outdoors, (6) observation and assessment of children's physical development indoor, and (7) planning for physical development indoors and outdoors.</i>	4.0 ± 0.4	4.0 (3.7-4.2)
Q12. Develop organisational policies for PA. n=39	5.1 ± 2.2	5.0 (4.0-7.0)	Subscale 3. Supporting physical activity and critical thinking n=6.	<i>(8) supporting and extending children's movement vocabulary, (9) encouraging sustained shared thinking by communicating and interacting through physical activity, and (10) supporting children's curiosity and problem solving indoors and outdoors.</i>	3.8 ± 0.6	3.7 (3.3–4.2)
Q14. Develop organisational policies for screen time. n=35	4.6 ± 3.1	4.0 (1.0-7.0)				
Q25. Minimise children's sedentary behaviour when they are tired. n=39	5.7 ± 2.6	6.0 (4.0-7.5)				
			Subscale 4. Parents/ carers and staff n=6.	<i>(11) staff inform families about children's development and the benefits to their learning, development, and health.</i>	4.0 ± 0.6	4.0 (4.0-4.0)

Note: Text highlighted **bold** reflects ECE-COMPASS moderately confident scores. Text in *italics* reflects content overlap between data collection tools (ECE-COMPASS Q.9 and MOVERS item 1), (ECE-COMPASS Q.13 and MOVERS item 5).

Discussion

The aim of this study was to gain a moment in time insight into EC teacher's practices, self-efficacy and physical activity environment in the facilitation and promotion of physical activity behaviours among young children in licensed ECE in NZ. Combining MOVERS' environmental rating with ECE-COMPASS's perceptual data allows for a multi-level indication of how teacher attitudes and structural conditions may impact physical activity provision for children during the childcare day. To our knowledge, this is the first study that incorporates EC teacher practices, self-efficacy and independent assessor observation of the quality of the movement environment.

Considering the moderately confident and above self-efficacy scores we found for both task and barrier EC teacher self-efficacy, there appears to be a generally good level of self-efficacy expressed by EC teachers in their ability to deliver quality daily physical activity behaviours. Our scores are similar to those of a study carried out in Canada who found that EC teachers ($n = 121$) scored similarly in both task self-efficacy (7.5 ± 1.6) and barrier self-efficacy (7.5 ± 2.0 ; (Bruijns, Vanderloo, et al., 2022). These scores are perhaps surprising given that EC teachers typically receive limited training in physical activity in their pre-service teacher training, and McLachlan and McLaughlin (2022) argue there is a need for teachers to have robust understanding of learning and development. For example, in a Canadian study, pre-service EC teachers ($n = 1,292$) were asked about their physical activity and sedentary behaviour training during their college/university education and nearly 70% indicated that they had not completed any physical activity-specific courses (Bruijns et al., 2019). Furthermore, Foulkes et al. (2020) revealed there was limited understanding about the concept of physical activity among EC teachers; however, knowledge of child development was evident and all participants agreed that there was a need for further training. Moreover, (McLachlan et al., 2017) suggest that in NZ, it is of concern that ITE programmes may allocate only a minimum number of hours to address childhood physical activity (and nutrition) because domain-specific knowledge (e.g. subject content) is not always taught in-depth to EC teachers.

Given that children's physical activity levels in ECE are less than optimal, Nathan et al. (2022), there appears to be a disconnect between EC teachers' self-efficacy, practice and children's physical activity, indeed an opportunity to bridge the gap between policy (prescriptive licensing criteria and regulations) to practice (EC teachers curriculum delivery). Further work exploring this disconnect is needed because supporting the process quality of EC teacher-led physical activity has been determined as an effective way to promote high levels of MVPA among children aged (3-6) years (Coleman & Dymont, 2013; Duff et al., 2019).

Most EC teachers' self-efficacy scores were above moderately confident, but lower scores were reported for four questions: facilitate higher intensity physical activity for children in my care every day; develop organisational policies for physical activity; develop organisational policies for screen time; and minimise children's sedentary behaviour when they are tired. Accordingly, it is reasonable to conjecture that EC teachers lack knowledge, fear higher intensity physical activity due to the perceived potential risk of such activities, and do not believe higher intensity physical activity is necessary, thus have not explored opportunities for such activities. Professional learning to improve EC teacher self-efficacy in facilitating and promoting higher intensity physical activity in ECE may be beneficial. This reflects WHO Global Standards for ECE, responding to the needs of EC teachers needing greater guidance on how to promote physical activity and manage appropriate levels of sedentary behaviour (including screen time) and reduce long periods of sitting.

The lower scores for developing organisational policies for physical activity and screen time are perhaps not surprising, as it is well documented that there is a dearth of physical activity and sedentary behaviour policies within ECE (Nathan et al., 2022; Sollerhed et al., 2021). To date, within the NZ context, there are limited guidelines which explicitly focus on physical activity for ECE, (Ministry of Health, 2017b), and a lack of physical activity information in ECE resources at both policy and implementation level. Of concern is the likelihood that policies around physical activity are missed, and that there are gaps that exist between knowledge and governance of health and education in ECE (Gibbons, 2015).

In NZ, teachers' practice within ECE is guided by a variety of national mandates, and individual ECE philosophies. Specifically, within ECE there are Ministry of Education resources for EC teachers such as He Māpuna te Tamaiti (each child is precious and unique) for promoting proactive, intentional approaches supporting the development of children's social and emotional competence, and Kia Kori Tahī (let us play together) for promoting physical wellbeing in early learning (Ministry of Education, 2019a, 2022). However, there is no explicit instruction on recognising the development components of physical activity, such as to develop stability children need to have their head out of an upright position and take part in activities that involve rolling, spinning, and hanging upside down. Thus, within the NZ context there is ample opportunity to improve policies that focus on physical activity and other related behaviours. These are reflected by the low score on question two (facilitate higher intensity physical activity for children in my care every day) and question 25 (minimise children's sedentary behaviour when they are tired). Additionally, there is scope to develop physical activity policies, reflected by the low score on question 12 (develop organisational policies for physical activity) and clearer guidelines on levels and categories of activity required for

optimum child development and on limiting screen use, and more EC teacher training (Gerritsen et al., 2016). Furthermore, the role of the EC teacher is central to the promotion of physical activity within ECE, therefore collective support from policy makers, Ministry of Education and ECE owners/ leaders is required to ensure impact on practice for positive outcomes for children.

In our study, MOVERS subscale item scores indicate the quality of the ECE movement environment was adequate. Interestingly, studies from Norway, Canada and Australia have reported slightly lower MOVERS scores than NZ. For example, a study from Norway ECE ($n = 46$) reported an average MOVERS score of 2.7 ± 0.7 (Krogager et al., 2022), likewise a study from Canada ECE ($n = 19$) reported average MOVERS scores as 3.4 ± 1.1 (Zhang et al., 2021), and a study from Australia ECE ($n = 13$) reported average MOVERS scores of 3.2 ± 0.6 (Kazmierska-Kowalewska et al., 2021). All four countries (i.e., NZ, Norway, Canada and Australia) share similarities in that ECE is not compulsory, and all have an early years curricula or framework where physical activity or active play is recognised. These collective results suggest there is room for improvement in quality of the ECE movement environment across the globe. Improving quality of the movement environment may be achieved through EC teacher professional learning as professional learning is the main knowledge transfer approach within the early childhood sector and has been shown to be effective in modifying EC teachers' pedagogy and practice (Clarke et al., 2021). Professional learning which explicitly unpacks and explores the notion of quality inclusive of resources, equipment, interactions between EC teachers and children and families, planning, observing, and assessing is needed (Siraj et al., 2019).

The two instruments used in conjunction in our study (ECE-COMPASS and MOVERS) illustrate content overlap and were selected due to their complementary strengths in capturing both teacher-level and environmental determinants of physical activity promotion. For example, question 9 (ECE-COMPASS); "create an environment that supports children's active play" aligns closely with item 1 of MOVERS; "arranging environmental space to promote physical activity". Further, question 13 (ECE-COMPASS); "serve as a positive role model for children's physical activity by participating in movement-based activities", aligns closely with item 5 of MOVERS; "staff engaging in movement with children indoors and outdoors". For both instruments, the role of the EC teacher is particularly pertinent. The ECE-COMPASS questionnaire suggests that the role of the EC teacher is about facilitation, leading, adapting, supporting, incorporating, programming, communicating, role modelling, engaging, planning, and intentionally providing physical activity experiences in the indoor and outdoor environment. Similarly, the role of the EC teacher is pertinent to high quality environments,

involving EC teacher planning, encouraging, engaging, arranging, extending, working alongside children, role modelling and communicating. Despite similarities between instruments used in this study, a disconnect between the two data sets was indicated, however this was not statistically tested (i.e., above moderate EC teacher self-efficacy and adequate movement environment quality). The datasets were collected by two different methods, self-report versus observation, which may provide insight into the disconnect; however, further investigation on a larger scale is warranted.

Similar instruments were used in studies, such as Hinkley et al. (2015) who carried out audits on Australian and Canadian ECE that drew on physical activity and sedentary behaviour items from existing instruments: 13 items from the Nutrition and Physical Activity Self-Assessment for Childcare (NAP SACC; Ammerman A et al. (2007) and one item from the Environment and Policy Assessment and Observation (EPAO) tool (Ward et al. (2008). However, both similar tools (NAP SACC and EPAO) have a dual focus on nutrition and physical activity whereas in our study (ECE-COMPASS and MOVERS) focused solely on physical activity, illustrating a potential intersection of the impact of EC teachers' and quality of the movement environment in physical activity facilitation in ECE.

A strength of our study is the use of two valid and reliable data collection tools to investigate current practices. To the best of our knowledge, these instruments have not previously been used in conjunction internationally, and never in NZ, hence providing an original insight into the physical activity environment in ECE. However, the results of our study should be considered in light of the following limitations. First, the study includes a generalizability of findings, as participant demographics are unknown and small sample sizes (ECE, $n = 6$, EC teachers $n = 42$). Due to the small sample size definitive conclusions are unable to be made, however study findings signal points of interest that warrant further investigation. As this is a formative study there were no target sample size calculations carried out, however target sample size to calculate effect and full demographic information would be a consideration in a full-scale trial.

EC teacher self-efficacy scores may have been subject to social desirability bias, as they were self-reported, and associations were not made between ECE-COMPASS and MOVERS. No inter-rated reliability took place as there was only one trained MOVERS assessor in NZ, however all MOVERS observations took place on the same day of the week for the same hours. Recruitment occurred during COVID-19, and during this time the ECE sector experienced significant challenges including low staff numbers and significant competing demands (Education Review Office, 2021). The COVID-19 pandemic led to the temporary

suspension of in-person activities and prompted a re-adaptation of pedagogical practices within ECE organisations. One of the substantial challenges in this process appears to have been promoting children's participation and autonomy within a context in which (for hygiene reasons) certain materials could no longer be used, groups could not be mixed, etc. (Van Laere et al., 2021). All MOVERS observations took place in the final stages of the COVID-19 pandemic amidst elevated levels of child and teacher absence, and anecdotally more teacher time required for cleaning and sanitising.

Conclusion

Our investigation sought to understand the teaching practices and self-efficacy of EC teachers and quality of ECE movement environments in promoting and facilitating physical activity for young children in NZ, licensed ECE. Both task and barrier EC teacher self-efficacy results indicate that this sample of EC teachers expressed above moderate confidence and the quality of the ECE movement environment was adequate. The indication of disparity between EC teacher self-perception and independent assessment of the quality of the movement environment indicates there is potential for improvement, potentially utilising professional learning.

Without doubt physical activity is important from a young age, and ECE has potential for promotion of physical activity; however, factors such as EC teachers' self-efficacy and quality of the movement environment are important considerations to best facilitate positive impact. Our study findings provide an original initial insight and a compelling indication that EC teachers need additional training in this area and serves to inform a wider scale study of NZ ECE.

Chapter 3

Movement-Active-Physical-Play (M.A.P.P)

Prelude

Chapter three presents an overview of the M.A.P.P physical activity programme. Prior to my study, I met with stakeholders in young child physical activity levels during the childcare day to determine if the concept of M.A.P.P was potentially fit for purpose as a physical activity intervention. This feedback can be found in appendix A-D. M.A.P.P was designed following over 20 years working as a practitioner in the field of child development across health, sport and education and refined over three weeks with end users ECE (n = 2), leaders (n = 2) and teachers (n = 2). In 2024 M.A.P.P was published in a trade journal article to share with the ECE community in New Zealand.

The final refined version of the M.A.P.P physical activity programme including professional development (narrated webinars and readings), activity videos and character action songs was then used as part of the intervention to determine the primary outcome in my study. The M.A.P.P physical activity programme can be found as an addendum in this chapter.

Abstract

Title

Refining Physical Activity Programme Movement-Active-Physical-Play (M.A.P.P)

Background: Active play during the first five years of life is essential to the health and future wellbeing of young children. Approximately 87% of New Zealand young children access and participate in early childhood education, well above the OECD average. Experts have identified early childhood education (ECE) as a potential setting for early intervention to increase the physical activity levels of young children. Physical activity programme interventions for young children across the globe and in New Zealand have had limited success with sustainability, scalability, and environmental change within an ECE setting. Childcare-based physical activity interventions have traditionally used in-person training to improve teachers' knowledge and self-efficacy to facilitate physical activity during the childcare day.

Methods: A qualitative study design was carried out to refine the Movement-Active-Physical-Play M.A.P.P programme for a subsequent pilot cluster-randomised controlled trial. ECE (n = 2), leaders (n = 2) and teachers (n = 2) volunteered to participate. Upon completing three weeks of M.A.P.P (online professional learning including three, 30-minute webinars, readings, and activity videos) semi-structured interviews and an implementation observation were conducted. Programme feedback was collected via leaders and teachers' semi-structured interviews and observation of M.A.P.P activity delivery.

Results: Leaders and teachers reported high levels of satisfaction with M.A.P.P and a general intention to utilise the programme in the future. Several aspects were identified for development to further improve the likelihood of M.A.P.P achieving success ongoing.

Conclusion: These findings demonstrate the potential of M.A.P.P as a teacher-led physical activity programme in ECE. Participant feedback will be used to make improvements to M.A.P.P to utilise as an intervention in a future pilot randomised-controlled study.

Introduction

In recent years considerable attention has been given to increasing PA through active play during the first five years of life as it is essential to the health and future wellbeing of children (Truelove et al., 2017). Young children should in a 24-hour period spend at least 180 minutes in PA, at least 60 of those minutes in moderate-to-vigorous PA (MVPA), sedentary screen time no more than 60 minutes and good quality sleep for 10 – 13 hours (World Health Organization, 2021). Sitting less, moving more, and sleeping well are important for healthy weight gain, mental health, behaviour, improved movement, competence skills and brain development including communication skills, higher emotional and social functioning, and the ability to make good decisions (Ministry of Health, 2017). Further, there is general agreement that being healthy in the early years generally sets children up for wellbeing across their life course (World Health Organization, 2019).

A quarter of four-year-old children in New Zealand (NZ) evidently choose to spend their free time (n=1568, 26%) doing active things whereas a third (n = 1859, 30%) regularly chose inactive things. The remainder (n = 2725, 44%) were just as likely to choose an active as inactive thing to do, confirming that young children spend a small proportion of time being active and have high levels of inactivity (Butler et al. 2021).

Education begins for most young children well before they are five with enrolment in early childhood education (ECE) continuing to rise, and the Organisation for Economic Cooperation and Development (OECD) stating that 71% of young children access and participate in an ECE setting internationally (Coe, 2020; Vaughn et al., 2021). 87% of NZ young children access and participate in ECE settings, well above the OECD average (OECD, 2015). Therefore, ECE have potential to influence the promotion of healthy PA behaviours in early childhood and early childhood is when health related habits are established (Goldfield et al., 2012; Jones et al., 2013). Thus, ECE may represent a setting of impact for PA interventions to gain reach to this cohort (Vanderloo et al., 2014). However, Gibbons (2015) noted there appears to be a concerning lack of collaboration regarding what teachers should know and do about health in the early childhood curriculum; or about how knowledge of health could and should be evident in the early childhood curriculum. This indicates that curriculum practice does not match curriculum purpose in relation to health. Further, Tesar (2015) stated that in NZ, the landscape of ECE is very complex and convoluted and refers to the range of services and ideas that allow children, mostly under the age of five, to be enrolled in early years services with diverse purposes, scope and focus on different philosophies and age groups.

According to Tucker et al. (2022) for young children attending ECE, teachers serve as their primary daytime role models and are responsible for promoting, participating in, and

scheduling PA. To maintain a license with the NZ Ministry of Education (MOE) to operate ECE, minimum standards must be met. These relate to such things as teacher-child ratios, space, health & safety, and delivery of the legislated curriculum where teachers are responsible for decision making about curriculum opportunities (Ministry of Education, 2017). Furthermore, the Active Play for Under 5 Guidelines 4.11, in relation to the NZ Health Strategy states that ECE are to ensure that PA is incorporated into daily routine and curriculum in formal childcare settings or institutions (Dutton, 2017), accordingly, PA is an essential thread in the NZ bi-cultural ECE curriculum Te Whāriki.

Although there is legislation, regulation, strategy, and curriculum supporting PA in ECE, worryingly teachers have communicated that they lack the education, body of knowledge and self-efficacy to confidently deliver (plan, implement and participate) in PA for young children (Aadland et al., 2020). Studies such as Foulkes et al. (2020) agree and revealed there was limited understanding about the concept of PA among teachers. Furthermore, key messages from J.S. Gerhis (2014) described how teachers felt they would benefit from more training about movement activities, and discussed their limited preparation and in-service training regarding children's movement. Sadly, in NZ it is of concern that initial teacher education (ITE) programmes may allocate only a minimum number of hours to address childhood physical activity (and nutrition) because domain-specific knowledge (e.g. subject content) is not always taught in-depth to ECE teachers (McLachlan et al., 2017). These messages reflect The World Health Organization (2021) Global Standards for ECE environments which is to respond to the needs of teachers, who reported needing greater guidance on how to promote PA and manage appropriate levels of SB (including screen time) and reduce long periods of sitting.

In the context of physical inactivity and its growing prevalence in young children, experts have confirmed ECE as a setting of impact for early intervention (Coe, 2020). Despite evidence of young children spending much of their time in sedentary activities, few PA interventions have focused on increasing young child PA levels (Howie et al., 2014). Overall, PA interventions in ECE have shown mixed results with most interventions only reporting moderate effects on PA outcomes (Ardoin & Bowers, 2020; Bourke et al., 2023; Finch et al., 2016; Grady et al., 2024; Jerebine et al., 2024). Several factors may be contributing to these modest changes such as study duration, length of follow up, intervention approach and level of intervention fidelity (Strooband et al., 2018). Therefore, the purpose of this study was to refine M.A.P.P as a potentially sustainable and scalable teacher-led PA programme delivered during the childcare day.

M.A.P.P aims to increase teacher self-efficacy in PA behaviours and positively impact PA opportunities for children with a programme that includes an alignment to the NZ early years

bicultural curriculum Te Whāriki, easy accessibility (online), self-paced with a focus on child development to improve teacher knowledge (of and in) PA practice.

Study Objective

The aim of leaders and teachers refining the M.A.P.P programme was to collect data to determine if the approach of M.A.P.P as a PA programme in ECE is potentially sustainable and scalable to improve PA quality and quantity for young children during the childcare day. M.A.P.P has been developed for future use in ECE to carry out a pilot cluster-randomised controlled trial. The primary objective of refining PA programme M.A.P.P was testing the design of the programme for implementation within an ECE by teachers.

Methods

1.1 Study Design

Our design was informed by Social Cognitive Theory where in the context of ECE, teachers act as role models for children's PA and the interaction between teacher self-efficacy and quality of the movement environment forms a dynamic system where positive teacher beliefs lead to better physical outcomes for children (Bandura, 1986). The M.A.P.P programme intervention was primarily refined with a participatory design approach in ECE with leaders and teachers (Cumbo & Selwyn, 2022). Teachers participated in the M.A.P.P programme that included three-weeks of online professional learning, readings and M.A.P.P activities, including the character action songs of Max, Ann, Pirie and Pip. The activities are designed to support PA opportunities in ECE, via teacher provision and increase child PA levels based on the holistic child development view as reflected in the M.A.P.P infographic (figure 1). All M.A.P.P activities are flexible and adaptable, such as being carried out indoors or outdoors, anytime of the day, in small or large spaces and adjusted to local context. On the fifth day of each week teachers and children have the opportunity to choose previous activities rather than a prescriptive session. Additionally, M.A.P.P activities have been designed to utilise active play or PA equipment that an ECE would already typically have.

Our study comprised qualitative methods with one data collection timepoint post M.A.P.P testing period. Data included semi-structured interviews, and direct observation to evaluate the effectiveness of M.A.P.P as a teacher-led PA programme in ECE.

A sample of leaders ($n = 2$) and teachers ($n = 2$) were interviewed to gain in-depth feedback on M.A.P.P implementation, content, and delivery. All interviews were 30-45 min and were digitally recorded and transcribed verbatim. Interviews with leaders and teachers provided a perspective on the M.A.P.P programme content, alignment with curriculum objectives, child

engagement and any alterations that may improve the programme. Table 3.1 describes the semi-structured interview schedule of questions.

Table 3.1: Interview schedule of questions

Topic area	Questions
Enjoyment	What M.A.P.P activity did you like best and why? What M.A.P.P activity did you like the least and why?
Implementation	What was the best time of the day to deliver M.A.P.P activities? Where was the best place to deliver M.A.P.P activities, indoors or outdoors? Were the M.A.P.P activities easy to follow? Were the children interested in joining in? Were there components of risk for children carrying out M.A.P.P activities, if so, what? Would you continue with M.A.P.P activities? Did children stay for the entirety of the activity session?
Implementation Variations	Did you have enough equipment for the session? What would you change and why? What would you keep the same and why?

Data collection was carried out in July 2022, when the effects of COVID-19 were still evident. In NZ the national lockdown and continued disruption caused by COVID-19 instigated a dramatic shift in the way that ECE operate. These shifts were acknowledged as having the potential to impact on the learning and wellbeing of children in ECE (Education Review Office, 2021).

Ethics approval was obtained from the research ethics committee of the Auckland University of Technology, NZ on 12 April 2022. ECE, leaders and teachers were provided information sheets, and all completed signed written consent forms.

2.2 Recruitment and Participants

Two ECE from chapter two volunteered to participate in refining the M.A.P.P physical activity programme. Table 3.2 describes study participants characteristics.

Table 3.2: Study Participant Characteristics

Participant	Number (n)	Description	Sex
Early Childhood Education (ECE)	2	Ministry of Education licensed	
Leader	2	Qualified and registered	Female
Teacher	2	Qualified and registered	Female

2.3 Measures

Outcome measures were collected from ECE (n = 2) post 3-weeks by the primary author in July 2022. Semi-structured interviews were carried out with leaders (n = 2) and teachers (n = 2). Data collection included an observation of teacher implementation adherence of a M.A.P.P activity session between the hours of 8am and 4pm.

2.4 Refining M.A.P. P Programme

Figure 3.1 Movement-Active-Physical-Play (M.A.P.P) infographic

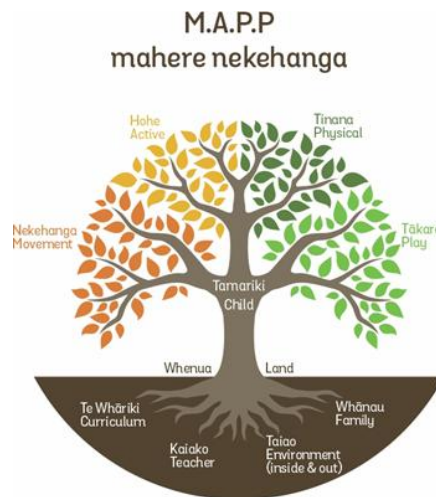


Figure 3.1 displays the M.A.P.P infographic design. The M.A.P.P infographic was designed to visually reflect the influences on a child in an ECE setting and the inter-connected, overlapping role that all components play to ensure a child has a positive identity as a physically active learner, a sense of well-being and connection to their world around them. Critically, at the centre of the M.A.P.P design is the holistic view of the child who is surrounded and supported by family, environment, teachers, ECE curriculum, environment, movement, active, physical, play. M.A.P.P is designed to be a physically nourishing PA programme and teaching resource providing quality professional development for teachers, including an online platform for pre-recorded webinars and activities. Additionally, M.A.P.P has been designed to connect the three domains of development physical, social-emotional and cognitive together in a developmentally appropriate, scalable, and sustainable way for teachers to deliver daily meaningful, quality, and fun PA for young children. The programme has been inspired by the Māori (indigenous people of NZ) holistic model of health Te Whare Tapa Whā, whenua (land, roots), taha tinana (physical wellbeing), taha wairua (spiritual wellbeing), taha hinengaro (mental wellbeing), taha whānau (family & social). M.A.P.P has been designed from a non-indigenous worldview, recognising the NZ early childhood curriculum Te Whāriki as bi-cultural. Te Whāriki is heralded as the first bicultural curriculum not only in NZ, but in the world (Tesar, 2015).

Importantly, PA is a key thread in the sum of planned and unplanned experiences in the early childhood curriculum in NZ. M.A.P.P has been developed to connect to the pedagogical principles of the curriculum, whakamana (empowerment), kotahitanga (holistic development), whanau tangata (family & community) and ngā hō ngonga (relationships) (Ministry of Education, 2017b). Further, learning outcomes are connected to curriculum pedagogical strands, such as exploration, moving confidently and challenging themselves physically (Ministry of Education, 2017b). Moreover, to create an environment that is physically comfortable and emotionally secure, M.A.P.P activity sessions can be adapted by teachers

and young children to weave in their own unique context. Activities are designed to be completed in a flexible fashion to ensure that it is not a barrier to action the M.A.P.P programme for young children.

There are three M.A.P.P webinars and readings being refined, these are in sequential order and made-up of PA in ECE, active teaching and planning for PA in ECE. Webinars are online, narrated and pre-recorded to enable teachers to view at a time that best suits them. The professional learning is self-paced and was designed to be completed during work hours when teachers were not teaching (non-contact time) children and to take no longer than 30 minutes. Each week teachers are encouraged to watch one webinar, engage in the prescribed reading, and implement their new knowledge with children during the childcare day. Each webinar and reading builds knowledge on the last, scaffolding learning for teachers so they can prioritise child interest in both intentional planning, spontaneous active play, and environmental provocations for PA.

Each M.A.P.P activity is pre-recorded, and children are invited to join the characters of Max, Ann, Piri and Pip on their experiential movement adventures through action songs. Activities have an element of predictability and routine with each activity beginning with high energy music and ending with hand on heart walking. Activity sessions are flexible and can be carried out inside or outside at any time of the day with fun as a priority. M.A.P.P activities can be adapted by teachers and children to weave in their own unique context, where PA is a key thread in the sum of planned and unplanned experiences in Te Whāriki curriculum in NZ.

Teachers are encouraged to take an active teaching role (M.A.P.P Motivator) in the delivery of the M.A.P.P activities. However, there is no reliance on teacher's as physical role models, they can use the pre-recorded activity videos of young children that are a variety of ages, sex and ethnicity carrying out M.A.P.P activities. Further, M.A.P.P is designed support teachers' assessment for learning knowledge, to notice, recognise and respond to the phenomena (PA) they are observing and engage with the knowledge provided in the professional learning segment of M.A.P.P.

All M.A.P.P character's love to dance to music every day and are an extension of M.A.P.P activities to support teacher professional learning. Providing an 'at a glance' visual aid to both teacher's and children on a nourishing daily movement diet that encompasses different ways of moving for optimal child development. A goal of the characters and character action songs was to inspire children to extend the movement behaviours of the characters into their child-led play during the childcare day and for teachers to ensure the ECE environment (indoors and outdoors) is set up to enable and inspire children to move in these different ways. Each character has their own action song and further active reading suggestions to encourage

teachers to not only take an active teaching role but to integrate physical activity into other areas of the curriculum, such as reading and storytelling, ultimately active literacy or numeracy. Table 3.3 displays the four M.A.P. P characters and movement characteristics.

Table 3.3. M.A.P.P Characters and Characteristics

Characters		Characteristics
Movement Max		Rolling, spinning, upside down, locomotion (moving from one place to another in different ways, directions, and speeds), such as stretching, crawling and bear walking. (Vestibular development)
Active Ann		Running, hopping, skipping, jumping, throwing, catching, bouncing, galloping, leaping, kicking. (Fundamental movement skills and midline development)
Physical Piri		Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling (Proprioception and power)
Playful Pip		Enjoys lots of time, space with moveable equipment to explore experiential learning in her own way, guided and supported by active teaching. (Spatial and body awareness)

M.A.P.P professional learning directs teachers to implement a daily (5-days) 15-minute activity session, either electronically (via pre-recorded activity video), role modelled in-person, or a combination of both approaches. Table 3.4 displays the M.A.P.P professional learning for teachers.

Table 3.4. M.A.P.P Professional Development programme

Week 1	Physical Activity in ECE	Narrated webinar	Reading	Monday Tuesday Wednesday Thursday Friday	Activity video Movement Max action song Activity video Active Ann action song Activity video Physical Piri action song Activity video Playful Pip action song Favourite M.A.P.P activities and action song of the week
Week 2	Active Teaching	Narrated webinar	Reading	Monday Tuesday Wednesday Thursday Friday	Activity video Movement Max action song Activity video Active Ann action song Activity video Physical Piri action song Activity video Playful Pip action song Favourite M.A.P.P activities and action song of the week
Week 3	Planning for Physical Activity	Narrated webinar	Reading	Monday Tuesday	Activity video Movement Max action song Activity video Active Ann action song

				Wednesday	Activity video
				Thursday	Physical Piri action song
				Friday	Activity video
					Playful Pip action song
					Favourite M.A.P.P
					activities and action
					song of the week

Supportive, Active, Autonomous, Fair, Enjoyable (SAAFE) principles represent an evidence-based framework designed to guide the planning, delivery and evaluation of organized PA sessions in school, community sport and ASPs (Lubans et al., 2017). SAAFE has been adapted by the primary author to reflect organised PA in an ECE with a M.A.P.P Motivator (Active Teacher). Table 3.5 displays the SAAFE teaching principles and M.A.P.P Motivator (Active Teacher) principles.

Table 3.5. M.A.P.P Motivator (Active EC Teacher) Role.

SAAFE teaching principles	Active Teacher: M.A.P.P Motivator Role
Supportive	Supportive
Teachers and students facilitate a supportive environment.	EC teachers provide encouragement to young children, using phrases such as “I can try”.
Active	Active
Lessons involve high levels of physical activity and minimal transition time.	Teacher-led physical activity is highly active with minimal transition time.
Autonomous	Autonomous
Lessons involve opportunities for student choice and graded tasks.	Young children choose how they participate.
Fair	Fair
All students provided with opportunities to experience success.	Equity opportunity for all young children to participate.
Enjoyable	Enjoyable
Lessons are enjoyable with a variety of activities.	Fun is the focus.

Table 3.6 displays week one M.A.P.P activities for teacher delivery.

Table 3.6. M.A.P.P activities week 1.

M.A.P.P Motivator (Active Teacher Role)	Activity 1 PA in ECE	Warm- Up	Skill Session	Activity (see video week 1)	Warm-Down
Actively support/ invite children to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for children to join you.</i>			Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the children are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for children to lead.</i>
<u>Monday</u> Movement Max action song	Bear walk		Have children on the floor on their hands and knees, encourage them to lift both knees off the floor, they are now in bear walk position, repeat	Have children in bear walk position and encourage them to move forwards, moving right hand and left leg (opposition movement), do this slowly, repeat other side. Co- construct a bear walking/ running track.	
<u>Tuesday</u> Active Ann	Twist up and down		Keep both feet planted on floor (use	Play a game of 'simon says'.	

action song			a chalk circle or something similar), twist at hips lifting one heel off the ground, swinging the arms.	Put your hands on different body parts, hips, knees, toes, elbows, ankles, Swing your arms and twist your hips like a washing machine. See if you can do the twist all the way to the floor and back up again without falling over. one way, then the other.	
<u>Wednesday</u> Physical Piri action song	Frog squat (refer to Leaping Lyle)		Find and stand in a hula hoop, your lily pad, pretend you are a frog and bend your knees, keeping your eyes on me and see if you can lay an imaginary egg, be sure not to leave your hula hoop lily pad.	See if you can lay 5 pretend eggs in your lily pad, then jump with two feet straight up and down, then lay another 5 eggs, how eggs can you lay– repeat as often as child interest allows.	
<u>Thursday</u> Playful Pip Action song	Spin around		Have children stand with two feet on the floor, encourage them to put	Have children stand with two feet on the floor and give themselves a hug, encourage	

			their arms out to their sides like an aeroplane. Encourage them to move around like an aeroplane.	them to turn all the way around, spinning 5 times in one direction, 5 times the other, then freeze like a snowman. Repeat as often as children want to participate.	
<u>Friday</u> M.A.P.P All character action songs	Create a teacher or child led M.A.P.P circuit of favourite activities for the week.				

Teachers carried out the M.A.P.P programme with young children for three weeks as part of the refine process. The daily scheduling and selection of M.A.P.P activities were at each teacher's discretion; however, the professional learning component of M.A.P.P, including online narrated webinar and readings were designed to provide support to teachers' self-efficacy in delivering activities.

Results

Intervention Fidelity

Fidelity of the activity session was measured by an observation carried out by the primary author utilising the ECE modified SAAFE teacher principles as a checklist (see Table 5) and adherence to the M.A.P.P activity protocol.

A total of 15 M.A.P.P sessions were delivered, indicating a 100% adherence as reported by teachers

Intervention Acceptability

Best and worst M.A.P.P activity

The best M.A.P.P activity as described by teachers was bear walking. Reasons for this were reported as levels of engagement with children was high, the activity was easily scaffolded into more challenging movements and both teacher role modelling and M.A.P.P activity video were used as teaching tools. The M.A.P.P activities liked the least were frog squat and the ribbon activity due to high levels of instruction and adding equipment to an activity changes the dynamic.

“Child engagement was high” ... “We drew a chalk line, each child had their own line, this was then scaffolded into wheel-barrow walking” ... “Too complicated to explain instructions to children” ... “As soon as you add equipment the session becomes chaotic”.

Implementation

Participants reported that M.A.P.P could be and was delivered at any time during the day, either morning or afternoon that best suited existing daily routines. Professional learning was carried out at the beginning of each week if possible. Most activity sessions were delivered outdoors due to the time taken to move furniture around indoors to create room for movement, however activities were noted as being easy to follow as they were short and repetitive. Children flowed in and out of the activity session with the high energy music warm-up acting as an activator for action and addition to predictability and routine of the childcare day. Walking with hand on heart to cool down and character action songs created an opportunity for cross-curricular links to support learning outcomes. Once children were familiar with M.A.P.P activities and action songs these were observed in their active play, both independently and in groups, with some children leading a spontaneous activity session. All participants agreed that they would carry on with the M.A.P.P programme.

“When indoors we had to move furniture to create space” ... “no risk, we just had to ensure good space if doing activities inside” ... “Group activity was easy to add to existing routine” ... “teacher role modelling and activity video were a good combination” ... “15 minutes was just the right amount of time” ... “We would watch the webinar, activities and do the reading on a Monday morning”... “Teaching team is continuing to use M.A.P.P as a teaching tool with children that they notice need physical activity to support wellbeing, social competence and learning”... “M.A.P.P provided professional learning and activities to empower the teaching team to deliver quality physical activity experiences that is able to be adapted to use within local curriculum”.

The most common items to keep the same were connected to teaching practice and embedding PA as a priority into daily routines to connecting to curriculum goals and outcomes. Also, information to share with parents on the value of PA for their child and the role that it

plays in learning. Notably, M.A.P.P was stated to be inclusive for all, not just able-bodied teachers or children.

“Love the alliteration and rich oral language in the action songs” ... “iPad a great teaching tool alongside role modelling” ... “physical activity curriculum links” ... “information for the noticeboard to engage with parents”.

Implementation Challenges

The most common item reported as a challenge was the M.A.P.P layout and technology. The use of technology as a tool within ECE and accessibility to ‘Wi-Fi’ to ensure a seamless transition into M.A.P.P activities via the iPad was reported as a challenge.

“Add a M.A.P.P implementation guide with room to make notes” ... “Print out of M.A.P.P, we would like a hard copy as well” ... “technology challenges if no Wi-Fi, being able to access M.A.P.P offline” ... “A zoom meeting for questions”.

After identifying strengths and weaknesses of M.A.P.P appropriate changes were made prior to a pilot cluster-randomised controlled trial.

Discussion

The M.A.P.P programme intervention was primarily refined with a participatory design approach in ECE with leaders and teachers. Participatory design is made up of four distinguishing features, a socio-ethical orientation to empowering whole communities, strong forms of equitable participation, developing rich understandings of participants’ practice and participatory design as a process of designing a tangible product (Cumbo & Selwyn, 2022). The Scandinavian participatory design principle of giving all users a voice and influence over design outcomes is understandably a prominent issue when conducting participatory design with children and adults, where methods encourage mutual learning about the diverse forms of knowledge, practice and perspectives (Bratteteig et al., 2012). At its core, participatory design can be defined as an approach to support mutual learning through equitable partnerships of communities and experts through the design of an intervention, derived from Scandinavian Cooperative Design in the 1960s (Bødker et al., 2000; Kensing et al., 1998). Hnatiuk et al. (2019) agree with this design process and suggest pilot testing materials with those involved would be the most efficacious mechanism for increasing young child MVPA levels.

As such, the M.A.P.P programme was refined via ECE leader and teacher feedback to be an engaging method of education for teachers, differing from the traditional approach of a face-to-face workshop. The online approach to professional learning is similar to Tucker et al.

(2022) quasi-experimental study training pre-service early childhood educators in physical activity (TEACH). Other interventions have been developed to better support ECE in promoting active behaviours among young children, such as 'Jump Start' by Okely et al. (2020) where ECE curriculum has been integrated into professional learning resources for positive health outcomes for children via teacher provision.

Strengths of the M.A.P.P programme as reported by participants was all ability access, including pre-recorded activities for both teachers and children. Along with the originality of the M.A.P.P characters and action songs to support increasing young child PA to ensure a well-balanced movement diet through both structured (teacher-led) and unstructured (child-led) active play. However, our findings must be viewed in light of the following limitations, the small sample size impacting generalization, recruitment occurred during COVID-19, and during this time the ECE sector experienced significant challenges including low staff numbers and significant competing demands (Education Review Office, 2021). Furthermore, the use of technology as a tool within ECE and accessibility to 'Wi-Fi' to ensure a seamless transition into M.A.P.P activities via the iPad was reported as a challenge. Although a participatory design approach was used at one timepoint in the final refinement of the M.A.P.P programme features of this design could be used at more than one timepoint in future studies to strengthen ECE as a health promoting environment for young children via teacher provision.

Therefore, refining of M.A.P.P provided an opportunity for the primary author to walk alongside leaders and teachers in ECE in a participatory design approach. To observe, reflect and collect data on the potential implementation, sustainability, and scalability of the M.A.P.P programme intervention for future use in a pilot cluster-randomised controlled trial.

Conclusion

ECE leaders and teachers provided feedback to refine the M.A.P.P programme and ensure it was fit for purpose. They were satisfied with their experience and would continue to use M.A.P.P. Thus, M.A.P.P has potential as an online intervention to improve teachers' knowledge and self-efficacy in PA behaviours, ECE has potential to become an environment to promote a physically active learner, and children may become physically active learners.

Supplementary Data

Figure 3.2 displays the intervention M.A.P.P pack delivered to ECE participants in the refine process.

Figure 3.2 M.A.P.P Back Pack



M.A.P.P equipment and resources were delivered to ECE in a backpack which was made up of an iPad, A Moving Child is a Learning Child book (referred to in readings), monkey bar certificates, evolution of movement (A4), evolution of movement (poster), balloon ball with balloons, bean bag, skipping rope, hula hoop, stretchy lycra and ribbons. Figure 4 displays an ECE noticeboard with M.A.P.P information for parents.

Figure 3.4 ECE Parent Noticeboard

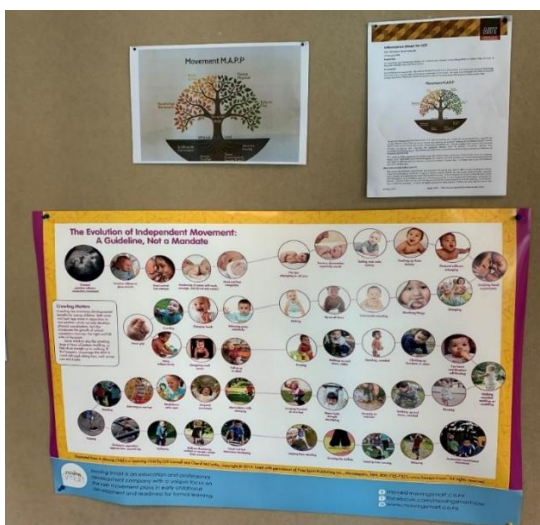


Figure 3.4 displays the infographic image of M.A.P.P, participant information sheet and evolution of movement poster that was exhibited on the parent noticeboard in the foyer of one of the ECE in the study.

Movement Max Action song

Max is a mega, mighty, magnificent, kid. He loves to sing, dance and move everyday. Max enjoys adventures everyday with his movement friends, Active Ann, Physical Piri and Playful Pip. Together they

- spin,
- run,
- push
- hop on one foot, then the other

Can you move like mega, mighty, magnificent, Max and his friends? Lets try now!

- Spin around, one direction then the other
- Run on the spot, fast feet, slow feet
- Give yourself a high 5 and squeeze your hands together
- Hop on one foot (5 times), the other foot (5 times)

Movement Max, Movement Max, Moving, Moving, Moving Max

Lets spin, lets spin, lets spin let's wind up

lets go this way, lets go that way, lets go this way, lets go that way

lets go up, lets go down, lets take our bodies upside down

lets go round and round and round

then STOP

Lets spin, lets spin, lets spin, lets unwind

Lets go this way, lets go that way, lets go this way, lets go that way

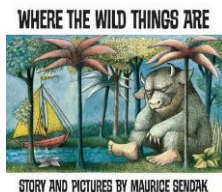
Lets go up, lets go down, lets take our bodies upside down

Lets go round and round and round

Then STOP - Repeat as often as the children want to participate

Oh what a busy day for mega, mighty, magnificent, Max , he is ready for a drink of water before he starts Moving again! Lets get a drink of water! See you soon!

Further Active Reading: *Where the Wild Things Are* by Maurice Sendak



Active Ann Action song

Active Ann is an awesome, amazing, agile, kid. She loves to sing, dance and move everyday.

Active Ann enjoys adventures everyday with her movement friends, **Movement Max**, **Physical Piri** and **Playful Pip**. Together they

- spin
- run,
- push (give yourself a high 5 and hold., squeeze it tight),
- hop on one foot, then the other

Can you move like awesome, amazing, agile **Active Ann** and her friends? Lets try now!

- Spin around, one direction, then the other
- Run on the spot, fast feet, slow feet
- Give yourself a high 5 and squeeze your hands together
- Hop on one foot (5 times), the other foot (5 times)

Active Ann, Active Ann, active, active, active Ann

Lets run, lets run, lets run lets wind up

lets go this way, lets go that way, lets go this way, lets go that way

lets go up, lets go down, lets take our bodies upside down

lets go round and round and round

then STOP

Lets run, lets run, lets run lets unwind

Lets go this way, lets go that way, lets go this way, lets go that way

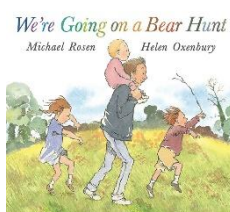
Lets go up, lets go down, lets take our bodies upside down

Lets go round and round and round

Then STOP

Repeat as often as the children want to participate

Oh what a busy day for awesome, amazing, agile **Active Ann**, she is ready for a drink of water before she starts being active again! Lets get a drink of water! See you soon!



Further Active Reading: *We're Going on A Bear Hunt*

Physical Piri Action Song

Piri is a proud, purposeful, physical kid. He loves to sing, dance and move everyday.

Piri enjoys adventures everyday with his movement friends, Movement Max, Active Ann, and Playful Pip. Together they

- spin,
- run,
- push (give yourself a high 5 and hold., squeeze it tight),
- hop on one foot, then the other

Can you move like physical Piri and his friends? Lets try now!

- Spin around, one direction, then the other
- Run on the spot
- Push (give yourself a high 5 and hold., squeeze it tight),
- Hop on one foot (5 times), the other foot (5 times)

Physical Piri, Physical Piri, physical, physical, physical Piri

Lets squeeze and squat, lets squeeze and squat, lets squeeze and squat, lets wind up

lets go this way, lets go that way, lets go this way, lets go that way

lets go up, lets go down, lets take our bodies upside down

lets go round and round and round

then STOP

Lets squeeze and squat, lets squeeze and squat, lets squeeze and squat

lets unwind

Lets go this way, lets go that way, lets go this way. Lets go that way

Lets go up, lets go down, lets take our bodies upside down

Lets go round and round and round

Then STOP

Repeat as often as the children want to participate

Oh what a busy day for Physical Piri , he is ready for a drink of water before he starts Moving again! Lets get a drink of water! See you soon!



Further Action Reading: *Leaping Lyle*

Playful Pip Action song

Pip is a peaceful, perky, playful kid. She loves to sing, dance and move everyday.

Pip enjoys adventures everyday with her movement friends, Movement Max, Active Ann, and Physical Piri. Together they

- spin,
- run,
- push (Give yourself a high 5 and squeeze your hands together and hold them tight)
- hop on one foot, then the other

Can you move like Playful Pip and her friends? Lets try now!

- Spin around, one direction, then the other
- Run on the spot, fast feet, slow feet
- Push (Give yourself a high 5 and squeeze your hands together and hold them tight)
- Hop on one foot (5 times), the other foot (5 times)

Playful Pip, Playful Pip, playful, playful, playful, Pip

Lets hop and jump, lets hop and jump, lets hop and jump, lets wind up

lets go this way, lets go that way, lets go this way, lets go that way

lets go up, lets go down, lets take our bodies upside down

lets go round and round and round then STOP

Lets hop and jump, lets hop and jump, lets hop and jump, lets unwind

Lets go this way, lets go that way, lets go this way, lets go that way

Lets go up, lets go down, lets take our bodies upside down

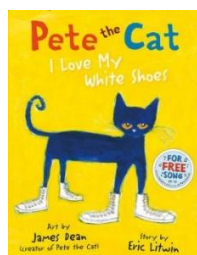
Lets go round and round and round

Then STOP

Repeat as often as the children want to participate

Oh what a busy day for peaceful, perky, playful Pip, she is ready for a drink of water before she starts Moving again! Lets get a drink of water! See you soon!

Further Action Reading: *Pete the Cat and I Love My White Shoes*



Title

Introducing Movement-Active-Physical-Play (M.A.P.P) Programme and Teaching Resource

Background

The Movement-Active-Physical-Play (M.A.P.P) programme and teaching resource was developed following over twenty years' experience working alongside children, their families, EC teachers and ECE centres unpacking the role that movement and nature play in child development whilst raising three sons with husband Colin. My previous work as co-Director of Moving Smart New Zealand, Director of TimberNook New Zealand and early years project lead and Trustee for the Hawkes Bay Institute of Sport & Health connects me to my special interest in linking health and education for the best outcomes for children. In 2016 I co-authored movement curriculum Move, Play & Learn with Smart Steps that was published in the USA, (Connell et al., 2016), and in 2019 Founder, Director, and Curriculum Lead of the DEN, a unique and innovative ECE centre for children two to six years located on two-acres of outdoor play space.

2024 begins my final year of Doctoral study at the Auckland University of Technology (AUT) investigating the feasibility and preliminary efficacy of a scalable and sustainable teacher-led physical activity programme in ECE centres in New Zealand. M.A.P.P has been designed to support EC teachers and ECE centres in noticing, recognising, and responding to physical activity as learning and increasing child levels of physical activity through active play opportunities.

In recent years considerable attention has been given to increasing physical activity through active play during the first five years of life as it is essential to the health and future wellbeing of children. It is so important it is recognised under the United Nations Convention on the Rights of the Child (1992). Furthermore, young children should in a 24-hour period spend at least 180 minutes in physical activity, at least 60 of those minutes in moderate-to-vigorous physical activity (MVPA), sedentary screen time no more than 60 minutes and good quality sleep for 10–13 hours (Ministry of Health, 2017).

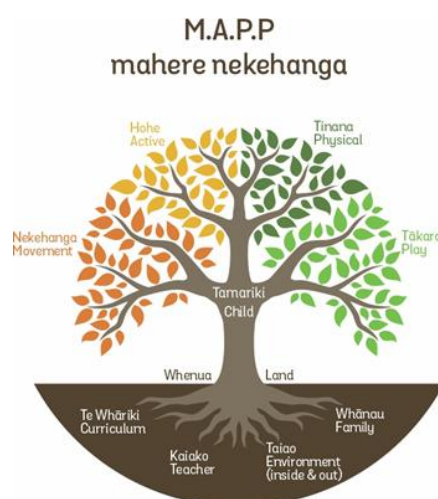
Significantly, Butler et al. (2021) found that in a parent-reported item about how four-year-old children in New Zealand choose to spend their free time if given a choice (n = 1568, 26%) chose to do active things whereas (n = 1859, 30%) regularly chose inactive things. The remainder (n = 2725, 44%) were just as likely to choose an active as an inactive thing to do, confirming that young children spend a small proportion of time being active and have high levels of inactivity. Further, there is general agreement that being healthy in the early years

generally sets children up for wellbeing across their life course (World Health Organization, 2019).

Education begins for most young children well before they are five with enrolment in early childhood education (ECE) continuing to rise and 87% of New Zealand young children access and participate in ECE, well above the OECD average of 71% (OECD, 2015). According to Tucker et al. (2022) for young children attending ECE centres, teachers serve as their primary daytime role models and although there is legislation, regulation, strategy, and curriculum supporting physical activity in ECE centres, worryingly EC teachers have communicated that they lack the education, body of knowledge and self-efficacy to confidently deliver (plan, implement and participate) physical activity for young children (Aadland et al., 2020) .

In the context of physical inactivity and its growing prevalence in young children, experts have confirmed ECE as a setting of impact for early intervention (Coe, 2020). Therefore, M.A.P.P was developed as a sustainable and scalable online physical activity programme and teaching resource in early childhood centres. I am grateful to the two ECE centres and EC teachers who piloted and provided valuable feedback in the final development of M.A.P.P over a 3-week period. Once refined M.A.P.P was used in a pilot cluster-randomised controlled trial.

Figure 3.1 Movement-Active-Physical-Play (M.A.P.P) infographic



The M.A.P.P infographic was designed to visually reflect the influencers on a child in an ECE centre and the inter-connected, overlapping role that all components play to ensure a child has a positive identity as a physically active learner, a sense of well-being and connection to

their world around them. M.A.P.P is designed to be a physically nourishing programme and teaching resource providing quality professional development for EC teacher, connecting the three domains of development physical, social-emotional and cognitive together. The programme has been inspired by the Māori holistic model of health Te Whare Tapa Whā, whenua (land, roots), taha tinana (physical wellbeing), taha wairua (spiritual wellbeing), taha hinengaro (mental wellbeing), taha whānau (family & social). Furthermore, M.A.P.P has been designed from a non-indigenous worldview, recognising the New Zealand early childhood curriculum Te Whāriki as bi-cultural. Te Whāriki is heralded as the first bicultural curriculum not only in New Zealand, but in the world (Tesar, 2015).

As such, M.A.P.P has been developed to connect to the pedagogical principles of the curriculum, whakamana (empowerment), kotahitanga (holistic development), whānau tangata (family & community) and ngā hō ngonga (relationships). Further, learning outcomes are connected to curriculum pedagogical strands, such as exploration, moving confidently and challenging themselves physically.

Children are invited to join the characters of Max, Ann, Piri and Pip on their experiential movement adventures through action songs. Activity sessions can be carried out inside or outside with fun as a priority. EC teachers are encouraged to take an active teaching role in the delivery of M.A.P.P activities. However, there is no reliance on EC teacher as physical role models, as they can use the pre-recorded activity videos. Further, M.A.P.P is designed to support EC teachers to notice, recognise and respond (assessment for learning) to physical activity as learning.

All M.A.P.P character's love to dance to music every day. Each character has their own action song and further active reading suggestions to encourage EC teachers to take an active teaching role. Table 3.3 displays the four M.A.P.P characters and movement characteristics.

Table 3.3. M.A.P.P Characters and Characteristics

Characters		Characteristics
Movement Max		Rolling, spinning, upside down, locomotion (moving from one place to another in different ways, directions, and speeds), such as stretching, crawling and bear walking. (Vestibular development)
Active Ann		Running, hopping, skipping, jumping, throwing, catching, bouncing, galloping, leaping, kicking. (Fundamental movement skills and midline development)
Physical Piri		Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling (Proprioception and power)
Playful Pip		Enjoys lots of time, space with moveable equipment to explore experiential learning in her own way, guided and supported by active teaching. (Spatial and body awareness)

The M.A.P.P online teaching resource is made up of narrated webinars, readings, activity videos and implementation guide to enable EC teachers to view at a time that best suits them. The professional learning is over 10-weeks, self-paced and designed to be completed during work hours when teachers are not teaching (non-contact time) and to take no longer than 30 minutes. Each week teachers are encouraged to watch one webinar, engage in the prescribed reading, and implement their new knowledge with children during the childcare day. Each webinar and reading builds knowledge on the last, scaffolding learning for EC teachers so they can prioritise child interest in intentional planning, spontaneous active play, and environmental provocations for physical activity. Activities are designed to be completed in a flexible fashion to ensure that it is not a barrier to action.

Each M.A.P.P activity is pre-recorded, with a combination of children of different ages, ethnicities, either individually or in a group. There is a level of predictability and routine in each session with a warm-up of high energy music encouraging children to participate and a cool down of walking with hand on heart to feel heartbeat and an opportunity for EC teachers to implement cross-curricula links and discuss with children their body's reaction to physical activity and the importance of drinking water after exercise. Typically, EC teachers hold a high trust relationship with children in their ECE therefore children are physically comfortable and emotionally secure to explore and try new things. See Table 3.7 for a sample of M.A.P.P professional development programme.

Table 3.7 M.A.P.P Professional development week 1.

Week 1	Physical activity in ECE	Narrated webinar	Reading	Monday Tuesday Wednesday Thursday Friday	Activity video Movement Max action song Activity video Active Ann action song Activity video Physical Piri action song Activity video Playful Pip action song Favourite M.A.P.P activities and action song of the week
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Table 3.8 M.A.P.P Monday activity.

M.A.P.P Motivator	Week 1	Warm- Up	Skill Session	Activity	Warm-Down
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(Active Teacher Role)	Physical activity in ECE			(see video week 1)	
Actively support/ invite children to session/ role model activity		High energy music and movement (3-5 minutes)			Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the children are wanting to participate.

<u>Monday</u> Movement Max action song	Bear Walk		Have children on the floor on their hands and knees, encourage them to lift both knees off the floor, they are now in bear walk position, repeat	Have children in bear walk position and encourage them to move forwards, moving right hand and left leg (opposition movement), do this slowly, repeat other side. Co-construct a bear walking/ running track.	
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The aim is that EC teachers will have increased confidence in delivering physical activity

during the childcare day resulting in increased physical activity levels for children. Where to next.....reflections on physical activity priorities for children in your ECE.

- Does your early childhood centre have a physical activity policy?
- Do you intentionally plan for physical activity experiences every day?
- Do your learning stories reflect physical activity as learning?
- Do you have pre-recorded music genres, such as high energy, nursery rhymes, calming and classical accessible in your ECE?
- Try the Movement Max activity in your ECE, notice the learning, such as head out of upright position supports the ability to be still, holding my own bodyweight on my shoulders, arms and hands builds strength to support both large and fine motor tasks.

Did you know weird is a side effect of being awesome? Be weird, the children will love you for it!

Wendy Pirie
PhD Candidate (AUT)

M.A.P.P Programme

Movement-Active-Physical-Play (M.A.P.P)			
	Content	Reading & Webinar	Activity with warm up & cool down (5 days)
Overview	Programme & Teaching Resource	15 minutes	15 minutes
Week 2	Physical Activity in ECE	30 minutes	15 minutes
Week 3	Active Teaching	30 minutes	15 minutes
Week 4	Planning for PA in ECE	30 minutes	15 minutes
Week 5	Notice PA as learning in ECE	30 minutes	15 minutes
Week 6	Recognise PA as learning in ECE	30 minutes	15 minutes
Week 7	Respond to PA as learning in ECE	30 minutes	15 minutes
Week 8	Implement		15 minutes
Week 9	Implement		15 minutes
Week 10	Implement		15 minutes

M.A.P.P Activities Implementation (each week)		
Day 1	Movement Max	video of activity
Day 2	Active Ann	video of activity
Day 3	Physical Piri	video of activity
Day 4	Playful Pip	video of activity
Day 5	M.A.P.P of all	video of activity

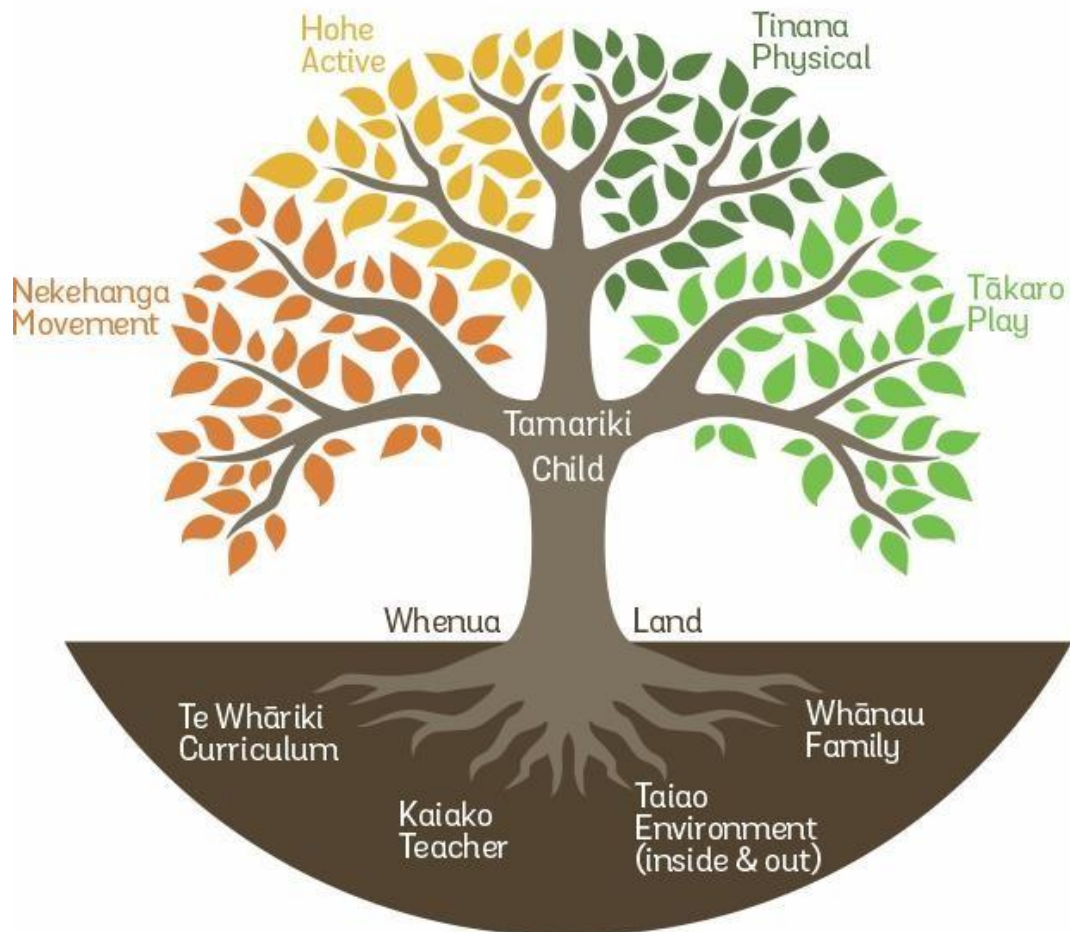
Predictability & Routine Each Activity

Warm up (music & movement)

Cool down (walking hand on heart feeling heartbeat)

Week 1: Overview

M.A.P.P mahere nekehanga



Movement: Active: Physical: Play (M.A.P.P)

Mahere nekehanga M.A.P.P is designed to be a physically nourishing physical activity programme centred and connected to and around tamariki delivered by a teacher/ Kaiako. M.A.P.P has been designed by the primary researcher based on connecting the three domains of development physical, social-emotional and cognitive together in a developmentally appropriate, scalable, and sustainable way for ECE teacher/ Kaiako to deliver daily meaningful, quality, and FUN physical activity for tamariki. The programme has been inspired by the Māori holistic model of health Te Whare Tapa Whā, whenua (land, roots), taha tinana (physical wellbeing), taha wairua (spiritual wellbeing), taha hinengaro (mental wellbeing), taha whānau (family & social). M.A.P.P has been designed from a pakeha worldview and knowledge recognising the New Zealand early childhood curriculum Te Whāriki as a bi-cultural curriculum.

Physical activity is a key thread in the sum of planned and unplanned experiences in early childhood Te Whāriki curriculum in New Zealand. M.A.P.P has been designed to connect to the pedagogical principles of Te Whāriki, whakamana (empowerment), kotahitanga (holistic development), whanau tangata (family & community) and ngā hō ngonga (relationships). Learning outcomes are connected to the pedagogical strands of the curriculum such as opportunities for tamariki to develop social and emotional competence, be leaders and all tamariki are invited to participate, never forced. To create an environment that is physically comfortable and emotionally secure. M.A.P.P sessions can be adapted by teacher/ Kaiako and tamariki to weave in their own unique context.

Each activity session is 15 minutes long and tamariki are invited to join the characters of Max, Ann, Piri and Pip on their experiential movement adventures. The programmes four characters support teacher/ Kaiako to connect with tamariki and how they might like to move on any given day. Each session begins with high energy music and music. Activity sessions can be carried out inside or outside. There is a google app of each session. Teacher/ Kaiako are encouraged in their professional learning online session (3- hours) made up of 30-minute timeslots to take an active teaching role in the delivery of the M.A.P.P activities. However, there is no reliance on teacher/ Kaiako as physical role models, they can use the google app with videos of tamariki that are a variety of ages, sex and ethnicity carrying out M.A.P.P activities.

M.A.P. P	Characters		Characteristics
Movement/ Nekehanga	Max		Rolling, spinning, upside down, locomotion (moving from one place another in different ways, directions, and speeds), such as stretching, crawling and bear walking. (Vestibular development refer to Chapter 8, page 83 A Moving Child is a Learning Child)
Active / Hohe	Ann		Running, hopping, skipping, jumping throwing, catching, bouncing, galloping, leaping, kicking. (Fundamental skills and midline development refer to Chapter 12 page 108 and Chapter 13 page 130 A Moving Child is a Learning Child)
Physical /Tinana	Piri		Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling (Proprioception and power refer Chapter 11, page 100 A Moving Child is a Learning Child)
Play / Tākaro	Pip		Enjoys lots of time, space with moveable equipment to explore experiential learning in her own way guided and supported by active teaching. (Spatial and body awareness refer to Chapter 9 page 90 A Moving Child is a Learning Child)

M.A.P.P is designed to enhance teacher/ Kaiako tools in their Kete of knowledge to **notice, recognise and respond** to the phenomena they are observing and engage with the knowledge provided in the professional learning segment of M.A.P.P. To support this teacher/ Kaiako pedagogical knowledge growth the 3-hour online professional learning is a key component of the M.A.P.P framework. The professional learning has been segmented into six 30-minute sessions to support teacher/ Kaiako activity delivery. These 30-minute professional learning sessions are designed to be carried out in teacher/ Kaiako non-contact work time during a normal workday. The sessions are designed to be completed in a flexible fashion to ensure that it is not a barrier to action the M.A.P.P programme for tamariki. Teachers/ Kaiako are provided with an online link to the professional learning sessions and will receive M.A.P.P certification when training is complete.

M.A.P.P Characters

The four_M.A.P. P characters are designed to support teacher/ Kaiako connect with tamariki and how they might like to move. All characters **LOVE** to dance to music every day.

Movement Max

Rolling, spinning, upside down, locomotion (moving from one place to another in different ways, directions, and speeds), such as stretching, crawling and bear walking. Supporting vestibular development.

Active Ann

Running, hopping, skipping, jumping, throwing, catching, bouncing, galloping, leaping, kicking. Supporting fundamental movement skills and midline development.

Physical Piri

Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling. Supporting proprioception and power development.

Playful Pip

Enjoys lots of time, space with portable equipment to explore experiential learning in her own way guided and supported by active teaching. Supporting spatial and body awareness.

M.A.P.P Professional Learning

Teacher/ Kaiako Professional Learning	Mahere nekehanga (movement characters)	Movement Environment (MOVERS)
Physical Activity in ECE Webinar	Nekehanga (movement) Max	Curriculum, environment, and resources for physical

• Reading • Activity	Rolling, spinning, upside down Hohe (active) Ann Hop, skip, jump, catch, throw, leap Tinana (physical) Piri Hanging, swinging, climbing Tākaro (playful) Pip Time, space, and portable equipment	development, arranging environmental space to promote physical activity, providing resources including portable and/or fixed equipment, gross motor skills are defined as those that use the large muscle groups of the body (such as the arms, legs, and trunk) and involve movement either on the spot (for example, bending, twisting and jumping up and down) or from one location to another (such as crawling, running, skipping, throwing and kicking). Body movement to support fine motor skills
Active Teaching • Webinar • Reading • Activity		Pedagogy for physical development, staff engaging in movement with children indoors and outdoors, observation and assessment of children's physical development indoors and outdoors, planning for physical development indoors and outdoors,
Planning for Physical Activity • Webinar • Reading • Activity		Supporting physical activity and critical thinking, encouraging sustained shared thinking by communicating and interacting through physical activity, Supporting children's

		curiosity and problem-solving indoors and outdoors,
Notice Physical Activity as Learning in ECE • Webinar • Reading • Activity		Parents/carers and staff , staff inform families about children's physical development and the benefits to their learning, development, and health. Teachers notice a great deal as they work with children.
Recognise Physical Activity as Learning in ECE • Webinar • Reading • Activity		Teachers recognise some of what they notice as “learning” and strive to understand it.
Respond to Physical Activity as Learning in ECE • Webinar • Reading • Activity		Teachers will respond to a selection of what they recognise and then put their understanding to good use, through verbal, non-verbal and written feedback.

M.A.P.P Framework

M.A.P.P (SAAFE Practice)	Motivator Teaching	M.A.P.P Intensity	M.A.P.P Curriculum Connections (all relevant)	Child Development Domain
Supportive:	Teacher/ Kaiako and students facilitate a supportive environment	Moderate to vigorous physical activity (MVPA)	Well-Being/ Mana atua Belonging/ Mana whenua Contributing/ Mana tangata Communication / Mana reo Exploration / Mana aotūroa	Physical Cognitive Social & Emotional

Active: Lessons involve high levels of physical activity and minimal transition time	Moderate to vigorous physical activity (MVPA)	Well-Being/ Mana atua Belonging/ Mana whenua Contributing/ Mana tangata Communication / Mana reo Exploration / Mana aotūroa	Physical Cognitive Social & Emotional
Autonomous: Lessons involve opportunities for student choice	Moderate to vigorous physical activity (MVPA)	Well-Being/ Mana atua Belonging/ Mana whenua Contributing/ Mana tangata Communication / Mana reo Exploration / Mana aotūroa	Physical Cognitive Social & Emotional
Fair: All students provided with opportunities to experience success	Moderate to vigorous physical activity (MVPA)	Well-Being/ Mana atua Belonging/ Mana whenua Contributing/ Mana tangata Communication / Mana reo Exploration / Mana aotūroa	Physical Cognitive Social & Emotional
Enjoyable: Lessons are enjoyable with a variety of activities	Moderate to vigorous physical activity (MVPA)	Well-Being/ Mana atua Belonging/ Mana whenua Contributing/ Mana tangata Communication / Mana reo Exploration / Mana aotūroa	Physical Cognitive Social & Emotional

M.A.P.P Motivator – Active Teaching Role

Follow the **SAAFE** teacher/ Kaiako practices.

Supportive – provide encouragement to tamariki, using phrases such as “I can try”.

Active – activities are highly active with minimal transition time.

Autonomous – tamariki choose how they participate.

Fair – equity opportunity for all tamariki to participate.

Enjoyable – FUN is the focus.

M.A.P.P Intensity and Effort

Encourage tamariki increase ‘try’ to move as much as possible during M.A.P.P time, both quantity and quality of movement. Using the language of “I can try”. Physical activity that is of moderate to vigorous intensity for at least 60 minutes of the day.

Discuss with tamariki where their heart is in their body and how it works when your legs and arms move, and sometimes your breathing feels different, encourage them to place their hand on their heart and listen for the pumping, also to feel the pulse in their neck or wrist.

Encourage different ways of moving, such as change,

- Direction – backwards/ forwards/ sideways/under/ over/ through
- Speed tempo– fast/slow/ super-fast/
- Eyes open/ eyes closed

Tamariki may:

- Develop physical fitness
- Develop movement motor competency and skills
- Develop a positive attitude towards movement
- Develop perseverance and resilience – *I Can Try*

Te Whāriki Curriculum Connections: Tamariki Learning Outcomes

Well-Being/ Mana atua

- Keeping themselves healthy and caring for themselves/ te orange nui
- Managing themselves and expressing their feelings and needs / to whakahua whakaaro
- Keeping themselves and others safe from harm/ ten oho haumaru

Belonging/ Mana whenua

Making connections between people, places, and things in their world/ to waihanga hononga

- Understanding how things work here and adapting to change / te mārama ki te āhua o nga whakahaere me te mōhio ki te panoni
- Showing respect for Kaupapa, rules and the rights of others / te mahi whakaute

Contributing / Mana tangata

- Treating others fairly and including them in play / te ngākau makuru
- Recognising and appreciating their own ability to learn / te rangatiratanga
- Using a range of strategies and skills to play and learn with others / te ngākau aroha

Communication / Mana reo

- Using gesture and movement to express themselves / he kōrero a-tinana
- Understanding oral language and using it for a range of purposes / he kōrero a-waha
- Recognising print symbols and concepts and using them with enjoyment, meaning and purpose / he kōrero tuhituhi
- Recognising mathematical symbols and concepts and using them with enjoyment, meaning and purpose / he kōrero pāngarau
- Expressing their feelings and ideas using a range of material and modes / he kōrero auaha

Exploration / Mana aotūroa

- Playing, imagining, inventing and experimenting / te whakaaro me te tūhurahura I te pūtaiao
- Moving confidently and challenging themselves physically / te wero a-tinana
- Using a range of strategies for reasoning and problem solving / te hīraurau hopanga
- Making sense of their worlds by generating and refining working theories / te rangahau me te mātauranga

M.A.P.P Activities Implementation (each week)

Day 1 **Movement Max**

Day 2 **Active Ann**

Day 3 **Physical Piri**

Day 4 **Playful Pip**

Day 5 **M.A.P.P of all**

Sample of Mahere Nekehanga M.A.P.P Programme Activities

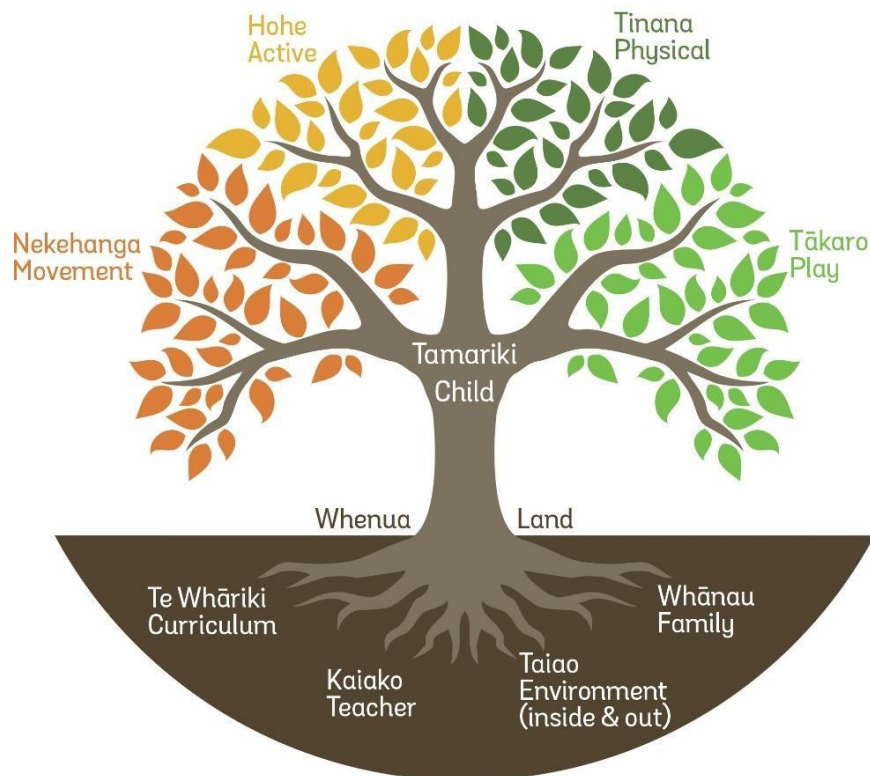
M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Movement	Warm- Up	Skill Session	Activity	Warm-Down
Actively support/ invite tamariki to session/ role model activity	Running on the spot	High energy music and movement	Running on the spot, eyes forward, head straight, pump your arms and legs	Co-construct a running track, there and back, around the cones – repeat as often as child interest allows.	Walk for 10 steps, feel your heart for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate.
Actively support/ invite tamariki to session/ role model activity	Squat	High energy music and movement	Find and stand in a hula hoop, your lily pad, pretend you are a frog and bend	See if you can lay 5 pretend eggs on your lily pad, then stretch up and jump	Walk for 10 steps, feel your heart for 10 beats, walk for 10 steps repeat as often as

			your knees, keeping your eyes on me and see if you can lay an imaginary egg, be sure not to leave your hula hoop lily pad.	with two feet to swap lily pads with the person next to you, then lay another 5 eggs, repeat as often as child interest allows.	the tamariki are wanting to participate.
Actively support/ invite tamariki to session/ role model activity	Scissor Jump	High energy music and movement	Find and stand in a hula hoop, your lily pad, stand with one foot inside the lily pad and one foot outside the lily pad, bend your knees and jump to change feet to have opposite foot on the inside and outside, using your legs like scissors, with your hands on your hips,	Layer your hoop with a friend and then both of you stand with one leg inside the hoop and one leg outside the lily pad hoop, see if you can scissor jump together changing legs until the teacher/ Kaiako claps their hands or count to 10 – repeat as often as child interest allows.	Walk for 10 steps, feel your heart for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate.

M.A.P.P Professional Learning for Teachers

Week 2: Session 1: Physical Activity in ECE

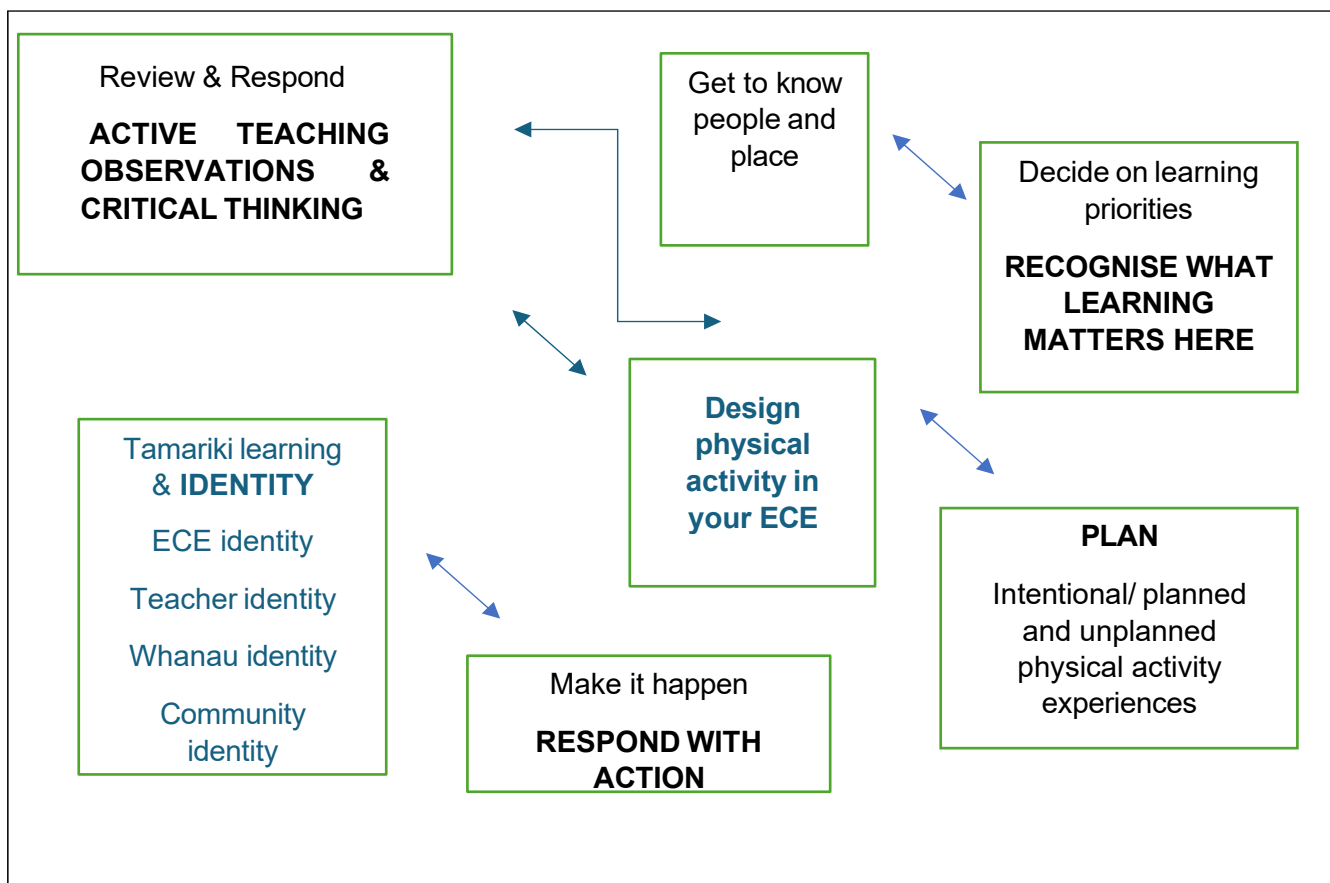
M.A.P.P mahere nekehanga



- **Week 2: Session One:** Physical activity in ECE
- **Week 3: Session Two:** Active Teaching
- **Week 4: Session Three:** Planning for physical activity
- **Week 5: Session Four:** Notice physical activity in ECE
- **Week 6: Session Five:** Recognise physical activity in ECE
- **Week 7: Session Six:** Respond to physical activity in ECE

M.A.P.P Professional Learning

Teacher/ Professional Learning (30 minutes)	Kaiako Mahere Nekehanga (movement M.A.P.P) characters	Movement Environment (MOVERS)
Physical Activity in ECE	Nekehanga (movement) Max (rolling, spinning, upside down) Vestibular development Hohe (active) Ann (march, run, hop, jump) Fundamental movement skills and midline development Tinana (physical) Piri (hang, swing, climb) Power and proprioception Tākaro (playful) Pip (time, space, moveable equipment) Spatial and body awareness	Curriculum, environment, and resources for physical development, arranging environmental space to promote physical activity, providing resources including portable and/or fixed equipment, gross motor skills are defined as those that use the large muscle groups of the body (such as the arms, legs, and trunk) and involve movement either on the spot (for example, bending, twisting and jumping up and down) or from one location to another (such as crawling, running, skipping, throwing and kicking). Body movement to support fine motor skills



Session One: Physical activity in ECE

Outline

- **What** is physical activity?
- **Why** do tamariki need physical activity?
- **When** do tamariki need to carry out PA?
- **Who** can support tamariki to carry out PA?
- **How** can I support tamariki to carry out physical activity every day?
- Introducing movement competencies
- Introducing Movement Max, Active Ann, Physical Piri, Playful Pip (M.A.P.P characters)

WHAT: Physical activity is defined as any bodily movement requiring energy expenditure. This physical nourishment takes many shapes and form such as rolling, spinning, running, and jumping but most importantly it involves non-sedentary behaviours such as sitting and lying down for extended periods of time. It is important that tamariki have the opportunity to experience a well-balanced movement diet every day. Physical activity is often termed in many different ways such as the list below, which can be confusing, see Table 1.

Table 1: Physical nourishment in early childhood education space.

Movement	An act of moving.
Active Movement	Regular physical activity
Active Play	Moving more, sitting less, sleeping well
Physical Activity	Any bodily movement produced by skeletal muscles that require energy expenditure
Physical Fitness	A state of health and wellbeing
Motor Competency	Gross movements that involve large muscle groups
Fundamental Movement Skills	Gross movement abilities that allow children to move in different ways
Physical Literacy	A combination of motivation, confidence, and competence to be active
Physical Education	Education through the physical
Sport	An activity involving physical exertion and skill in which an individual or team competes against another or others

WHY: The Ministry of Health (MOH) developed Active Play recommendations for children birth to five years <https://www.healthnavigator.org.nz/healthy-living/a/active-play-for-under-5s/>. Active Play is made up of three components; sit less, move more and sleep well. From birth to five years children develop and move most through their play. Active play encourages this development and helps children to develop the skills to be active throughout their lives (Dutton, 2017). Children 3- 5 years of age should in a 24-hour period:

- Spend at least 180 minutes in PA
- At least 60 of those minutes in moderate-to-vigorous-PA (MVPA)
- Sedentary screen time no more than 60-minutes
- Good quality sleep for 10 – 13 hours

Active play during the first five years of life is essential to the health and future wellbeing of children. It is so important that it is recognised under the United Nations Convention on the Rights of the Child. Sitting less, moving more, and sleeping well are important for healthy

weight gain, mental health, behaviour, improved movement, competence skills and brain development including communication skills, higher emotional and social functioning, and the ability to make good decisions. It is vital for the development of physical movement skills that will provide a platform for learning more complicated skills in the future (Ministry of Health, 2017).

Kia kōri tahi/ physical wellbeing in early learning describes a balanced state of body, mind and spirit where the child is a physically active and healthy learner

<https://tewhariki.tki.org.nz/en/teaching-strategies-and-resources/wellbeing/physical-wellbeing-in-early-learning/>

WHEN: Tamariki in an ECE setting need space to move both indoors and outdoors every day. They need to be provided with both planned and unplanned physical activity experiences. Often tamariki are most active outdoors in the first 10-15 minutes of going outside, so opportunities that allow time and space for active play regularly throughout the day.

WHO: Planned physical activity experiences by teachers to provide an opportunity to tamariki to participate regularly throughout the ECE day. ECE teachers role model active teaching practices and active rather than sedentary behaviours. The organisations that the role of the ECE teacher in an early learning setting is reflected in Table 2.

Table 2: Governing Organisations

Ministry of Education	Ministry of Health	Teaching Council	Education Review Office (ERO)	ECE Philosophy
Te Whāriki Curriculum	Active Play	Teacher Registration	Quality framework for evaluation and improvement in ECE	Physical Activity policy
He Māpuna te Tamaiti,				
National Education and Learning Priorities (NELP)				

HOW: Planning for **FUN** daily physical activity opportunities that meet the unique developmental needs of tamariki in your ECE.

Notice tamariki physical activity behaviours, recognise what these behaviours mean and then respond with action, either planned or unplanned (spontaneous). This may be by providing movable equipment that children can manipulate and use however they want to, such as loose parts and PE equipment.

Introduce M.A.P.P characters and their physical activity behaviours to practice, such as rolling, hanging, hopping, and skipping.

Notice if tamariki are able to mirror your movement, **recognise** that if they unable to or not interested in carrying out movement activities. **Respond** to this need by providing physical activity provocations indoors and outdoors.

M.A.P. P	Characters		Characteristics
Movement/ Nekehanga	Max		Rolling, spinning, upside down, locomotion (moving from one place another in different ways, directions, and speeds), such as stretching, crawling and bear walking. Vestibular (balance) development
Active / Hohe	Ann		Running, hopping, skipping, jumping, throwing, catching, bouncing, galloping, leaping, kicking. Fundamental movement skills and midlines

Physical / Tinana	Piri		Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling Power and proprioception
Play / Tākaro	Pip		Enjoys lots of time, space with moveable equipment to explore experiential learning in her own way guided and supported by active teaching. Spatial and body awareness

Fun Fact

The most advanced form of balance is the ability to be still. Growing your balance system (otherwise known as vestibular system) is by taking your head out of an upright position and into positions such as rolling, spinning and hanging upside down, just like M.A.P.P character Movement Max.

Critical Thinking

- What does physical activity mean to you, what is your physical activity identity?
- What is the identity of physical activity in your ECE?
- Does your ECE have a physical activity policy?
- What does physical activity mean to tamariki at your ECE?

- Are tamariki active for 180 minutes/ day at your ECE?
- How to connect high intensity music into your ECE daily practice, notice what music you enjoy, , what music tamariki and whanau enjoy and members of your teaching team enjoy.

Action

Review whether your ECE has a physical activity policy. If there is one, an opportunity to review it, if not an opportunity to develop one.

Plan a music & movement (a disco) session each day, encouraging children to have their head out of upright position as much as possible. Moderate to vigorous intensity, high tempo songs with active teaching for as long as the children want to participate. Try this at different times of the day and evaluate which time works best in your own unique context.

Carry out week 2 M.A.P.P activities.

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 2 Physical Activity in ECE	Warm- Up	Skill Session (see videos week 2)	Activity (see videos week 2)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Movement Max Action Song	Movement Max Action Song	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Bear walk		Have children on the floor on their hands and knees, encourage them to lift both knees off	Have children in bear walk position and encourage them to move forwards, moving	

			the floor, they are now in bear walk position, repeat	right hand and left leg (opposition movement), do this slowly, repeat other side. Co-construct a bear walking/ running track.	
Active Ann	Twist up and down		Keep both feet planted on floor (use a chalk circle or something similar), twist at hips lifting one heel off the ground, swinging the arms.	Play a game of ' <i>simon says</i> '. Put your hands on different body parts, hips, knees, toes, elbows, ankles, Swing your arms and twist your hips like a washing machine. See if you can do the twist all the way to the floor and back	

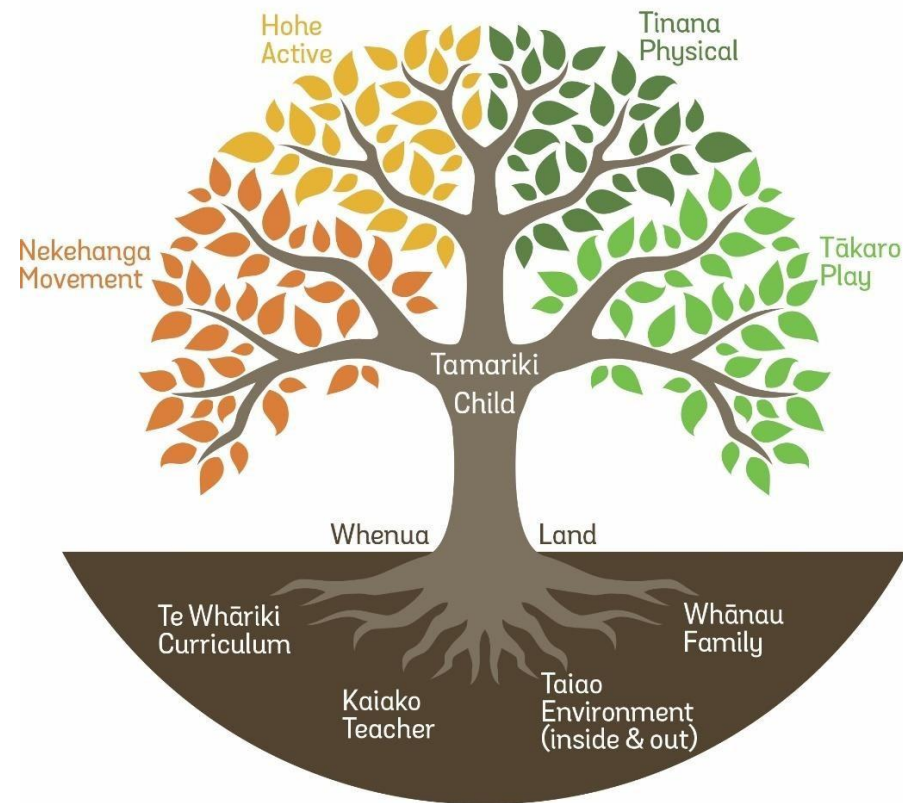
				up again without falling over. one way, then the other.	
Physical Piri	Frog squat (refer to Leaping Lyle)		Find and stand in a hula hoop, your lily pad, pretend you are a frog and bend your knees, keeping your eyes on me and see if you can lay an imaginary egg, be sure not to leave your hula hoop lily pad.	See if you can lay 5 pretend eggs in your lily pad, then jump with two feet straight up and down, then lay another 5 eggs, how eggs can you lay– repeat as often as child interest allows.	
Playful Pip	Spin around		Have children stand with two feet on the floor, encourage them to put their arms out to their sides like	Have children stand with two feet on the floor and give themselves a hug, encourage them to	

			an aeroplane. Encourage them to move around like an aeroplane.	turn all the way around, spinning 5 times in one direction, 5 times the other, then freeze like a snowman. Repeat as often as children want to participate.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Movement Max action song.				

M.A.P.P Professional Learning for Teachers

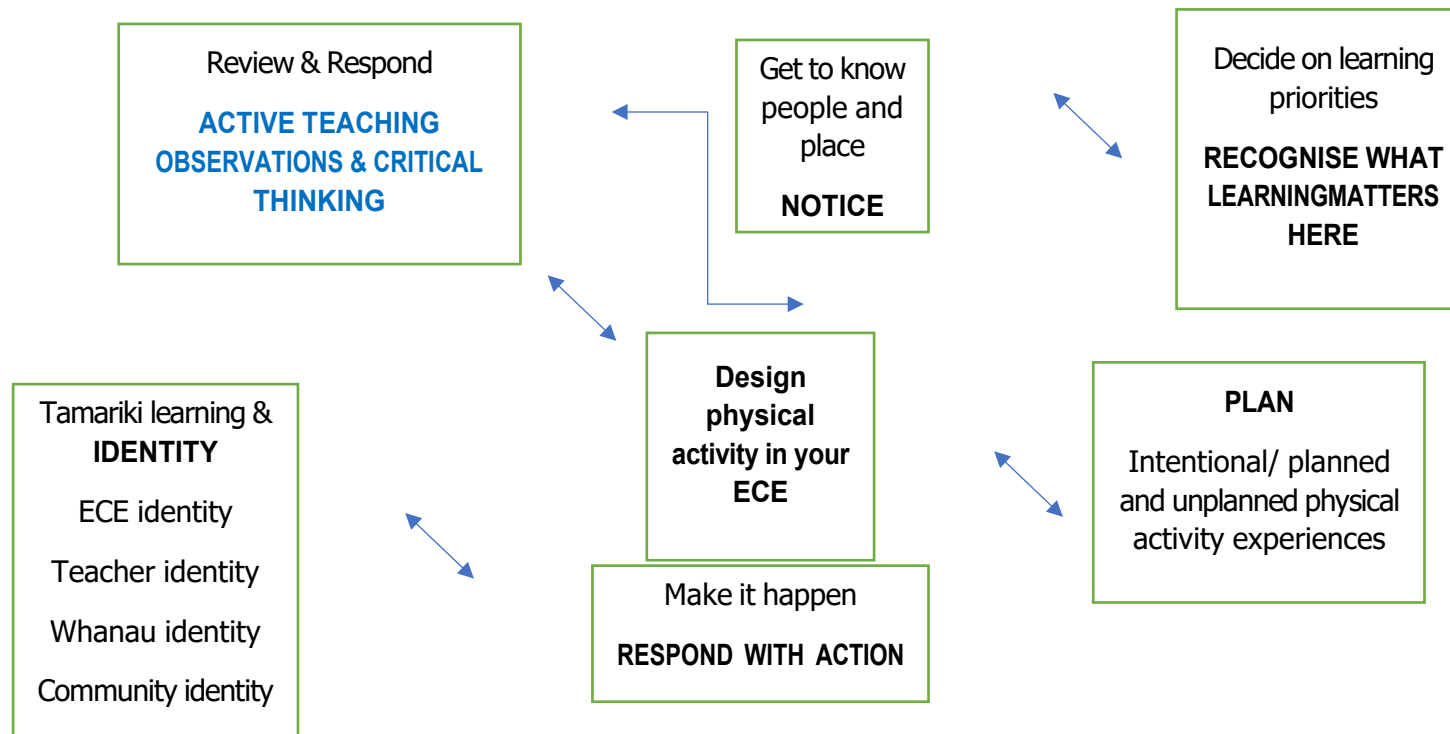
Week 3: Session 2: Active Teaching

M.A.P.P mahere nekehanga



Outline

- **Week 2: Session One:** Physical activity in ECE
- **Week 3: Session Two:** Active Teaching
- **Week 4: Session Three:** Planning for physical activity
- **Week 5: Session Four:** Notice physical activity in ECE
- **Week 6: Session Five:** Recognise physical activity in ECE
- **Week 7: Session Six:** Respond to physical activity in ECE



Session Two: Active Teaching

- What is active teaching?
- Why practice active teaching?
- When to practice active teaching?
- How to be an active teacher?
- Planning to be an active teacher.
- Provocations for active teaching, Movement Max, Active Ann, Physical Piri, Playful Pip

M.A.P.P Professional Learning

Teacher/ Kaiako Professional Learning (30 minutes)	Mahere nekehanga (movement M.A.P.P) characters	Movement Environment (MOVERS)
Active Teaching <i>Knowledgeable about children's learning and development and able to identify varied abilities, strengths, interests and learning trajectories. Role models for practices that support their own health and that of others. (Te Whāriki, pg 59)</i>	Nekehanga (movement) Max Vestibular/ Balance Hohe (active) Ann Fundamental movements & Midline Tinana (physical) Piri Power & Proprioception Tākaro (playful) Pip Spatial & Body Awareness	Pedagogy for physical development , staff engaging in movement with children indoors and outdoors, observation and assessment of children's physical development indoors and outdoors, planning for physical development indoors and outdoors,

What is active teaching?

Adult guided collaborative play.

This adult guided collaborative play is found to be the most effective and most supportive implementation model.

Physical activity (PA) is an essential thread to Te Whāriki curriculum as it describes children's ability to make sense of experiences as working theories whereby physically active experiences provide the opportunity for children to evolve ideas and understandings using their existing knowledge to try and make sense of new experiences (May & Carr, 1997). Braithwaite (2014) comments that in the context of the exploration strand of Te Whāriki, Kei Tua O Te Pai, children will achieve a range of milestones on their way to gaining control over their bodies and highlight the motivation and curiosity associated with physical explorations which in turn develops a positive identity as a learner.

While taking part in PA children are having to experientially learn social norms such as turn taking, transitions and routines of conversations; these skills can be developed through a collaborative-play approach where children's interests can then promote active learning and engagement through active play (Taylor & Boyer, 2020). In Te Whāriki, Ministry of Education (2017) the curriculum states that *"when children have chosen their own activities, or when they have come to "own" an activity or find personal meaning in it, they are more likely to be closely involved in the activity and to ask and follow up on their own questions or questions that interest them"*.

Taylor and Boyer (2020) phrase play-based learning as adult guided play that transpires as a middle ground on the play continuum between free play and intentional teaching. Children still have the freedom and choice to direct their own play however the educator's role is then to facilitate conversation, play along, offer questions to consider different perspectives, and provide ways in which to continue the play or how to use available materials to extend the play. Whereas free-play as stated by Ajoke et al. (2019) encourages children to be self-driven in play using their own imagination in unregulated play while developing social behaviours and physical literacy levels that influence long-term health.

Intentional Teaching	Play Based Learning	Adult Guided Play	Free Active Play
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Early Childhood Teachers/ Kaiako

There is a significant role of the teacher as a positive role model for PA delivery in an ECE service. 50% of teachers believe supervision impacts on their ability to provide quality PA and time spent supervising children is an opportunity for teachers to sit and observe. Children follow their lead by taking part in sedentary behaviour. Veldman et al. (2020) agree with the impact of active supervision by teachers where teachers take an active participatory role rather than a passive role confirming the importance of intentional teaching practices in relation to PA for pre-schoolers PA.

Tonge et al. (2017) state that 61% of educators in ECE spent their workday in sedentary behaviour. They identified there is significant association between educators' sedentary behaviour and children's sedentary behaviour. Reducing sedentary behaviour of educators will likely improve children's PA levels.

The role of a qualified, provisional, or fully registered Early Childhood Education (ECE) teacher in NZ is varied and governed by the Ministry of Education, Te Whāriki curriculum, Teaching Council and ECE philosophy they work in.

The Ministry of Education (2017) states the role of the teacher is to plan, prepare and present lessons, teach a wide range of subjects such as arts, English, maths and science, keep up to date with curriculum changes and assessment methods, assess and record learning and development of each child.

Te Whāriki clarifies the roles and responsibilities of Kaiako, emphasizing the need for collaborative approaches, critical enquiry and reflection, and the use of evidence to inform practice. It also highlights the important role of intentional teaching in supporting and promoting learning (He Maapuna te Tamaiti, pg20).

The Teaching Council of Aotearoa New Zealand is the professional body for teachers. The Teaching Council's purpose is to ensure safe and high-quality leadership, teaching and learning for children and young people and to protect the safety of children and high quality of teacher practice by ensuring teachers continue their professional learning and maintain and enhance their competence to practice. (Teaching Council, 2017).

Each ECE have their own philosophy, values and cornerstones that are influenced by the Education Review Office (ERO) statement and compliance model, 'what matters here' and 'what matters most'. This includes evidenced connections to tamariki, whānau and community.

Teacher/ Kaiako-Led Physical Activity (PA)

Teacher-led PA sessions have been determined as an effective way to promote high levels of moderate to vigorous physical activity (MVPA) in children three to six years (Duff, 2019). Carroll et al. (2021) agree stating that a teacher guided and led pre-school PA intervention is a feasible approach to acutely benefits children's MVPA. Gibbons (2015) also noted that there appears to be a concerning lack of collaboration regarding what teachers should know and do about health in the early childhood curriculum; or about how knowledge of health could and should be evident in the early childhood curriculum. This indicates that curriculum practice does not match curriculum purpose in relation to health.

This is influenced by early childhood educational settings that support PA with strong policy, teacher professional learning and development, curriculum connections and adequate space indoors and out for PA. To clarify this further Coleman and Dymont (2013) indicated that teachers positive perceptions of children's PA may be indirectly affecting the provision of PA opportunities in childcare, when children are in fact nearly 50% of the time engaged in sedentary behaviours.

Teaching perceptions and approaches may vary based on prior education, knowledge, and experience. Wurdiner (1996) stressed the idea that knowledge is not static or readymade and requires students and teachers to construct their own meaning from their own experiences. To enrich child knowledge in relation to movement we need to provide children with varied experiences and opportunities for PA, both structured and unstructured. Wurdiner (1996) goes on to state that fun is an important element in the learning process for both students and teachers, and effective facilitation is more apt to occur when teachers can be spontaneous and can laugh at themselves.

Interestingly, Norway promotes risky play in an early childhood educational setting whereas NZ and Australia environments are risk adverse. Even more compelling, Braithwaite (2014) suggests that countries such as Australia and the US do not have mandated PA in their early years curriculum whereas Belgium has specialist PA teachers and PA delivery in their early years curriculum from three years old.

Tonge et al. (2020) state that outdoor environments are important for children PA levels and have the potential to be a valuable space for learning. However, educator perceptions, supervision and element of risk may create a barrier to utilising the outdoors. In support of this view Sumiya and Nonaka (2021) found that the spatial layout of the playground affects the pattern of play and increases the PA levels of young children. Features of play spaces, both inside and out are influenced not only by regulations but also types of play equipment available and size. Ajoke et al. (2019) argue these have been linked to PA levels and a variety of play behaviours among pre-school children.

J.S. Gerhis (2014) carried out focus groups to determine teachers' perceptions about children's movement and learning in ECE with four major themes: how movement influences learning; what types of movement experiences are most beneficial for children, and what settings best support children's movement and challenges related to children's movement.

The results concluded that more professional learning development (PLD) for teachers on movement and PA is required. Furthermore, Lyn et al. (2013) found that ECE significantly improved their PA environments by introducing ECE PA policy to enhance active play, reduce sedentary behaviour opportunities for children and teachers. Adding portable play equipment, improved PA staff behaviours and PA teacher training and education.

Volmut and ŠlmuniČ (2021) confirm that play or sports equipment that children have had experience with, in a structured teacher-led PA approach should be made available to children in recess or free play time. This availability of equipment during non-structured active play has shown to be an effective way to promote high levels of PA and increase time spent in MVPA where teachers are encouraged to incorporate a range of different sports equipment to encourage children to play freely.

Routines describe what we do during our shared, daily activities such as eating, toileting, using resources help to provide a reassuring rhythm to the day and support attachment and confidence with a view to learning to trust and a sense of belonging. For young children the provision of consistent routines and a level of predictability to their day help them to manage their day and prepare for what is going to happen next. This is key to developing a sense of belonging/ mana whenua which is a key learning outcome within Te Whāriki (He Mapuna te Tamaiti, pg 28).

Kaiako can support children developing fluency of routines by modelling and practicing them and providing positive feedback and flexibility. Therefore, ensuring PA is a daily routine in an ECE setting may be an opportunity to increase PA quantity and quality. Coleman and Dymont (2013) agree that teacher knowledge and skills in delivering PA may be limited due to lack of PLD and limited teacher knowledge on formative assessment practices that help illuminate and illustrate children's learning in and through PA.

Why practice active teaching?

The prevalence of childhood obesity has been increasing dramatically in recent years is '*one of the most serious public health challenges of the 21st century*' (World Health Organisation 2021a). Active play during the first five years of life is essential to the health and future wellbeing of children. It is so important that it is recognised under the United Nations Convention on the Rights of the Child.

Over a quarter of the global population are insufficiently active, with a higher and increasing prevalence of physical inactivity in high income countries (Mizdrak et al., 2021). Physical inactivity caused 5.3 million deaths worldwide in 2008, and in 2016 the global prevalence of physical

inactivity was at 27.5% (Bull et al., 2020). The mortality estimates for physical inactivity are like those observed for tobacco smoking. However, unlike tobacco control programmes, the promotion of PA globally has largely been unsuccessful due to poor coordination, ambiguous messaging, and a general absence of recognition of physical activity as a fundamental human right and public health priority (Hallal & Pratt, 2020).

In New Zealand there is a worrying physical inactivity trend, the worsening of scores in NZ's Report Card on PA for Children and Youth (5 – 18 years) from 2014 to 2018 is concerning (Maddison et al., 2014, 2016, 2018).

2014 **B (61% - 81%)** of children and youth are carrying out sufficient levels of PA, however, high sedentary behaviour was noted.

2016 **B- (40% - 60%)**, with one third of NZ children and youth not meeting the recommendation of more than 60 minutes PA per day

2018 **D- (less than 20%)** of children and youth are carrying out sufficient levels of PA. These reports show low levels of PA and high levels of screen time.

So, how do we consider the health and sport framework in an educational setting when an estimated 42 million children globally under the age of 5 suffer from being overweight and obese (Coleman & Dymont, 2013)? Anthes (2020) state that being physically active has many benefits for children including reducing obesity risk, improving overall physical and mental health, fostering social and emotional development, all the while boosting academic performance.

In the context of the national and international problem of physical inactivity, childhood obesity and its growing prevalence in young children **experts have identified ECE as an ideal setting for early intervention in childhood obesity** (Coe, 2020). The healthy weight environment of childcare centres is influenced by the quality of foods served, the time children spend being physically active, caregiver/ teacher behaviours, and the presence of nutrition, wellness, and PA policies (Lyn et al., 2013). The Active Play for Under 5 Guidelines 4.11, in relation to the **NZ Health Strategy states that ECE are to ensure that PA is incorporated into daily routine and curriculum in formal childcare settings** or institutions (Dutton, 2017).

Active play, sitting less, moving more, and sleeping well are important for healthy weight gain, mental health, behaviour, improved movement, competence skills and brain development including communication skills, higher emotional and social functioning, and the ability to make good

decisions. It is vital for the development of physical movement skills that will provide a platform for learning more complicated skills in the future (Ministry of Health, 2017).

Planning to be an active teacher.

The Ministry of Education has recently released *kia kori tahi* physical wellbeing in early learning, see <https://tewhariki.tki.org.nz/en/teaching-strategies-and-resources/wellbeing/physical-wellbeing-in-early-learning/> In this resource you will find easy use templates for planning to be an active teacher in your ECE.

Planned physical activity provocations for active teaching include the action songs for Movement Max, Active Ann, Physical Piri, Playful Pip. These can be carried out either indoors or outdoors. Encourage tamariki to learn the words and actions with you so they can lead and you can support spontaneous physical activity experiences.

Get to know your ECE environment inside and out. Notice if there is time, space, and opportunities for moving like Max, rolling, spinning and upside down, active Ann can practice and refine fundamental movement skills such as hopscotch, throwing, catching, physical Piri is able to hang, swing and climb, while playful Pip has open space and portable equipment to enjoy moving at her own time and in her own way. Recognise tamariki who seek out opportunities to be active and support this disposition. Be equally aware of tamariki who actively seek out opportunities to be sedentary and invite them to participate in physical activity opportunities consistently across the ECE day across the continuum of intentional teaching, play based learning, adult guided play, free active play. M.A.P.P activities always begin with a high energy music and movement session which acts as an invitation for tamariki to join in.

Fun Fact

Tamariki 3–5 years are most active in the first 10–15 minutes of going outside. Plan provocations to encourage tamariki to be physically active indoors and out by providing portable equipment that they have had experience using, such as hula hoops, sack race bags, bean bags, balls, and a variety loose– parts. Always ensure that there is time and space for tamariki to experience the joy of moving at their own speed from one place to another.

Critical Thinking

- Reflect on your teaching practice, where are you currently on the active teaching continuum, intentional teaching, play based learning, adult guided play, free play? Is this where you want to be?
- Do you implement all four of these active teaching strategies every day?
- Do you have information for whanau in your ECE regarding the benefits of active play for tamariki?
- How much time do you spend in sedentary behaviour during the ECE day?

Action

Over the week find a focus child 3–5 years and record whether they are spending 180 minutes of the day at your ECE engaged in 180 minutes of physical activity. Provide physical activity provocations along the active teaching continuum and notice the engagement of tamariki. Engage tamariki and plan for physical activity opportunities both indoors and outdoors. Take an active teaching role during the day with both movement and cross curricula experiences (cognitive, social, and emotional) driven by physical activity.

Carry out week 3 activities and Active Ann action song.

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 3 Active Teaching	Warm- Up	Skill Session (see videos week 3)	Activity (see videos week 3)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Active Ann Action Song	Active Ann Action Song	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Touch Toes		Have children stand with two feet on the floor, use a chalk lily pad so they know	Upside down look through your legs behind you and call out what you see. Stand up turn	

			where to stand. Put hands on hips and bend forward until you can touch the floor with your fingers	around and try again, call out something different that you see.	
Active Ann	Marching		Stand on the spot and hands on hips. March your legs only, on the spot and then moving around, make sure your hands stay on your hips. Stand on the spot and march only your arms, pretending their arm lights on your elbows and you need to lift them up to see where you are	March on the spot with both arms and legs together. March slow like a robot, holding your leg in air without falling over. March with fast feet on the spot. March up tall and march down low, repeat, co-construct a marching track.	

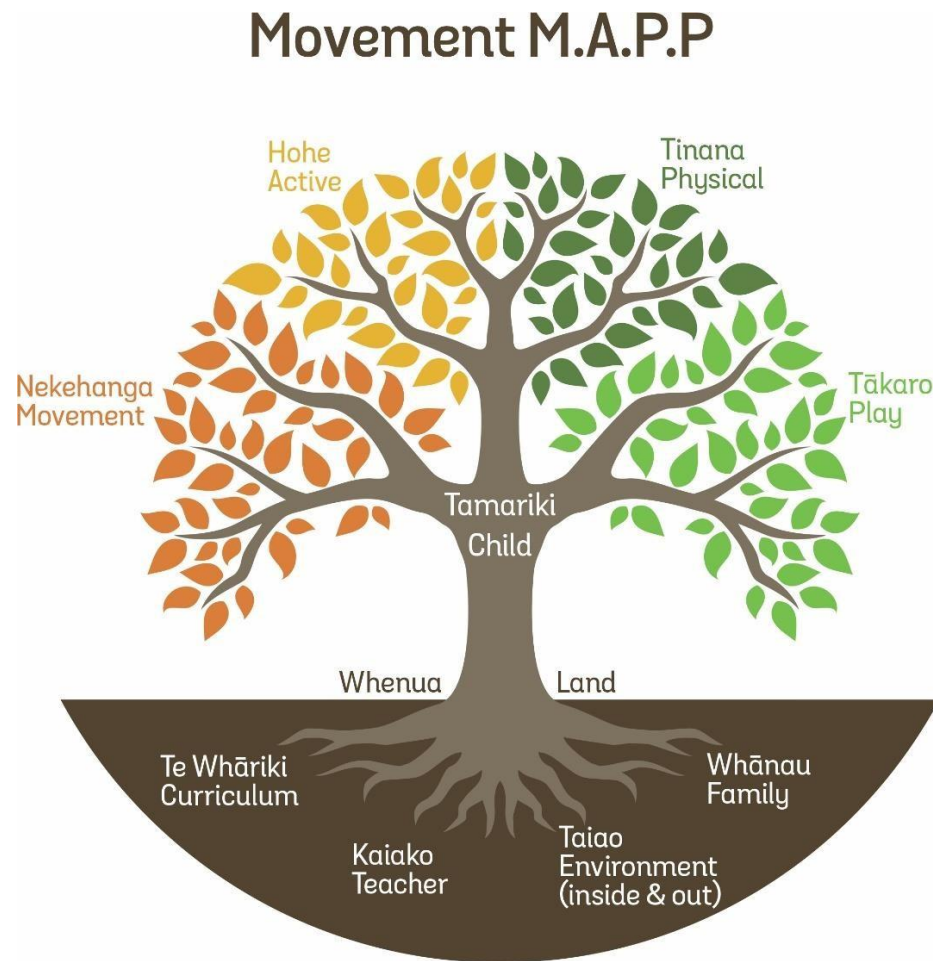
			going. March only one arm, keep the other one still, then swap. March both arms together at the same time. March arms in opposition.		
Physical Piri	Frog Squat Swap (<i>refer to book Leaping Lyle</i>)		Find and stand in a lily pad, pretend you are a frog and bend your knees, keeping your eyes on me and see if you can lay an imaginary egg, be sure not to leave your lily pad.	See if you can lay 5 pretend eggs in your lily pad, then jump with two feet to swap lily pads with the person next to you, then lay 5 eggs in their lily pad – repeat as often as child interest allows.	

Playful Pip	Swishing Ribbons		Give children a ribbon for each hand, then have them stand with two feet on the floor, encourage them to put their arms out to their sides like an aeroplane. Encourage them to move around like an aeroplane. Watching their ribbons swish.	Have children spin and swish their ribbons 5 times in one direction, 5 times the other, then freeze like a snowman, moving their arms quietly so that the ribbon keeps swishing. Make as many different movements to swish the ribbons as you can, invite ideas from the children too. Repeat as often as children want to participate.	
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M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Active Ann action song.				
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M.A.P.P Professional Learning for Teachers

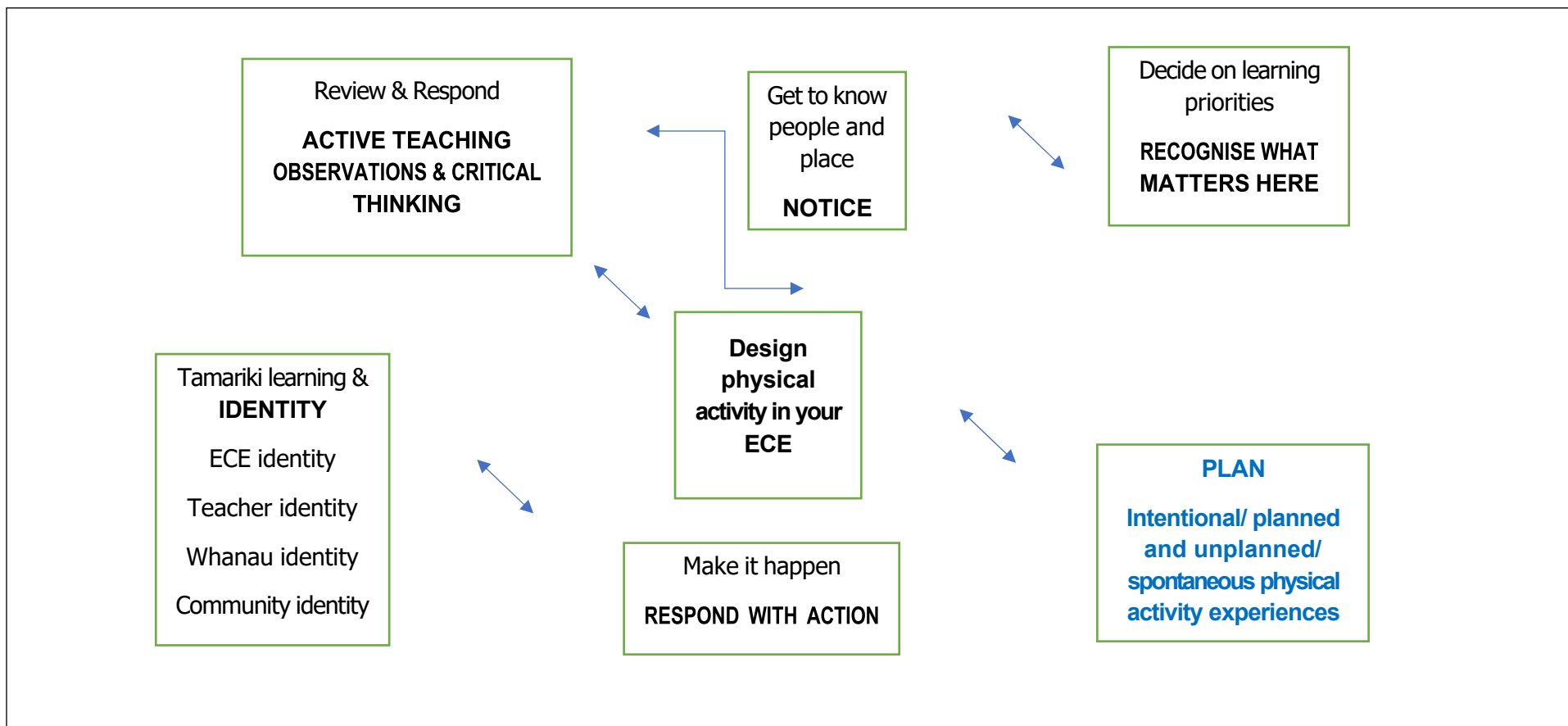
Week 4: Session Three: Planning for Physical Activity



- **Week 2: Session One:** Physical activity in ECE
- **Week 3: Session Two:** Active Teaching
- **Week 4: Session Three: Planning for physical activity**
- **Week 5: Session Four:** Notice physical activity in ECE
- **Week 6: Session Five:** Recognise physical activity in ECE
- **Week 7: Session Six:** Respond to physical activity in ECE

M.A.P.P Professional Learning

Teacher/ Kaiako Professional Learning	Mahere Nekehanga (movement M.A.P.P) characters	Movement Environment (MOVERS)
Planning for Physical Activity (30-minutes)	Nekehanga (movement) Max (rolling, spinning, upside down) Vestibular development Hohe (active) Ann (march, run, hop, jump) Fundamental movement skills and midline development Tinana (physical) Piri (hang, swing, climb) Power and proprioception Tākaro (playful) Pip (time, space, moveable equipment) Spatial and body awareness	Supporting physical activity and critical thinking, encouraging sustained shared thinking by communicating and interacting through physical activity, Supporting children's curiosity and problem-solving indoors and outdoors,



Week 4: Session Three: Planning for Physical Activity

Outline

- **What** is planning for physical activity?
- **Why** do we need to plan for physical activity?
- **When** is the best time to plan for physical activity?
- **Who** should carry out the planning for physical activity?
- **How** do I plan to ensure tamariki to carry out physical activity every day?
- M.A.P.P characters planning play provocations utilising Movement Max, Active Ann, Physical Piri, Playful Pip

WHAT:

To ensure planning for physical activity takes place a physical activity policy in ECE is required. Understanding and connecting with local curriculum 'what matters here' through whānau consultation. Daily physical activity is a key thread of the child development domain and overlaps and interlinks with social/ emotional and cognitive domains. There are Ministry of Education and Ministry of Health initiatives to support and provide guidance on developing policy and plans for physical activity in ECE.

Ministry of Education	Ministry of Health	Teaching Council	Education Review Office (ERO)	ECE Philosophy
Te Whāriki Curriculum	Active Play	Teacher Registration	Quality framework for evaluation and improvement in ECE	PA policy
He Māpuna te Tamaiti,				
National Education and Learning Priorities (NELP)				

WHY:

If we do not plan for physical activity, then potentially it will not happen either intentionally or not. A plan is best supported by an ECE physical activity policy that supports local curriculum, whanau aspirations and ECE teacher education and knowledge and a team approach. A plan that supports and values the health and wellbeing of tamariki by providing a daily well-balanced movement diet both inside and outside the ECE. A plan that is led by the physical activity behaviours of tamariki, space in the ECE, equipment (portable and fixed) available and knowledge and experience of ECE teachers. It is critical that this plan is spontaneously reviewed daily informally and formally reviewed with a timeslot in team meetings with whole teaching team contribution.

WHEN:

Daily planning, weekly, monthly, and strategic planning is required to ensure tamariki in an ECE setting have space to move and take part in physical activity opportunities both indoors and outdoors every day. Planning ensures that tamariki are provided with both intentional and spontaneous physical activity experiences that include no equipment or fixed and portable equipment. There is evidence to suggest that tamariki will move with more intensity in the first 10-15 minutes of going outside. Active teachers that allow time, equipment (portable and fixed), and space for active play regularly throughout every day.

WHO:

Planned and unplanned physical activity experiences by all the teaching team provide an opportunity for tamariki to participate in regularly throughout the ECE day. This is supported by noticing, recognising, and responding to tamariki behaviours. ECE teachers role model active teaching practices and active rather than sedentary behaviours.

HOW:

Planning for **FUN** daily physical activity opportunities that meet the unique developmental needs of tamariki in your ECE. Ensure that tamariki physical activity holds an agenda spot in team meetings and there are opportunities for whanau to share their physical activity aspirations for their tamariki. Ensure that there is information for whanau on the value and importance of daily physical activity experiences and how they can be supported at home. Engagement with tamariki and their sense of belonging at ECE provides a platform for quality and meaningful physical activity experiences for tamariki and teachers – have the confidence to bring the weird and wonderful to life through movement!

M.A.P. P	Characters		Characteristics
Movement/ Nekehanga	Max		Rolling, spinning, upside down, locomotion (moving from one place to another in different ways, directions, and speeds), such as stretching, crawling and bear walking. Create a bear walking station in the playground
Active / Hohe	Ann		Running, hopping, skipping, jumping, throwing, catching, bouncing, galloping, leaping, kicking. Create a hopscotch area
Physical / Tinana	Piri		Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling Encourage children to wall walk and wheelbarrow walk (please note supervision required at all time)

Play / Tākaro	Pip		Enjoys lots of time, space with moveable equipment to explore experiential learning in her own way guided and supported by active teaching. Create a loose parts area in your play space and ensure that it has physical activity equipment that tamariki have used before, such as hula hoops and invite tamariki to use equipment, step back and notice how tamariki use the equipment.
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Fun Fact

Planning is the process of deciding in detail how to do something before you actually start to do it. Taking the time to consider daily physical activity opportunities for tamariki is the first step in your planning! Next, take action.....

Critical Thinking

Te Whāriki a curriculum for all children. All children have rights to protection and promotion of their health and wellbeing. A fundamental expectation is that each service will offer a curriculum that recognises these rights and enables the active participation of all children, including those who may need additional learning support. (Ministry of Education, 2017).

How might Kaiako provide opportunities for children to develop and extend their physical capabilities with confidence? How do Kaiako empower all children to pursue challenges in ways that acknowledge their current physical and cognitive abilities and strengths? (Te Whāriki, 2017, pg 50).

- How does your ECE meet the expectation of active participation for all children in physical activity experiences? How do you support this in your teaching practice?
- How does your ECE protect and promote the health and wellbeing of tamariki through physical experiences during the ECE day? How do you support this in your teaching practice?

- What support do you need in your teaching practice to promote the health and wellbeing of tamariki through physical activity experiences throughout the ECE day?

Action

Plan daily physical activity experiences for a week from today for tamariki at your ECE following the M.A.P.P framework, ensuring a vestibular (Movement Max), fundamental movement skills (Active Ann), power (Physical Piri) and body and spatial awareness opportunities (Playful Pip). Share this plan with your team and choose a focus child to notice their movement behaviours and disposition towards physical activity. Encourage your team to do the same and evaluate at your next team meeting. Then plan another week based on your evaluation. Ensure that high energy physical activity is a component of each intentional teaching session, such as music and movement.

Carry out week 4 activities and Physical Piri action song.

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 4 Planning for Physical Activity	Warm- Up	Skill Session (see videos week 4)	Activity (see videos week 4)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Physical Piri Action Song	Physical Piri Action Song	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Caterpillar Crawl		Have children stand with two feet on the floor, bend over and put hands on the floor, keep feet still	In press up position encourage children to press palm of hands to floor and see if they can push	

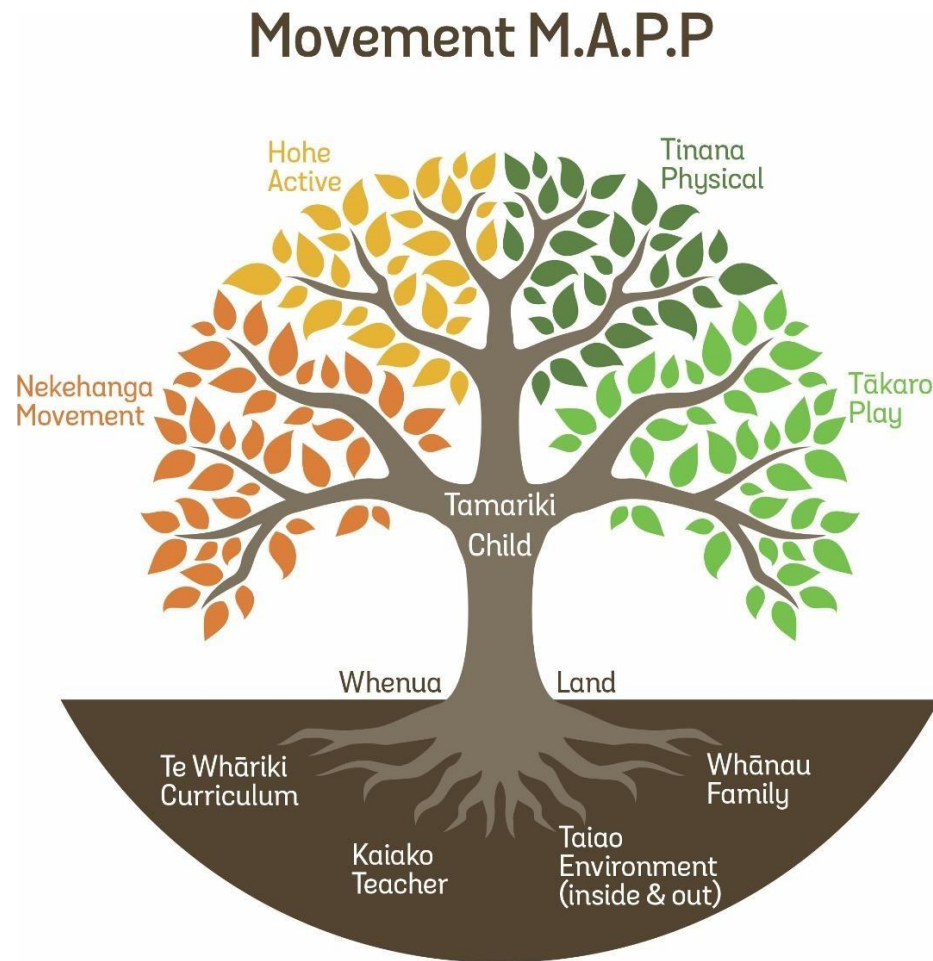
			and walk hands away from body until they are in press- up position, then walk hands back to body. This time bend over and put hands on the floor, keep them still and walk legs backwards until in press up position, hold to for a few seconds and walk legs back to body, repeat.	up into downward facing dog yoga position, back into press up position then walk hands back towards body, stand up straight jump and claps hands, repeat.	
Active Ann	Running on the Spot		Running on the spot, eyes forward, head straight, pump your arms and legs	Co-construct a running track, there and back, around the cones – repeat as often as child interest allows.	

Physical Piri	Squeeze & Squat (<i>refer to book Leaping Lyle</i>)		Find and stand in a lily pad, put the palm of your hand together and squeeze, then pretend you are a frog and bend your knees, keeping your eyes on me and see if you can lay an imaginary egg, be sure not to leave your lily pad or stop squeezing your hands together.	Stand opposite your partner and put the palms of your hands together, push against each other gently and squat like a frog, don't let your hands come apart, they are stuck together like glue.	
Playful Pip	Free skipping		Have children stand on the floor on two feet, with hands on hips, encourage them to	Have children free skipping, verbally supporting with step-hop, encourage hands	

			take a step forward on one foot and hop, step forward and hop, keep repeating these instructions until children have mastered this. Once mastered encouraged children to speed this up, step-hop, step, hop until free skipping is established.	off hips and swinging arms, then co-construct a skipping course.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

M.A.P.P Professional Learning for Teachers

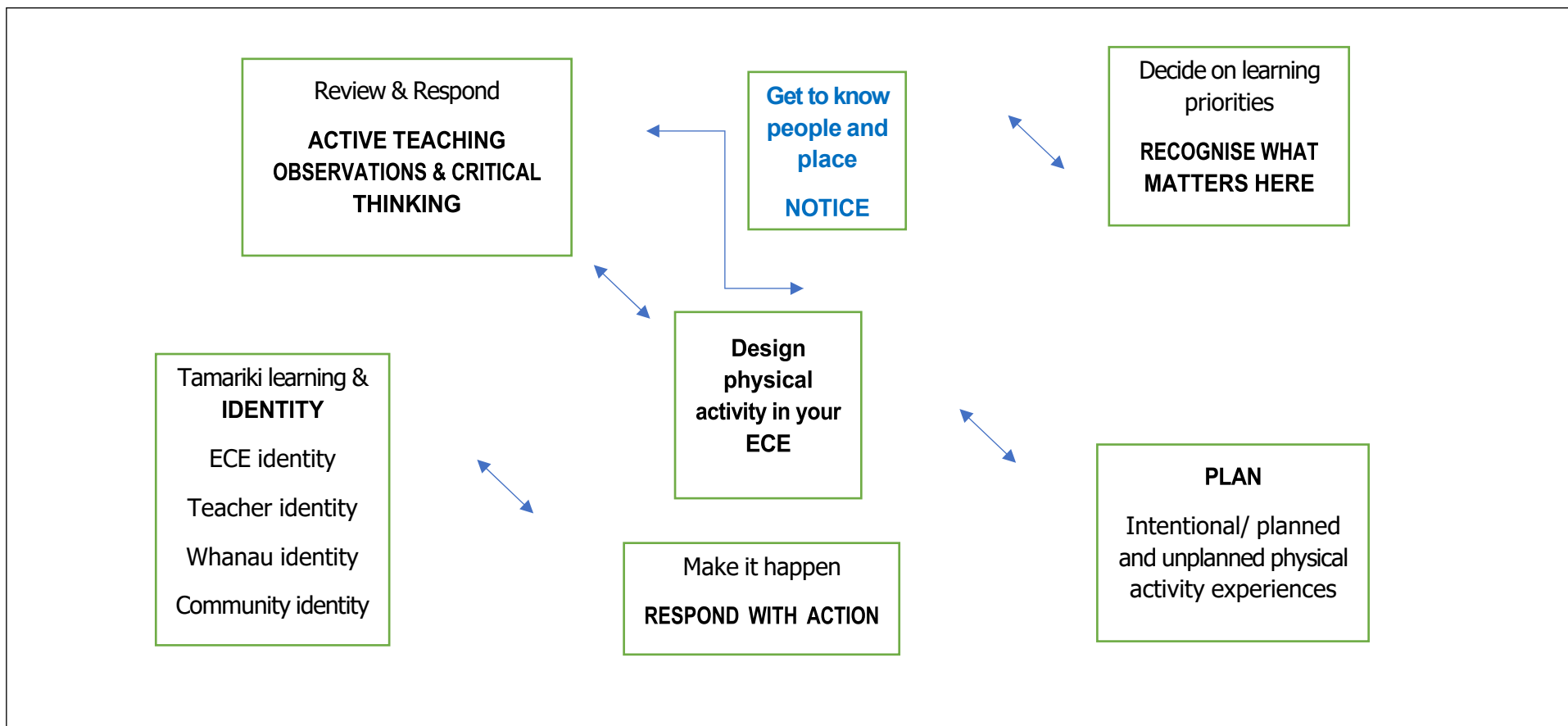
Week 5: Session Four – Notice Physical Activity as Learning in ECE



- **Session One:** Physical activity in ECE
- **Session Two:** Active Teaching
- **Session Three:** Planning for physical activity
- **Session Four:** Notice physical activity as learning in ECE
- **Session Five:** Recognise physical activity as learning in ECE
- **Session Six:** Respond to physical activity as learning in ECE

M.A.P.P Professional Learning

Teacher/ Kaiako Professional Learning	Mahere Nekehanga (movement M.A.P.P) characters	Movement Environment (MOVERS)
Notice Physical Activity in ECE (30-minutes)	Nekehanga (movement) Max (rolling, spinning, upside down) Vestibular development Hohe (active) Ann (march, run, hop, jump) Fundamental movement skills and midline development Tinana (physical) Piri (hang, swing, climb) Power and proprioception Tākaro (playful) Pip (time, space, moveable equipment) Spatial and body awareness	Parents/carers and staff, staff inform families about children's physical development and the benefits to their learning, development, and health. Teachers notice a great deal as they work with children.



Session Four: Notice Physical Activity

Outline

- **Notice** ECE environment, indoors and outdoors
- **Notice** ECE physical activity practice
- **Notice** ECE physical activity equipment (portable & fixed)
- **Notice** tamariki ECE behaviours in relation to physical activity
- **Notice** whanau physical activity aspirations for tamariki
- **Notice** physical activity Professional Learning in your ECE
- **Notice** physical activity narratives such as learning stories
- **Notice** physical activity information available to whanau
- M.A.P.P characters planning play provocations utilising Movement Max, Active Ann, Physical Piri, Playful Pip

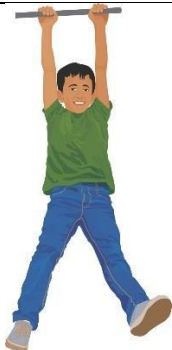
Notice tamariki physical activity behaviours, **recognise** and understand what these behaviours mean and then **respond** with action, either planned or unplanned. This may be by providing portable equipment that children can manipulate and use however they want to, such as loose parts and PE equipment. Continue to introduce M.A.P.P characters and their physical activity behaviours to daily experiences and opportunities, such as rolling, hanging, hopping, and skipping. **Notice** if tamariki are able to mirror your movement, such as a high five and connect with your hand with appropriate force. **Recognise** that if they are able to or unable to carry out this movement competency and its connection to learning. **Respond** to this behaviour by providing physical activity provocations such as developing the proprioceptive sense <https://theinspiredtreehouse.com/sensory-processing-proprioception/> . Physical Piri offers an invitational provocation for tamariki to connect with the way Piri moves, plays and has FUN, such as lifting, carrying, pushing, pulling.

Noticing

Tanemāhuta developed a plan to ascend through the 10 plains by way of a vine or aka. At each level he would stop, observe, scan, we ask ourselves: Are we surprised by what we have noticed? Is this what we expected? Is this good? How do we feel about this? Should we be concerned? If so, why? Do we need to take a closer look? Do we need to investigate to find out what is happening here? What are our evaluation wonderings? **NOTICING** involves keeping our focus on equity, having our priorities for children's learning at the front of our minds, scanning being aware of hunches and gut reactions knowing when to be deliberate and intentional about responding to what we are noticing.

https://ero.govt.nz/sites/default/files/media-documents/2021-07/ERO_Nga%CC%84%20Aronga%20Whai%20Huasm.pdf

(page 22)

M.A.P. P	Characters		Characteristics
Movement/ Nekehanga	Max		Rolling, spinning, upside down, locomotion (moving from one place to another in different ways, directions, and speeds), such as stretching, crawling and bear walking. Vestibular development
Active / Hohe	Ann		Running, hopping, skipping, jumping, throwing, catching, bouncing, galloping, leaping, kicking. Fundamental movement skills and midline development
Physical / Tinana	Piri		Hanging, swinging, climbing, monkey bars, lifting, carrying, pushing, pulling Power and proprioception

Play / Tākaro	Pip		Enjoys lots of time, space with moveable equipment to explore experiential learning in her own way guided and supported by active teaching. Body and spatial awareness
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Fun Fact

Tamariki develop physical literacy through activation of physical activity.

Kaiako are a key resource in any ECE service and are knowledgeable about children's learning and development and are able to identify their varied abilities, strengths, interests and learning trajectories. Kaiako are role models for practices that support their own health and wellbeing and that of others. Te Whāriki, 2017, pg 59.

Critical Thinking

Notice ECE environment, indoors and outdoors

Plan to notice and record your ECE environment both indoors and outdoors and how it supports physical activity for tamariki. Use the M.A.P.P characters of Max (rolling, spinning, upside down), Ann (running, hopping, jumping, skipping), Piri (hanging, swinging, climbing), Pip (free, open space with loose parts/ portable equipment).

Notice ECE physical activity practice

Do you have a PA policy? Do you take part in PA Professional learning?

Notice ECE physical activity equipment (portable & fixed)

Record what physical activity equipment is available to tamariki, do tamariki help with playground set up?

Notice tamariki behaviours in relation to physical activity

Observe and record a focus child each day for a week with a focus on physical activity behaviours

Notice whanau physical activity aspirations for tamariki

Review whanau aspirations for tamariki, is physical activity discussed?

Notice physical activity professional learning development (PLD) in your ECE

What physical activity PLD is available to teachers at your ECE?

Notice physical activity narratives such as learning stories

Review narratives for tamariki that are shared with whanau, do any discuss physical activity benefits?

Notice physical activity information available to whanau

Review whether this information is offered at all, if yes in what form, noticeboard, electronically, parent evenings?

Action

- Choose a focus child and notice their physical activity behaviours. Is this consistent across tamariki at your ECE?
- Are they meeting the active play recommendations 180 minutes/ day with 60 minutes/ day high intensity?
- What is supporting or negating these behaviours?
- Is there a time of day that works best for physical activity in your ECE?
- Do you have a rhythm/ routine to your ECE day that involves intentional teaching of physical activity?
- How can you support cross curricula learning through physical activity?
- Notice if both your indoor/ outdoor environments offer physical activity experiences, using the M.A.P.P characters of Max, Ann, Piri and Pip as your observational tool.
- Carry out week 5 activities and Playful Pip action song.

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 5: Notice PA in ECE	Warm- Up	Skill Session (see videos week 4)	Activity (see videos week 4)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Playful Pip Action Song	Playful Pip Action Song	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Turn around/ Roll Over		Have children stand on a spot, chalk circle or line on the floor with both feet.	Encourage children to keep arms above head in that position and lie down on	

			Encourage them to put both hands above heads and inside of elbow touching their ears, turn around 5 times one direction, 5 times the other	the floor on their back, stand where they can see you and tell them to roll over to the left, showing them with your arms the direction of left, roll 5 times to the left and 5 times to the right, pretend they are a rolling ball, over and over.	
Active Ann	2-foot jump		2-foot jump on the spot/ forwards/ backwards/ side to side/ around in a circle – repeat 10 times	Co-construct and play a game of 2-foot jump hopscotch	
Physical Piri	Squat Jump		Find and stand in a lily pad, keeping	Find and stand in or on a lily pad,	

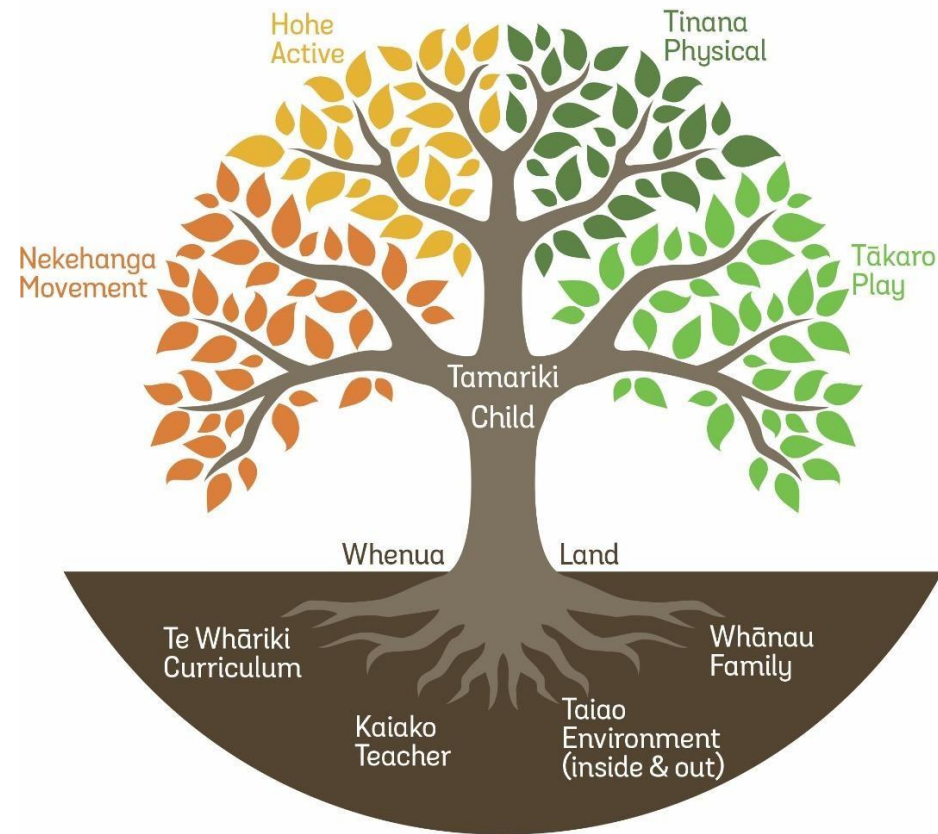
	(refer to book <i>Leaping Lyle</i>)		your eyes on me and see if you can lay an imaginary egg, jump up with 2 feet with both hands above your head, repeat as often as children want to participate.	imagine you can hear flies buzzing in the air directly above you, bend your knees to squat down and lay your egg then jump up with arms above your head and see if you can reach the flies in the sky, squat as low as you can and jump as high as you can!	
Playful Pip	Feather Frenzy		Have children stand on the floor with two feet and a feather in one hand. Have them try and squash the feather between their hands. If the feather lands on	Have children place the feather on the palm of one hand and bring it towards their mouth as if they are blowing out the candles on a birthday cake.	

			ground ensure children jump on it with two feet so that it does not blow away,	Have them blow the feather into the air and watch it land. When it lands jump on it with 2 feet, then repeat.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

M.A.P.P Professional Learning for Teachers

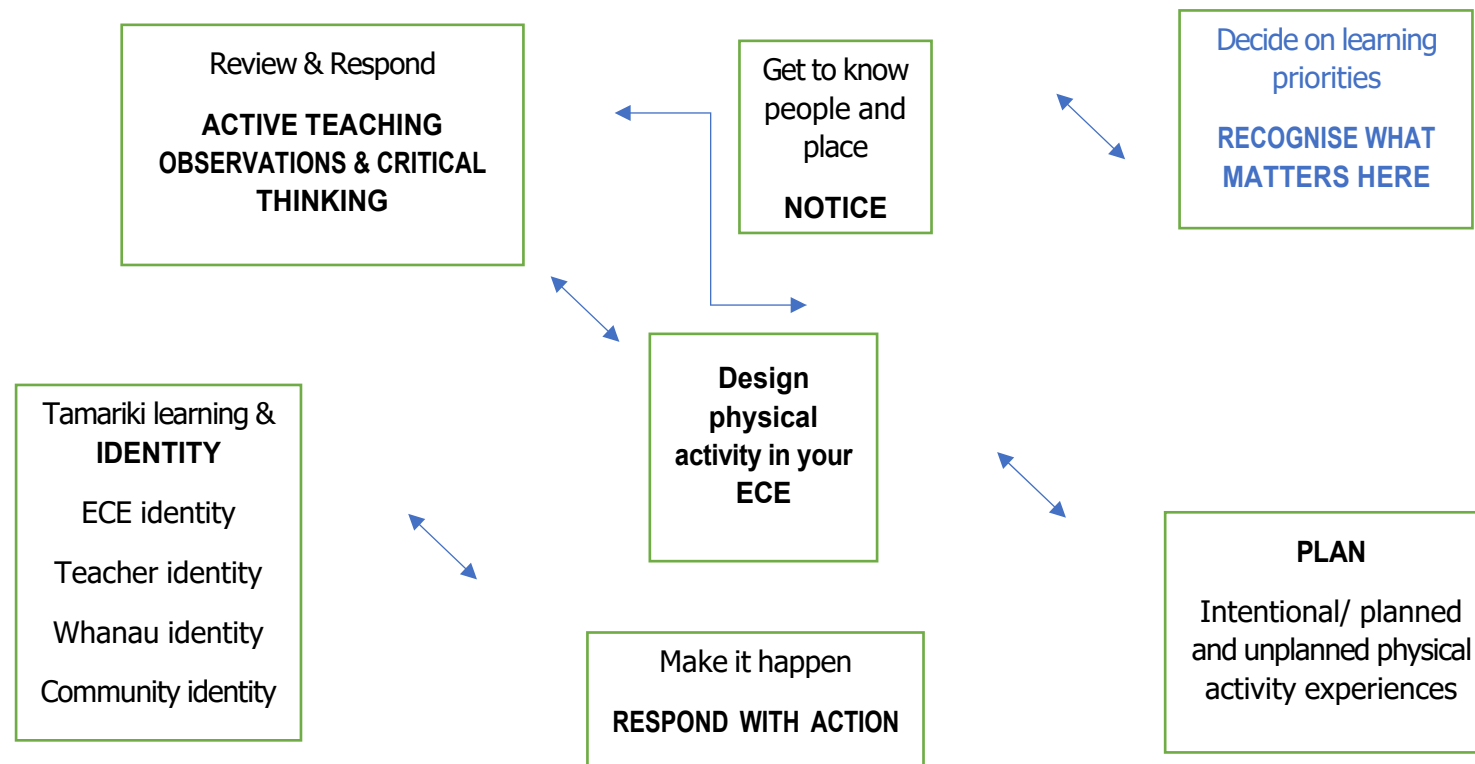
Week 6: Session 5: Recognise Physical Activity as Learning in ECE

Movement M.A.P.P



Outline

- **Session One:** Physical activity in ECE
- **Session Two:** Active Teaching
- **Session Three:** Planning for physical activity
- **Session Four:** Notice physical activity in ECE
- **Session Five:** Recognise physical activity as Learning in ECE
- **Session Six:** Respond to physical activity in ECE



Week 6: Session Five: Recognising PA as Learning in ECE

Outline

- Assessment for learning – notice, **recognise**, respond
- Te Whāriki curriculum design with a PA lens
- Recognising physical activity as learning examples

M.A.P.P Professional Learning

Teacher / Kaiako Professional Learning	Mahere nekehanga (movement M.A.P.P) characters	Movement Environment (MOVERS)
Recognising PA as Learning in ECE	Nekehanga (Movement) Max Rolling, spinning, upside down Vestibular/ Balance Hohe (Active) Ann Hop, skip, jump Fundamental movements/ Midline Tinana (Physical) Piri Hanging, swinging, climbing Power/ Proprioception Tākaro (Playful) Pip Time, space, and portable equipment Spatial/ Body Awareness	Encouraging sustained shared thinking by communicating and interacting through physical activity.

Assessment for Learning

Noticing, **recognising**, and responding

Refer to <https://www.education.govt.nz/early-childhood/teaching-and-learning/assessment-for-learning/kei-tua-o-te-pae-2/an-introduction-to-kei-tua-o-te-pae-he-whakamohiotanga-ki-kei-tua-o-te-pae/assessment-for-learning-te-aromatawai-mo-te-akoranga/noticing-recognising-and-responding-2/>

Assessment for learning is described as “noticing, recognising, and responding”. This description comes from Bronwen Cowie’s work on assessment in science classrooms (2000). These three processes are progressive filters. Teachers notice a great deal as they work with children, and they recognise some of what they notice as “learning”. They will respond to a selection of what they recognise.

"[the] ways in which, in our everyday practice, we [children, families, teachers, and others] observe children's learning [notice], strive to understand it [recognise], and then put our understanding to good use [respond]." Page 13.

The difference between **noticing** and **recognising** is the application of professional expertise and judgments. In particular, a powerful role for exemplars is to help teachers to recognise some of what they notice as learning (that is, to develop their ability to recognise learning). Sometimes recognising the learning occurs in retrospect, sometime after the event. However, if there is a time gap between noticing and recognising, the teacher can't act (respond) in the moment.

Te Whāriki Curriculum Design (pg 16)

The curriculum is designed in terms of principles, stands, goals and learning outcomes.

Principles Four fundamental expectations • Empowerment/ Whakamana • Holistic Development / Kotahitanga • Family and Community / Whānau tanagata • Relationships/ Ngā hononga	Goals For Kaiako to support children's learning and development across the strands of the curriculum. Describe characteristics of ECE environments and pedagogies that are conducive to learning.
Strands Five areas of learning and development • Wellbeing/ Mana atua • Belonging/ Mana whenua • Contribution/ Mana tanagata • Communication/ Mana reo • Exploration/ Mana aotūroa	Learning Outcomes Broad statements of valued learning are designed to inform curriculum planning and evaluation to support the assessment of children's progress. Children are most likely to generate and refine working theories in learning environments where uncertainty is valued, inquiry is modelled and making meaning is the goal.

Recognising physical activity as learning in ECE examples

Typical daily experiences in ECE

Experience	Strand	Goal	Learning Outcome (PA lens)
Gardening	Wellbeing	Health is promoted.	Keeping themselves healthy and caring for themselves. Lifting and digging use power muscles in our body. Using these big muscles supports the development of smaller muscles to be able to hold a pen or pencil.
Playing tag	Exploration	Children gain confidence in and control of their bodies.	Moving confidently and challenging themselves physically. Playing tag involves running which is important to improve my fitness. Children 3–5 years should be active for 180 minutes per day, 60 of those minutes in huff and puff activities.
Music & Movement	Contribution	Children are affirmed as individuals.	Recognising and appreciating their own ability to learn. Our body has an innate rhythm, such as our beating heart. This rhythm can be experienced through music & movement of all genres. This activity supports our

			developing sense of temporal awareness the ability to judge distance and time. This helps us to judge how fast a car is going before we cross the road.
Eating lunch	Belonging	Children feel comfortable with the routines, customs, and regular events at ECE	Understanding how things work here and adapting to change. Children need to sit still and eat. Being still is highest form of balance so for children to sit still and eat their lunch it is helpful for them to have a well-developed balance system. Children develop balance by spending time with their head out of an upright position and doing activities such as rolling, spinning, and hanging upside down, celebrate these FUN activities with your child!
Action Story telling	Communication	Children experience the stories and symbols of their own and other cultures	Using a range of strategies and skills to play and learn with others. An action story often is exciting, and children want to participate and contribute to the storytelling, rather than sitting and listening. Creating the

			opportunity to re-tell favourite stories through movement offers children the opportunity to communicate and contribute in a variety of ways, expressing themselves through movement.
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Fun Fact

Experience is the best teacher, and the senses are the pathway to all experiences.

Critical Thinking

How do you recognise physical activity as learning in your ECE?

Do you require further professional learning on physical activity as learning?

Do you capture learning both informally and formally notice, recognise, and respond? If yes, how do you document this?

What are cross curricula links between physical activity and other curriculum in your ECE?

Action

Over the week find a focus child 3-5 years and notice what's happening here and recognise tamariki learning through physical activity experiences. Document at least five different experiences either formally or informally. Notice and recognise all phases of the active teaching continuum, Intentional Teaching – Play Based Learning – Adult Guided Play – Free Active Play.

Carry out week 6 activities and child choice of character action song.

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 6: Recognise PA in ECE	Warm- Up	Skill Session	Activity	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>			Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an</i>

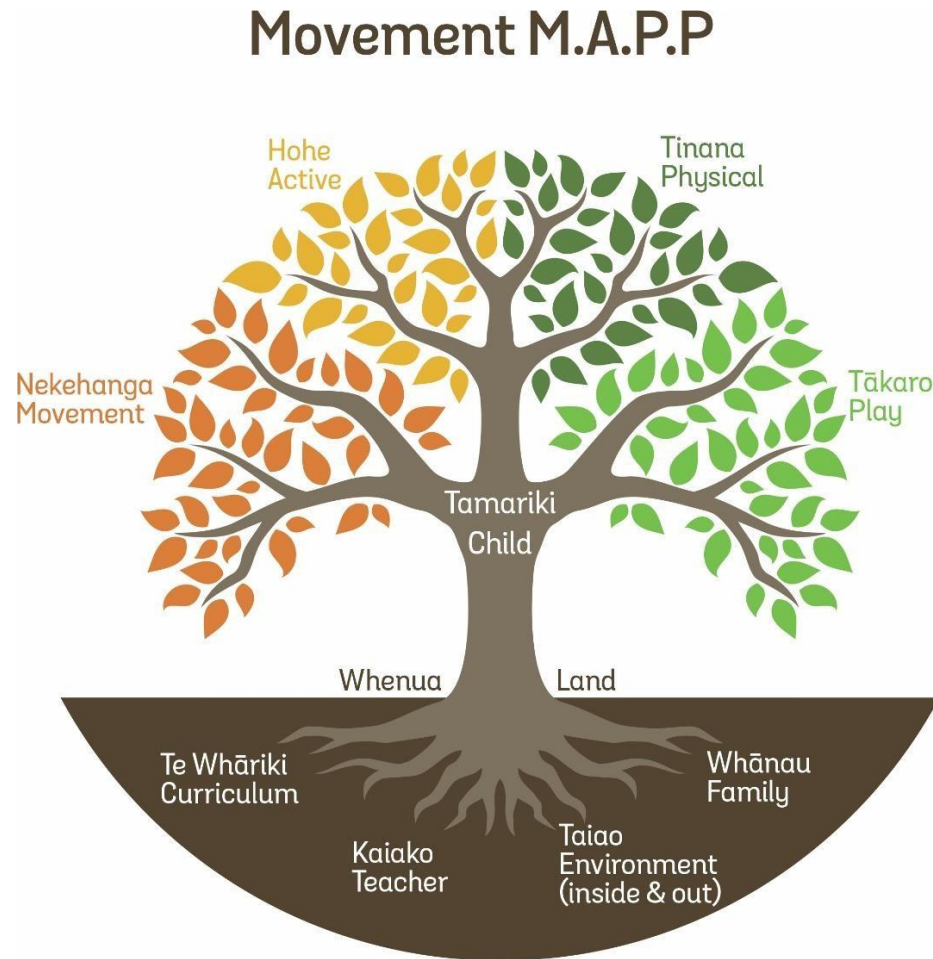
					<i>opportunity for tamariki to lead.</i>
Movement Max	Crab Crawl		Have children sit on the floor, both feet on floor and knee at right angle. Have palms of hands straight down from shoulders, directly behind them, fingers facing towards their body, see if they can lift their bottom off the ground and hold it for 5 seconds, have them reposition their body until this feels comfortable. This is a crab on the sand.	Ask the children to move across the sand (floor) just like crabs at the beach, changing direction, forwards, backwards, sideways, co-construct a crab highway.	
Active Ann	Gallop		Have children stand with two feet on the floor, encourage them to think of a horse and how it	Co-construct a racecourse where children can gallop,	

			moves fast – a gallop. Have the children gallop on the spot as fast as a horse, make sure they hang onto the reins with their hands.	ensure there is a start and finish line.	
Physical Piri	Sack race (with pillowcase)		Have children bring an old pillowcase from home. Each child stands in their pillowcase on two feet and jumps up and down.	Have children co-construct a sack racecourse, all behind the starting line and try to hold onto your sack with two hands whilst jumping forward and around the course without falling over.	
Playful Pip	Balloon Ball		Have children stand with two feet on the ground holding onto the balloon ball with one hand on	Encourage children to throw the balloon ball straight up into the air and then catch it with	

			each side of the balloon, using only enough force to stop the balloon from flying away. The balloon ball moves at the speed of a balloon to allow children time to coordinate eyes, hand, and feet to be in position to catch the balloon ball.	two hands. Try catching and throwing with one hand, see if you can throw and catch with someone else. Set up an indoor volleyball net and see if you can bat the balloon over the net.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

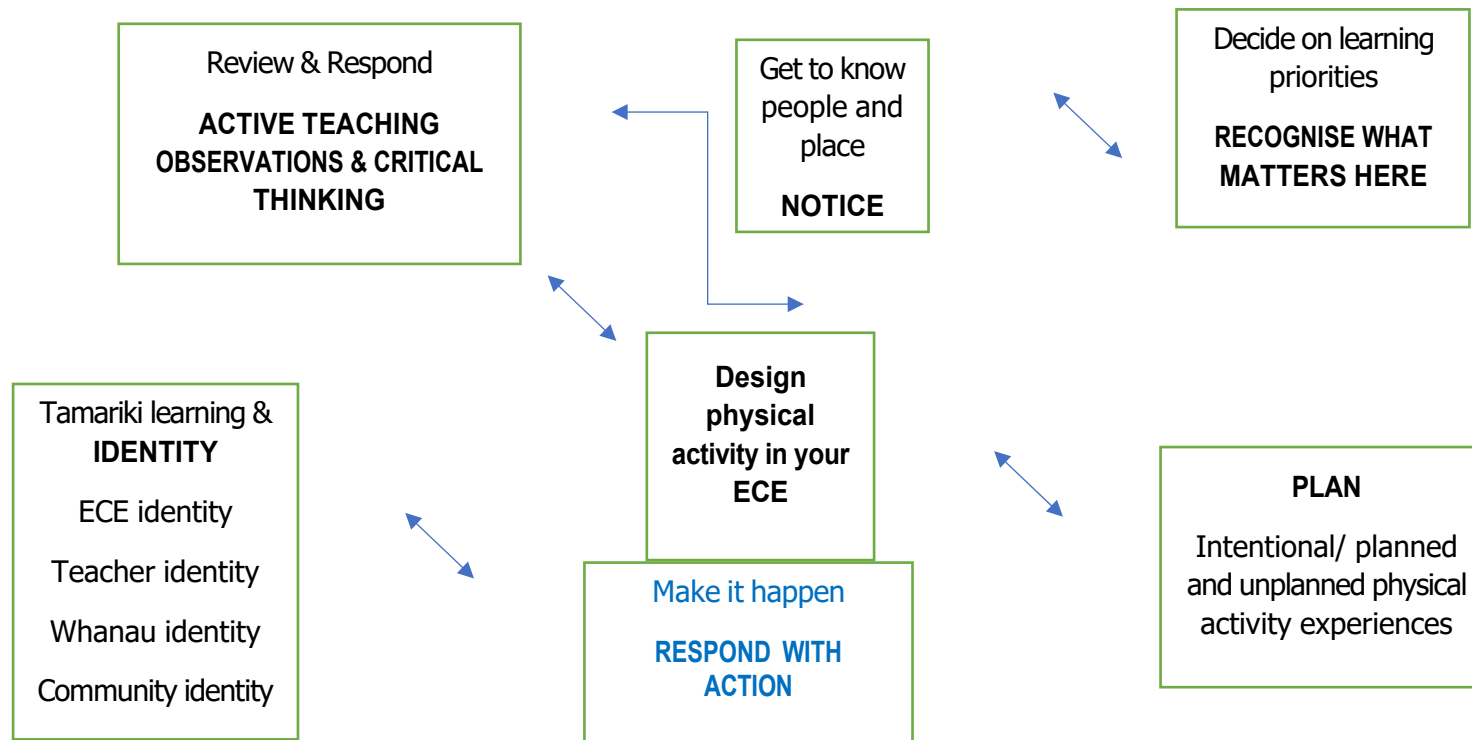
M.A.P.P Professional Learning for Teachers

Week 7: Session 6: Respond to Physical Activity as Learning in ECE



Outline

- **Session One:** Physical activity in ECE
- **Session Two:** Active Teaching
- **Session Three:** Planning for physical activity
- **Session Four:** Notice physical activity as learning in ECE
- **Session Five:** Recognise physical activity as learning in ECE
- **Session Six:** Respond to physical activity as learning in ECE



Session Six: Responding to Physical Activity as Learning in ECE

Outline

- Assessment for learning – Notice – Recognise – **Respond**
- Aspects of competence
- The origins of learning: The senses
- Responding to physical activity as learning

M.A.P.P Professional Learning

Teacher/ Kaiako Professional Learning	Mahere Nekehanga (movement M.A.P.P) characters	Movement Environment (MOVERS)
Respond to PA as Learning in ECE (30-minutes)	Nekehanga (movement) Max (rolling, spinning, upside down) Vestibular development Hohe (active) Ann (march, run, hop, jump) Fundamental movement skills and midline development Tinana (physical) Piri (hang, swing, climb) Power and proprioception Tākaro (playful) Pip (time, space, moveable equipment) Spatial and body awareness	Arranging environmental space to promote physical activity.

Assessment for Learning

Refer to

<https://www.education.govt.nz/early-childhood/teaching-and-learning/assessment-for-learning/kei-tua-o-te-pae-2/an-introduction-to-kei-tua-o-te-pae-he-whakamohiotanga-ki-kei-tua-o-te-pae/assessment-for-learning-te-aromatawai-mo-te-akoranga/noticing-recognising-and-responding-2/>

Aspects of Competence

- Personal goals, interests and working theories
- Learning strategies and dispositions
- Social roles and culturally valued literacies
- Knowledge
- Skills
- Dispositions

These aspects overlap and appear to underpin successful learning. Children develop competence as they pursue their personal interests and goals. They develop working theories about themselves as learning and about the world around them. Their goals, interests and working theories may not be immediately apparent, and many will change during the learning itself. (Kei Tua o te Pae, 2015, pg 3).

Kaiako play an important role in scaffolding children's learning and development through guiding and prompting and by provoking learning to occur. It is important that all children have opportunities to be supported in their learning by Kaiako. This enables them to stretch towards their potential through collaboration with adults and more capable peers. (He Mapuna te Tamaiti, 2019, pg 69).

The Origins of Learning: The Senses

The senses are filters through which we internalise the world around us and come to know our own bodies. There are seven senses, five that are well known and two that are not,

- **Hearing** using our ears to gather information
- **Tasting** using our mouth to gather information

- **Touching** using our body to gather information
- **Smelling** using our nose to gather information
- Seeing using our eyes to gather information
- **Vestibular/ Balance** – It is the sense of where our body is in space. Close your eyes for a minute and take a quick inventory of your body. Even without seeing or touching, you know where your arms and legs are in space. Vestibular sense is important because it helps us stand, walk, and sit up without falling over.
- **Proprioception** – This sense helps us understand where our body parts are in relation to each other. It also helps us figure out how much force to use in different activities such as closing the door and gripping the pencil without breaking it.

Senses are the very beginnings of learning. They deliver the raw information the brain needs to make sense of the world, and **all learning begins with the body**. Physical movement experiences stimulate the senses which collect information and deliver it to the brain for analysis, interpretation, reaction, and storage as memory. To make sense of this information the brain must learn to integrate it and form a complete picture. Sensory integration is how a child perceives, interprets, and understands sensory information through movement, essentially how children learn. (A Moving Child is a Learning Child, 2014, pg 53). Children need to practice movement over and over again to automate movement patterns and free up the brain for learning.

Moving IS learning and recognising that empowers Kaiako to respond accordingly to each child's individual learning journey through daily movement and physical activity experiences.

Narratives

Learning stories are there to highlight and explain the learning, not just the engagement. (Ministry of Education, 2011)

Learning Stories Through a Movement Lens

- Connection between moving and learning (physical, social/ emotional, cognitive)
- Specific skills investigated and what this means to the learning
- Setting... own, pairs, group, equipment, set up, own discovery
- Language, and added vocab by adult
- Pictures
- Child's voice

- Next step – moving towards
- Parent voice – ideas of home activities
- Life context – combine what is happening in and out of the centre

FUN Fact

If we want to recognise and respond to the learning that is taking place we will seek multiple perspectives, one of which will be the child's. (Kei Tua of te Pae, 2015, pg 5)

Critical Thinking

- Is assessment a two-way process between tamariki and Kaiako in your ECE?
- Do you assess PA as learning in your ECE, if yes how?
- What and how do you implement informal assessment of PA as learning in your ECE?
- What and how do you implement formal assessment of PA as learning in your ECE?

Action

- Implement M.A.P.P week 7 activities
- Implement an action song, Movement Max, Active Ann, Physical Piri, Playful Pip
- Carry out an informal assessment in response to PA as learning on a focus child in your ECE
- Carry out a formal assessment in response to PA as learning on a focus child in your ECE

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 7 Respond to PA as Learning in ECE	Warm- Up	Skill Session (see videos)	Activity (see videos)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Action Song Max, Ann, Piri, Pip	Action Song Max, Ann, Piri, Pip	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>

Movement Max	Cat Stretch/ Cat & mouse		Have children on the floor on their hands and knees, encourage them to hold in their tummy and see if it can touch their back, stretching like a cat, keeping knees and hands on the floor. Try this stretch with knees off the floor.	Have half the children be the cat and half be the mouse. See if the mice can crawl underneath the cat stretching, then swap. Co-construct a crawling track.	
Active Ann	Hop		Have children stand with two feet on the floor, encourage them to stand on only one foot, then step forward and stand on the other foot, stand/ step/ hold on one foot, repeat	Co-construct a group of lily pads and have children stand on one foot, then hop from one lily pad to the other. Try 5 hops on one foot, then change to other foot. Revisit the hopscotch and add hop to 2-foot jump.	
Physical Piri	Leap		Have children stand with two feet on the floor, encourage them to imagine a very tall giant with very tall legs, have	Draw a line with chalk or put a rope on the floor and encourage children to take a giant step over the rope. Next draw another	

			them take a giant step forward, then backwards.	line 10 steps from the rope and have children stand behind the line and run towards the rope and leap over it with a giant step, please note you may need to demonstrate. Once all children are leaping over add this challenge to your racecourse. Have children start galloping then leap over the rope, if comfortable add height to the rope for added challenge.	
Playful Pip	Short rope skipping		Have children hold the handle of the rope in each hand. Swing the rope over their head, when it is nearing their feet call out jump.	Stand inside the rope with a child. Hold onto the handles, have the child facing you. Swing the rope and tell them when to jump, you both jump together. Encourage 2	

				children to do this together when they can.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 8	Warm- Up	Skill Session (see videos)	Activity (see videos)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Action Song Max, Ann, Piri, Pip	Action Song Max, Ann, Piri, Pip	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Roll over reading/		Have children on the floor arms above head, on their back. Have	Choose a short story or make up a story and have children on the floor on	

	Spinning Story telling		them practice rolling over whenever you clap your hands, encourage children to close eyes and listen for the clap.	their tummy, arms above head, read a page and when you turn the page children need to turn over once, until the story is finished. You can try this standing up, where children spin around every time you turn the page.	
Active Ann	Bean bag catch		Have children stand with two feet together and make a plate with their hands with pinky fingers on each hand touching. Place a bean bag on their hand.	Encourage children to throw the bean bag up and down, throwing no higher than their shoulders, encourage them to bend their knees when throwing, keeping their pinky fingers together. Have them put the beanbag in one hand and see if they can throw it to their other hand, back	

				and forth as many times as they can.	
Physical Piri	Back bridge		Have children sit on the floor the same as the crab crawl. See if they can lift their bottom off the floor 5 times.	This time have the children stretch their belly button to the sky and create a bridge with their body, encourage some children to become a mouse, crab, bear, monkey or caterpillar and crawl under the bridge	
Playful Pip	Catching bubbles		Have children stand with two feet on the ground, stand in the middle of the circle in front of the children and blow bubbles, use a bubble gun or machine for more bubbles. Encourage children to focus on one bubble and watch	This time encourage children to focus on one bubble and see if they can catch it with both hands, bringing both hands together and clapping like crocodile jaws to make the bubble pop. Try this with the group lying down on their backs or	

			where it goes without moving.	catching with different body parts.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 9	Warm- Up	Skill Session (see videos)	Activity (see videos)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3-5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Action Song Max, Ann, Piri, Pip	Action Song Max, Ann, Piri, Pip	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Crawl Challenge Course		Co-construct a challenge course, indoors or out where	Have children crawl along the course with at least one knee on the	

			the children can crawl around, through, over and under. Ensure that the course has varying challenges such as a tunnel (chairs and sheet), variety of ground surfaces and heights, enriching the sensory experience.	ground at all times, have beanbags to pick up along the way and put on their back, or under their chin and a box at the end of the course to place them in. Roll over all the way back to the start of the course.	
Active Ann	Bean bag throw		Have children stand with two feet on the floor and make a muscle shape (strongman) with their arms, encourage them to step one foot forward, point with their finger where they want to throw and then practice throwing. Cue strong	Give children a beanbag of small ball and repeat the cues, strongman-step-point-throw. Have them change sides after 5 throws.	

			man-step-point-throw. Practice this on both sides of the body.		
Physical Piri	Wall walk		Find a wall inside or out where children stand with their lower body touching the wall, have them bend over and put both hands on the floor, stand up straight, clap their hands together and repeat 5 times.	Find a wall inside or out where children stand with their lower body touching the wall, have them bend over and put both hands on the floor, encourage children to walk their feet up the wall until their legs are above their body and arms are straight – then walk feet back down the wall. ADULT supervision required.	
Playful Pip	Catching bubbles with a popsicle stick		Have children in an area where they can move about, give them each an ice cream stick	Stand in the middle of the group and blow bubbles, more than one teacher if possible! Encourage children to catch the bubble on	

				their ice-cream stick, 5 catches with one hand and 5 with the other, 5 up high, 5 down low.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

Mahere Nekehanga - M.A.P.P Programme Activities

(These activities include the movement competencies of push/pull/twist/hinge/squat/lunge)

Please note you may need to demonstrate some of these activities, a video clip is available.

M.A.P.P Motivator (Active Teacher/ Kaiako Role)	Week 10	Warm- Up	Skill Session (see videos)	Activity (see videos)	Warm-Down
Actively support/ invite tamariki to session/ role model activity		High energy music and movement (3–5 minutes) <i>This remains the same for all activities, routine and predictable, an invitation for tamariki to join you.</i>	Action Song Max, Ann, Piri, Pip	Action Song Max, Ann, Piri, Pip	Walk for 10 steps, feel your heart and tummy for 10 beats, walk for 10 steps repeat as often as the tamariki are wanting to participate. <i>This remains the same for all activities, routine and predictable, an opportunity for tamariki to lead.</i>
Movement Max	Balance block bear challenge		Have each child go and find something in the ECE environment that	Co-construct a balance course with each child placing their item on	

			they can stand on or jump over that is not taller than their knee and at least one foot can fit on. Ensure that you have placed some PE equipment out as loose parts that would be suitable for this activity, such as hula hoop, bean bags, pillowcase.	the course. Encourage children to complete the course, using both feet and hands, walking like a bear. Encourage head moving out of an upright position <i>(Refresh memories by carrying out the bear walk activity if needed).</i>	
Active Ann	Bean bag target		Have children stand with two feet on the floor and make a muscle shape (strongman) with their arms, encourage them to step one foot forward, point with their finger where they want to throw and	Give children a beanbag of small ball and repeat the cues, strongman-step-point-throw. Have them change sides after 5 throws. Co-construct a target to throw beanbags at, it might be a goal, corndog hole, tree trunk, have	

			then practice throwing. Cue strong man-step-point-throw. Practice this on both sides of the body.	children draw an x makes the spot on target. Encourage groups of children to construct a target and place them around the ECE for children to see how targets they can hit by throwing their bean bag. For cross curricula you could measure the distance of each throw, ensure both arms practice throwing (dominance may not have emerged yet).	
Physical Piri	Stretchy lycra tug-o-war		Have children sit at one end of the stretchy lycra and a teacher at the other end, push and pull the lycra once this is comfortable encourage	Have 2-3 children (with 1 teacher) at one end of the stretchy lycra and 2-3 children (with one teacher) at the other end and encourage them to	

			the child to stand up and continue your tug-o-war! (Ensure you co-construct the rules for tug-o-war with the children before you begin)	pull, start sitting, then move to standing. Create a line in the middle to see which team wins, keep the competition going. Encourage children to build their strength by wheelbarrow walking with their friends.	
Playful Pip	Balloon ball volleyball		Blow up your balloon ball and have children in a circle batting the balloon ball to each other, encourage them to not let the balloon ball hit the floor, start with sitting and move to standing.	Put a line in the middle of the circle and encourage children to bat the ball over the line to their friends on the other side, start with sitting and move to standing. Use a rope and have two children hold it tight like a volleyball net and see how many times the ball can be batted over the net, just like	

				volleyball. Try 5 hits from each side and then swap the children holding the rope.	
M.A.P.P	Create a M.A.P.P circuit of activities for the week, including Physical Piri action song.				

M.A.P.P Character Action Songs



Movement Max – action song

Max is a mega, mighty, magnificent, moving kid. He loves to sing, dance and move everyday.

Max enjoys adventures everyday with his movement friends, Active Ann, Physical Piri and Playful Pip. Together they

- spin,
- run,
- push
- hop on one foot, then the other

Can you move like mega, mighty, magnificent, Moving Max and his friends? Let's try now!

- Spin around, one direction then the other
- Run on the spot, fast feet, slow feet
- Give yourself a high 5 and squeeze your hands together
- Hop on one foot (5 times), the other foot (5 times)

Movement Max, Movement Max, Moving, Moving, Moving Max

Lets spin, lets spin, let's wind up

let's go this way, let's go that way, let's go this way, let's go that way

lets go up, let's go down, let's take our bodies upside down

let's go round and round and round

then STOP

let's go slow, let's go slow, let's go slow, lets unwind

Let's go this way, let's go that way, let's go this way, let's go that way

Lets go up, let's go down, let's take our bodies upside down

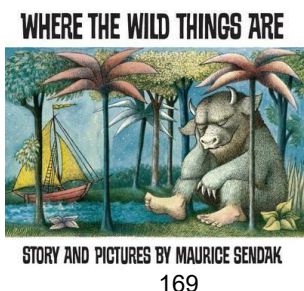
Let's go round and round and

round Then STOP

Repeat as often as the children want to participate

Oh, what a busy day for mega, mighty, magnificent, Moving Max, he is ready for a drink of water before he starts Moving again! Let's get a drink of water! See you soon

Further Active Reading: *Where the Wild Things Are by Maurice Sendak*





Active Ann – action song

Active Ann is an awesome, amazing, agile, kid. She loves to sing, dance and move everyday.

Active Ann enjoys adventures everyday with her movement friends, **Movement Max**, **Physical Piri** and **Playful Pip**. Together they

- spin
- run,
- push (give yourself a high 5 and hold., squeeze it tight),
- hop on one foot, then the other

Can you move like awesome, amazing, agile **Active Ann** and her friends? Let's try now!

- Spin around, one direction, then the other
- Run on the spot, fast feet, slow feet
- Give yourself a high 5 and squeeze your hands together
- Hop on one foot (5 times), the other foot (5 times)

Active Ann, Active Ann, active, active, active Ann

Lets run, lets run, lets run let's wind up

let's go this way, let's go that way, let's go this way, let's go that way

lets go up, let's go down, let's take our bodies upside down

let's go round and round and round

then STOP

let's go slow, let's go slow, let's go slow let's unwind

Let's go this way, let's go that way, let's go this way, let's go that way

Lets go up, let's go down, let's take our bodies upside down

Let's go round and round and

round Then STOP

Repeat as often as the children want to participate

Oh, what a busy day for awesome, amazing, agile **Active Ann**, she is ready for a drink of water before she starts being active again!

Let's get a drink of water! See you soon!

Further Active Reading: We're Going on A Bear Hunt





Physical Piri – action song

Piri is a proud, purposeful, physical kid. He loves to sing, dance and move everyday.

Piri enjoys adventures everyday with his movement friends, Movement Max, Active Ann, and Playful Pip. Together they

- spin,
- run,
- push (give yourself a high 5 and hold., squeeze it tight),
- hop on one foot, then the other

Can you move like physical Piri and his friends? Let's try now!

- Spin around, one direction, then the other
- Run on the spot
- Push (give yourself a high 5 and hold., squeeze it tight),
- Hop on one foot (5 times), the other foot (5 times)

Physical Piri, Physical Piri, physical, physical, physical Piri

Let's squeeze and squat, lets squeeze and squat, lets squeeze and squat, lets wind up

lets go this way, let's go that way, let's go this way, let's go that way

let's go up, let's go down, let's take our bodies upside down

lets go round and round and round

then STOP

Let's squeeze and squat, lets squeeze and squat, lets squeeze and squat

lets unwind

Let's go this way, let's go that way, let's go this way. Let's go that way Lets go up, lets go

down, let's take our bodies upside down

Let's go round and round and

round Then STOP

Repeat as often as the children want to participate

Oh what a busy day for Physical Piri, he is ready for a drink of water before he starts Moving again! Let's get a drink of water! See you soon!



Further Action Reading: *Leaping Lyle*



Playful Pip – action song

Pip is a **peaceful**, **perky**, **playful** kid. She loves to sing, dance and move everyday.

Pip enjoys adventures everyday with her movement friends, **Movement Max**, **Active Ann**, and **Physical Piri**. Together they

- spin,
- run,
- push (Give yourself a high 5 and squeeze your hands together and hold them tight)
- hop on one foot, then the other

Can you move like **Playful Pip** and her friends? Let's try now!

- Spin around, one direction, then the other
- Run on the spot, fast feet, slow feet
- Push (Give yourself a high 5 and squeeze your hands together and hold them tight)
- Hop on one foot (5 times), the other foot (5 times)

Playful Pip, Playful Pip, playful, playful, playful, Pip

*Let's hop and jump, lets hop and jump, lets hop and jump, lets wind up lets go this way,
let's go that way, let's go this way, let's go that way lets go up, let's go down, let's take
our bodies upside down*

let's go round and round and

round then STOP

Let's hop and jump, lets hop and jump, lets hop and jump, lets unwind

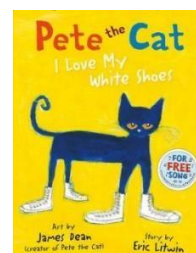
*Lets go this way, let's go that way, let's go this way, let's go that
way Lets go up, let's go down, let's take our bodies upside down*

Let's go round and round and

round Then STOP

Repeat as often as the children want to participate

Oh what a busy day for **peaceful**, **perky**, **playful Pip**, she is ready for a drink of water before she starts Moving again! Let's get a drink of water! See you soon!



Further Action Reading: *Pete the Cat and I Love My White Shoes*

Chapter 4

The Feasibility and Potential Efficacy of Movement-Active- Physical-Play (M.A.P.P) Physical Activity Program in New Zealand Early Childhood Education: A Pilot Cluster-Randomised Controlled Trial.

Prelude

Setting out the landscape of physical activity promotion in ECE from chapter two teaching practices, self-efficacy and the physical activity environment in Aotearoa, New Zealand Early Childhood Education Centres and seeking input from ECE, leaders and teachers in refining M.A.P.P in chapter three leads into chapter four. Chapter four presents the core of my thesis; the impact of M.A.P.P. Findings in this study determines the feasibility and potential efficacy of M.A.P.P in New Zealand ECE.

Although the study was designed as a preliminary pilot, and participant numbers reflect that, the methods are also applicable to a larger scale study in the future. A retrospective clinical trial was registered with Australian New Zealand Clinical Trials Registry, ANZCTR12624000754549.

This study was accepted as an oral presentation at the 2024 ISBNPA Advancing Behaviour Change conference in Omaha, USA, however due to an unexpected family illness I was unable to attend. An oral presentation was carried out at the 2025 ISBNPA Advancing Behaviour Change conference in Auckland, New Zealand.

Abstract

Title

Feasibility and potential efficacy of Movement-Active-Physical-Play (M.A.P.P) physical activity program in New Zealand Early Childhood Education: A pilot cluster-randomised controlled trial.

Objective:

To determine feasibility and potential efficacy of M.A.P.P.

Method:

ECE randomised to intervention (n = 2) or control (n = 2), 46 children (3.9 ± 0.5 y, M = 22, F = 24), and 28 teachers. M.A.P.P (10-week) online programme, with teacher professional development and activities. Potential efficacy quantified by comparing change in physical activity patterns and change in quality of ECE movement environment. Feasibility determined via interviews and observations.

Results:

No significant intervention effect observed. Time in moderate-intensity physical activity and MVPA decreased for both boys and girls, more favourable trends for girls. Mean MOVERS total scores changed for intervention (baseline 3.6; follow-up 4.3) and control (baseline 4.0; follow-up 3.9). Leaders, teachers and children reported M.A.P.P. as enjoyable. Observations revealed programme adherence, 80% of activities delivered.

Conclusion:

Potential for M.A.P.P to impact activity behaviours in ECE, particularly in girls, thus a larger study is warranted.

Implications for public health:

Supporting teachers to promote physical activity for children during the childcare day may provide public health benefits.

Key words: physical activity, children, early childhood education, intervention

Introduction

Optimal levels of physical activity (PA) and sedentary behaviour are critical for young children's health and development Carson et al. (2017) and PA is among the primary modifiable risk factors for the development of overweight and obesity in young children Lanigan (2018). Thus, the importance of PA and movement in early childhood is increasingly being acknowledged by teachers, health professionals, and government departments worldwide (Aadland et al., 2020; Okely et al., 2020; Tucker et al., 2022). Importantly, the World Health Organisation recognises the prolonged effects of physical inactivity in children, and in response have developed a Global Action Plan for Physical Activity (GAPPA) which aims to reduce physical inactivity by 15% by 2030 (World Health Organization, 2019). Current global guidelines recommend that young children aged (3–5) years should engage in at least 180 minutes of PA including 60 minutes of moderate-to-vigorous intensity PA (MVPA) each day, including both structured and unstructured play (World Health Organization, 2019). Further, findings suggest that it is important to establish high levels of MVPA in early childhood, as children may then be more likely to maintain higher levels over time (Downing et al., 2021).

Although it is not compulsory, almost all NZ children attend an early learning service for a sustained period of time before starting school (Duncan et al., 2019). Once children reach the age of three, ECE and care is the norm in the vast majority of OECD countries, with an average enrolment rate of 74% (OECD, 2023). ECE has been identified globally as a suitable location to promote PA (Krogager et al., 2022; Maitland et al., 2020; Vanderloo et al., 2014) ¹.

It is widely believed that positive and enjoyable experiences of PA in the early years will encourage children to continue enjoying and benefitting from PA through to adulthood (Lu & Montague, 2016). However, the existing framework of ECE does not necessarily support positive and enjoyable experiences of PA, as children are conditioned to remain calm and often cautioned for engaging in too much activity or being too loud whilst indoors (Alhassan et al., 2016). Concerningly, approximately 50% of young children do not meet the recommended levels of PA during the childcare day, spending around half of their time in sedentary activities Jones et al. (2019), even though the promotion of health and well-being is a mandated component of ECE curricula in NZ (Ministry of Education, 2017b).

Within ECE teachers have an influential role in promoting adequate PA (Peden et al., 2018; Saamong et al., 2023), and teacher-facilitated PA sessions have been shown to be feasible and effective in promoting high levels of MVPA (Carroll et al., 2021; Duff et al., 2019; Mak et al., 2021). However, according to Finch et al. (2016) and Wicks et al. (2022) who compared

¹ May, H. (2019). *Politics in the playground: The world of early childhood in Aotearoa New Zealand*. Otago University Press.

interventions delivered by external experts and teachers, found that those interventions delivered by teachers were clearly less effective. Additionally, similar studies in NZ, such as, McLachlan et al. (2017) suggest that more effective teaching practices and curriculum planning may lead to increased PA with enhanced motor skill development and Ali, McLachlan, Mugridge, et al. (2021) describe a significant barrier to appropriate PA opportunities for young children in ECE is teachers' capacities to provide effective programmes.

Of concern, globally, teachers have reported low confidence levels in promoting PA, Dymont and Coleman (2012), although the implementation of effective PA requires highly competent ECE staff (Aadland et al., 2020). Remarkably, some teachers perceive PA not to be an issue, potentially due to the misconception that 'children are active and full of energy' (Grady et al., 2024). Other variables include teacher behaviours and intentionality, provision of active opportunities, use of outdoor space and service quality. (Tonge et al., 2024). Thus, supporting teachers in ECE via online professional development to equip them with the knowledge, self-efficacy and intention to promote PA may provide substantial public health benefits (Tucker et al., 2022).

Hence, there is an urgent need for high-quality PA intervention studies that demonstrate effectiveness in dynamic and complex real-world ECE. Interventions designed specifically with scalability and sustainability as fundamental factors are a particular imperative (Aadland et al., 2020). Accordingly, the purpose of this study is to examine the novel multi-component online M.A.P.P programme as potentially scalable and sustainable in Aotearoa New Zealand (NZ) ECE.

Methods

Study Design

A mixed methods approach was selected in this feasibility and potential efficacy study which is made up of quantitative and qualitative data. This pilot cluster-randomised controlled trial adhered to the Standard Protocol Items: CONSORT extension guidelines for randomised trials (Campbell et al., 2012) and feasibility studies (Eldridge et al., 2016) utilising a mixed methods approach. The study was retrospectively registered at the Australian New Zealand Clinical Trials Registry and can be viewed elsewhere [ACTRN12624000754549](https://www.anzctr.org.au/Trial/Registration/TrialRegistration.aspx?ACTRN12624000754549).

Recruitment and Participants

Participants include ECE, leaders, teachers and children. An invitation to ECE (n = 225) in one region of NZ to participate in the study was extended via direct email. Recruitment continued until the intended sample of ECE volunteered to participate. Leaders/ teachers in these ECE

were then invited to participate. Inclusion criteria were that the ECE were licensed within the MOE region of NZ and teachers were qualified and fully or provisionally registered.

Following consent from ECE recruitment packs for child participants (one per guardian of each enrolled child) and a collection box for consent forms were delivered. Inclusion criteria for data collection were that children were aged (3-5) years old and had parental/ guardian consent. All children had the opportunity to participate in M.A.P.P activities.

Licensed ECE were randomly allocated (using Microsoft Excel randomisation function) to the intervention or control (standard practice) group immediately following baseline data collection. Ethics approval was obtained from Auckland University of Technology Ethics Committee, NZ on 12 April 2022. Children provided assent and their legal guardians/ parents provided signed written consent. Each ECE, leader, and teacher all provided signed written consent.

Intervention

Movement-Active-Physical-Play (M.A.P.P) was underpinned by Social Cognitive Theory (Bandura, 1986), and inspired by the NZ indigenous peoples' (Māori) holistic model of health, Te Whare Tapa Whā (Rochford, 2004). M.A.P.P is connected to the principles, strands, goals and learning outcomes of Te Whāriki (NZ bi-cultural early childhood curriculum), and is designed to improve teachers' self-efficacy in delivering PA during the childcare day to increase PA levels for children. The four components of M.A.P.P each have an associated character with specific active play characteristics and action songs; Movement Max, Active Ann, Physical Piri and Playful Pip.

The 10-week M.A.P.P program, carried out from August to October 2022, was developed by the primary author with feedback from end users (ECE n = 2, teachers n = 4) prior to the present study. M.A.P.P online professional development is made up of an implementation guide seven narrated webinars, seven readings and fifty pre-recorded activity videos. Teacher professional development was self-paced, completed during work hours and took no longer than 30 minutes per session, once per week. Webinars include a M.A.P.P overview, PA in ECE, Active Teaching, Planning for PA, Notice, Recognise and Respond to PA as learning. The pre-recorded activity videos were based on a nutritious movement diet, Monday is balance (Movement Max), Tuesday is fundamental movement skills (Active Ann), Wednesday is power and proprioception (Physical Piri), Thursday is body and spatial awareness (Playful Pip) and Friday is active play. Each activity session has predictability and routine with music and movement as the warmup and walking with hand on heart as the cool down.

Each week teachers watch one webinar, engage in the prescribed reading, implement new knowledge in daily practice and deliver a daily (Monday to Friday) 15-minute activity alongside children. Each webinar, reading and activity builds knowledge on the prior, scaffolding learning for teachers so they can prioritise child interest in intentional planning, spontaneous active play, and environmental provocations for PA. The M.A.P.P program has been detailed elsewhere (Pirie, 2024).

Control

Control ECE continued with their usual PA standard practice.

Efficacy Outcomes

Accelerometers

To assess the primary outcome (percentage of time that children spent in PA behaviours), reliable and valid Axivity AX3 accelerometers (Hedayatrad et al., 2021) attached to the wrist were used during the childcare day (9.00am to 3.00pm). A day was considered a valid monitoring day if daily wear time was at least 70% of the childcare day. Non-wear time was defined as intervals with at least 20 consecutive minutes of zero counts. Wear time was calculated by subtracting non-wear time from the total monitoring time for the day. The monitor was programmed to store data at second-by-second epoch daily. Wrist worn accelerometers were fitted when the child arrived at ECE in the morning by a teacher or parent/ caregiver and removed when they leave the ECE in the afternoon for five days at baseline and five days directly following the 10-week intervention. A standardised monitoring end time of 3.00pm was chosen to align with the typical majority leaving time for children in ECE. The Roscoe et al. (2017) cut points were used to define time spent in PA behaviours and were implemented using the GGIR R package (Migueles et al.).

Movement Environment Rating Scale (MOVERS)

To examine ECE environmental movement quality, the MOVERS observation scale (Archer & Siraj, 2017) was used. The scale comprises 11 items, which are distributed into four subscales. Subscale 1: curriculum, environment, and resources for physical development (items 1–4); Subscale 2: pedagogy for physical development (items 5–7); Subscale 3: supporting physical activity and critical thinking (items 8–10); and Subscale 4: parents/carers and staff (item 11). Each item consists of several indicators that describe practice. Items are rated on a 7-point scale: 1 = inadequate; 3 = minimal; 5 = good; and 7 = excellent. The items within each subscale were averaged to form subscale score, and all items were averaged to calculate the total mean score.

The observation was conducted by a non-blinded trained researcher on-site for a full day (9.00am to 4.00pm) at baseline and post intervention. This was followed by discussion with a leader, such as a head teacher, and supplemented by a review of documentation, including ECE policies to provide additional information to describe ECE policy and teacher practice. Observations took place from August to October 2022.

MOVERS test-retest reliability has been determined previously (intraclass correlation coefficient 0.959; $p < 0.001$), demonstrating excellent reliability (0.904; $p = 0.001$). Internal consistency of the scale has been determined using Cronbach's alpha, producing $\alpha = 0.94$ for the first MOVERS observations and $\alpha = 0.89$ for the second MOVERS observations (Kazmierska-Kowalewska et al., 2021).

Feasibility Outcomes

An assessment of feasibility and acceptability is an important part of process evaluation of a novel intervention to highlight study design aspects that may need to be modified (Norman et al., 2024). We assessed self-reported participant fidelity data (PLD completed, M.A.P.P activity sessions delivered) and interview responses. Intervention feasibility was further determined by assessing whether M.A.P.P activities were delivered as planned.

Data Analysis of Efficacy Outcomes

PA behaviour data were conveyed in terms of percentage of time spent in each intensity; the raw minutes in each intensity divided by the total minutes worn, adjusting for any differences in total wear time that might have occurred between baseline and follow-up time points. Intervention and interaction effects were quantified using generalised linear mixed models, a technique that copes with nested outcome and not normally distributed data (i.e., children nested within ECEs was specified as the random effect). The fixed effect was group (intervention or control), and the dependent variable was the post-intervention outcomes variables (e.g., % of time spent in MVPA). Model covariates were sex (male, female), age (years), and baseline value of the outcome, to adjust for any imbalances between the intervention and control groups at baseline (Vickers & Altman, 2001). Uncertainty in all estimates were expressed as 95% confidence intervals (CI).

MOVERS scores are presented in the form of component (each question, subscale) and overall total score with data expressed as mean $\pm$ SD.

Data Analysis of Feasibility Outcomes

Feasibility was determined by intervention fidelity and acceptability between August and October 2022. Analysis began after the period of data collection.

Fidelity includes the number of professional development webinars completed, activity sessions delivered, and activity session programme adherence. Teachers self-reported PLD webinars completed and M.A.P.P sessions delivered across the 10-week intervention timeframe. An observation of one teacher-led M.A.P.P activity session implementation in each intervention ECE was carried out to determine programme adherence.

The feasibility questions of the study were to evaluate the acceptability of M.A.P.P in ECE with leaders, teachers and children and to determine intention to use M.A.P.P in the future. To answer these feasibility questions interviews were carried out by the primary author. These interviews were semi-structured, each lasting 30-60 minutes with a casual approach adapted for the specific age group to facilitate engagement. The semi-structured interview is more powerful than other types of interviews for qualitative research because it allows for researchers to acquire in depth information and evidence from interviewees while considering the focus of the study (Ruslin et al., 2022). Children participated in the group interview if they were attending ECE on that day (n = 23).

Child interview questions.

Topic area	Questions
Enjoyment	What did you like about the programme? What was your favourite activity and why?
Barriers/ Challenges	What didn't you like about the programme?

All intervention ECE leaders (n = 4) and teachers (n = 10) participated in an interview.

ECE staff questions.

Topic area	Questions
Enjoyment	What did you enjoy about the intervention?

	What was your favourite activity and why?
	Was your favourite activity also the children's favourite activity?
	What worked well in the intervention?
Barriers/ Challenges	What did not work well in the intervention?
	What was the activity that you did not like and why?
	Were there any barriers to implementing the intervention?
Sustainability	Would you do the intervention again?
	Will you carry on using the intervention?

As the purpose of the interviews was to explore participants' perspectives of the intervention, a pre-defined categorisation matrix and coding was developed focusing on important intervention elements, such as barriers to implementation. Segmenting and coding the data allows themes to emerge that were based upon study aims (Braun & Clarke, 2021; Clarke & Braun, 2017). All interviews were audio recorded, and de-identified with each participant assigned a code. Following transcription and re-reading of the transcripts, coding of the transcripts based on the pre-determined categorisation matrix occurred.

Results

Recruitment and Participants

ECE and leaders/ teachers represented the Hawkes Bay region, (population 185,000, socio-economic deprivation index 6.0, slightly above the NZ deprivation index of 5.6) NZ (Ministry for Business Innovation and Employment, 2023). ECE response rate (2.6%), four centre managers, four head teachers, and 20 teachers. Of 163 children across four ECE, 46 (28.2%) provided assent.

Table 1. Overall participant descriptives

Intervention	Control	All
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Children	Mean (SD)	Mean (SD)	Mean (SD)
Age	4.0 (0.5)	3.8 (0.5)	3.9 (0.5)
	N	N	N
Ethnicity			
Māori	12	3	15
NZ European	9	9	18
Other	3	10	13
Sex			
Male	9	13	22
Female	15	9	24
Total	24	22	46
ECE Centre Managers	2	2	4
ECE Head Teachers	2	2	4
ECE Qualified and Registered Teachers	10	10	20
Sex			
Female	28		28
Male	0		0
Total			28

Preliminary Efficacy

Table 2. Baseline to follow-up physical activity results.

		CONTROL		INTERVENTION					
		Baseline (n=20) Mean (SD)	Follow-up (n=20) Mean (SD)	Baseline (n=22) Mean (SD)	Follow-up (n=21) Mean (SD)	Estimated Mean difference (Intervention – Control), [95% Confidence interval]	p- value	Beta Coefficient, [95% Confidence interval]	Standard error
Sedentary Behaviour (%)									
Overall		24.7 (11.1)	23.7 (11.6)	21.7 (14.6)	24.8 (9.77)				
Girls		25.8 (14.2)	25.9 (11.8)	21.8 (15.9)	23.2 (10.2)	3.52, [-2.41, 9.46]	0.244	1.14, [-7.00, 9.27]	4.15
Boys		24.1 (9.69)	22.3 (11.7)	21.6 (12.9)	28.0 (8.59)				
Light PA (%)									
Overall		16.1 (6.51)	21.4 (19.6)	15.8 (7.63)	18.5 (4.81)				
Girls		15.0 (6.31)	28.5 (29.0)	15.6 (7.86)	18.1 (4.53)	-4.19, [-13.3, 4.91]	0.367	11.5, [- 0.971, 23.9]	6.35
Boys		16.7 (6.79)	16.7 (8.27)	16.1 (7.74)	19.2 (5.64)				
Moderate PA (%)									
Overall		50.4 (14.1)	46.8 (16.0)	51.3 (14.1)	48.9 (9.65)	1.71, [-6.54, 9.96]	0.685	-10.8, [- 22.1, 0.495]	5.76

Girls	51.7 (18.0)	40.7 (17.0)	51.5 (15.4)	50.6 (10.9)				
Boys	49.7 (12.3)	50.9 (14.5)	51.0 (12.6)	45.6 (5.92)				
Vigorous PA (%)								
Overall	8.76 (3.18)	8.02 (6.22)	11.2 (9.67)	7.77 (5.73)				
Girls	7.50 (2.58)	4.88 (3.36)	11.2 (10.4)	8.06 (6.89)	-1.25, [-4.53, 2.04]	0.458	-1.98, [- 6.48, 2.51]	2.29
Boys	9.45 (3.36)	10.1 (6.90)	11.3 (9.02)	7.19 (2.47)				
MVPA (%)								
Overall	59.2 (16.5)	54.8 (20.2)	62.5 (19.8)	56.7 (12.0)				
Girls	59.2 (19.9)	45.6 (18.9)	62.6 (21.0)	58.6 (13.4)	0.968, [-8.97, 10.9]	0.849	-13.5, [- 27.1, 0.125]	6.93
Boys	59.1 (15.2)	61.0 (19.4)	62.3 (19.0)	52.7 (7.97)				

Table 2 displays PA outcomes from baseline to 10-week follow-up. There was no overall significant intervention effect observed. However, a significant interaction effect was observed between sex and moderate-intensity physical activity ($P=0.031$), and sex and MVPA ($P=0.013$). Time in both intensities decreased for both boys and girls, but to a lesser extent for girls.

ECE Movement Environment Quality

Table 3. MOVERS baseline to follow-up results.

	Control			Intervention		
	Baseline (n = 2)	Follow-up (n = 2)	Mean change	Baseline (n = 2)	Follow-up (n = 2)	Mean change
MOVERS Subscale 1						
Curriculum, environment, & resources for physical development	3.5 (1.1)	4.0 (0.4)	0.5	3.4 (0.9)	4.5 (0.4)	1.1
Subscale 2						
Pedagogy for physical development	4.2 (0.2)	4.5 (0.2)	0.3	3.6 (0.0)	4.5 (0.2)	1.1
Subscale 3						
Supporting physical activity and critical thinking	3.7 (0.5)	3.3 (0.4)	-0.4	3.3 (0.0)	4.2 (0.2)	0.9
Subscale 4						
Parents/ carers and staff	4.5 (0.7)	4.0 (0.0)	-0.5	4.0 (0.0)	4.0 (0.0)	0.0
Total Score	4.0 (0.7)	3.9 (0.5)	-0.1	3.6 (0.4)	4.3 (0.3)	0.7

MOVERS 11 item scale (1= inadequate, 3= minimal, 5= good, 7= excellent).

Although MOVERS results were not statistically tested, descriptive results for subscale 1 “Curriculum, environment, & resources for physical development” show a mean score increase change for both control (0.5) and intervention (1.1). Subscale 2 “Pedagogy for physical development” a mean score increase change for both control (0.3) and intervention (1.1). However, subscale 3 “Supporting physical activity and critical thinking” showed a mean score change decrease for control (-0.4) and an increase for intervention (0.9). Subscale 4 “Parents/ carers and staff” showed a mean score decrease for control (-0.5) and no score change for intervention. Total scores showed a decrease in mean score change for control (-0.1) and increase for intervention (0.7).

Intervention Feasibility

Fidelity

A total of seven webinars were completed (100% adherence), however not all were completed during the childcare day. A total of 40 of the 50 sessions were delivered by teachers (80%) with teachers reporting good attendance at an average of four different sessions per week. Activity session observations revealed intervention delivery fidelity adhered to stated activity session programme, however complete fidelity remains uncertain.

Acceptability

Via semi-structured interviews children described M.A.P.P activities as enjoyable and fun. The specific activity most enjoyed was tug ‘o’ war where both teachers and children participated together. Teachers noticed how happy children were when participating in activities. Demonstrations of acceptability were manifest in comments such as

“M.A.P.P was fun (with lots of laughing) “... “They all seemed to enjoy it when they were doing it”

When asked about what worked well in the M.A.P.P intervention teachers described accessibility to online professional learning and pre-recorded activities at a time that was suitable for them. Similarly, the opportunity to increase PA knowledge through narrated webinars and readings to then immediately put that knowledge into practice during the childcare day. Illustrations of increased teacher PA knowledge are

“I’ve enjoyed current research and theory because it really validates what we do, it gives us purpose, and it gives us meaning about why we do things and why it is so

important” ... “I’ve probably enjoyed most the learning side of things and being able to have different experiences to offer the children that I wouldn’t normally do”

In addition, teachers and leaders described an increase in confidence after taking part in M.A.P.P professional learning, such as

“I just think M.A.P.P has been really beneficial, when I look at the children before M.A.P.P and then I look at them now, and I look at the teaching team as well I feel like we are more equipped to notice, recognise and respond to PA as learning”

One teacher increased their own fitness and sense of wellbeing

“My fitness has improved too, it’s good for your wellbeing you know a bit of exercise, so it has been good for me”.

Teachers commented that time to carry out all M.A.P.P components within the childcare day was a challenge, as well as the competing demands of an ECE such as children needing intensive support.

“Finding the time to deliver activity sessions and complete M.A.P.P professional learning” ... “Everyday busyness of the ECE environment such as mixed age groups and open plan setting”

Barriers raised by leaders included limited understanding of teacher knowledge regarding PA therefore an effect on prioritisation of PA during the childcare day. All teachers commented on the challenges of inconsistent staffing due to either sickness or teacher shortages such as not being able to permanently fill teaching roles.

“A lack of understanding from teachers regarding the importance of PA for children” ... “In the early stages of bedding in a programme you need consistent staff, and we have not had that”.

Discussion

The aims of our study were to determine feasibility and potential efficacy of M.A.P.P. Key findings demonstrate there was no overall significant intervention effect observed, and time in moderate-intensity physical activity and MVPA decreased for both boys and girls, but to a lesser extent for girls. M.A.P.P was reported as enjoyable by participants and quality of the ECE movement environment signalled improvement. Feasibility (fidelity and acceptability) and potential efficacy study designs have provided precedent formative designs with scalability and sustainability in mind for potential future full scale investigations (Norman et al., 2024).

Importantly, children in our formative study described M.A.P.P as fun, and intervention teachers reported M.A.P.P worked well with whole staff accessibility and opportunity to immediately implement new knowledge into practice, promoting PA with confidence during the childcare day. Health promotion interventions that can be integrated into daily routines are more likely to be implemented (Howie et al., 2014), and similar studies (Bellows et al., 2013) suggest that when teachers facilitate program activities on a daily basis the fidelity of program implementation is high; thus, teacher facilitation is a strategy that facilitates future sustainability. For changes to be embedded into everyday routines in ECE ongoing professional development is critical (Bruijns, Adamo, et al., 2022).

Not surprisingly, Tucker et al. (2022) suggest the position of a teacher as an influencer of positive health behaviours and role model in an ECE is important. Leaders in our study described teachers as being more equipped to notice, recognise and respond to PA as learning following M.A.P.P professional development, therefore, the increase in the quality of the ECE movement environments may be attributable to the professional development component of M.A.P.P. Our findings complement similar studies such as Krogager (Krogager et al., 2022) and Zhang (Zhang et al., 2021) where high quality environments resulted in better outcomes. Zhang et al. (2021) found that childcare process quality, particularly curriculum and pedagogy, appeared important to PA in preschoolers, whilst Krogager et al. (2022) described positive associations between PA and pedagogy, highlighting the importance of teachers promoting children's PA.

Although our study was not designed to detect significant changes in efficacy outcomes our results provide a base as formative research for a better informed future full trial, such as Bourke et al. (2024) who found that an e-Learning course was highly successful at improving early childhood educators' capacity pertaining to physical activity and sedentary behaviours and Carroll et al. (2021) describe that a teacher-guided and -led indoor preschool physical activity intervention is a feasible approach.

Findings in our study signalled an overall decrease in both moderate-physical activity and MVPA, however, it is interesting to note, girls to a lesser extent. Similarly, to Engel et al. (2022) and Pate et al. (2016) found that girls, but not boys significantly increased MVPA. In contrast, Tonge et al. (2020) reported boys are typically more active than girls and more likely to meet physical activity recommendations during the childcare day, as girls generally engage in more sedentary contexts and experiences, such manipulative, dramatic, and fine motor play (Miller & Kuhaneck, 2008). M.A.P.P activities were sex neutral and there was equal sex representation in characters, therefore, it is plausible to suggest the improvement with girls

may be associated with different programme elements such as intentional teacher-led daily physical activities and active play provocations rather than sedentary activities. However, boys may prefer active play with peers rather than intentional teacher-led activities.

Interestingly, only one of the four ECE in our study had a PA policy in place, however this policy did not recommend specifics on the amount and type of PA. ECE are well placed to influence children's PA behaviours, and policies in these settings need to provide specific recommendations on the amount and type of PA children should do in care (Wenden et al., 2023). In contrast of this view Jerebine et al. (2024) and Jago et al. (2023) describe the significance of the individual context of each ECE or school and the perceptions, attitudes and experiences of staff are likely to impact PA provision, therefore not a one-size fits all approach. Both context and cultural considerations would be valuable in the development of policy, particularly in NZ. Despite the potential influence of ECE and teachers on children's PA behaviours there is clearly a need to support and promote the development of policy and capacity building in this setting. Further, policy is necessary to implement sustainable change in ECE to achieve high levels of fidelity and overcome barriers to implementation (Tonge et al., 2017), identifying the requirement for a whole ECE approach to PA promotion during the childcare day supported by strong PA policy, professional development and training. Therefore, coupling the implementation of policy with capacity building can improve teachers practice (Bellows et al., 2013; Saravanamuttoo et al., 2024).

A strength of our study is the novel multi-component M.A.P.P intervention, refined by ECE prior to implementation, which included a whole ECE approach to modify PA practices, also validated and reliable instruments were used to collect data. The mixed method study design approach, qualitative and quantitative data integration enhances overall findings and contributes to a more holistic understanding of the impact of M.A.P.P. However, there are the challenges associated with this design, such as the complexity of data integration and the potential for conflicting results. Further limitations in our study include a small cohort of participants, only one region of NZ and one follow-up time point postintervention. In addition, the challenge of ensuring unbiased questions, especially with spontaneous or unscripted follow-ups in semi-structured interviews and further potential bias due to lack of blinding by the assessor.

Conclusion

The delivery of M.A.P.P was feasible, movement environment quality of ECE signalled improvement, however this was not statistically tested. Although there was no overall

intervention effect in terms of PA, these findings provide a formative base for future investigations; thus, a larger study is warranted.

Conflicts of Interest

The authors have no competing interests to declare.

Ethics and Consent

Ethics approval was obtained from Auckland University of Technology Ethics Committee, NZ on 12 April 2022. Children provided assent and their legal guardians/ parents provided signed written consent. Each ECE, leader, and teacher all provided signed written consent.

Author Contributions

WP and NH conceived the study. All authors critically reviewed and approved the manuscript.

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We also wish to extend our appreciation to all participants in the study.

Supplementary Data

Figure 4.2 Flow of participants through the M.A.P.P study

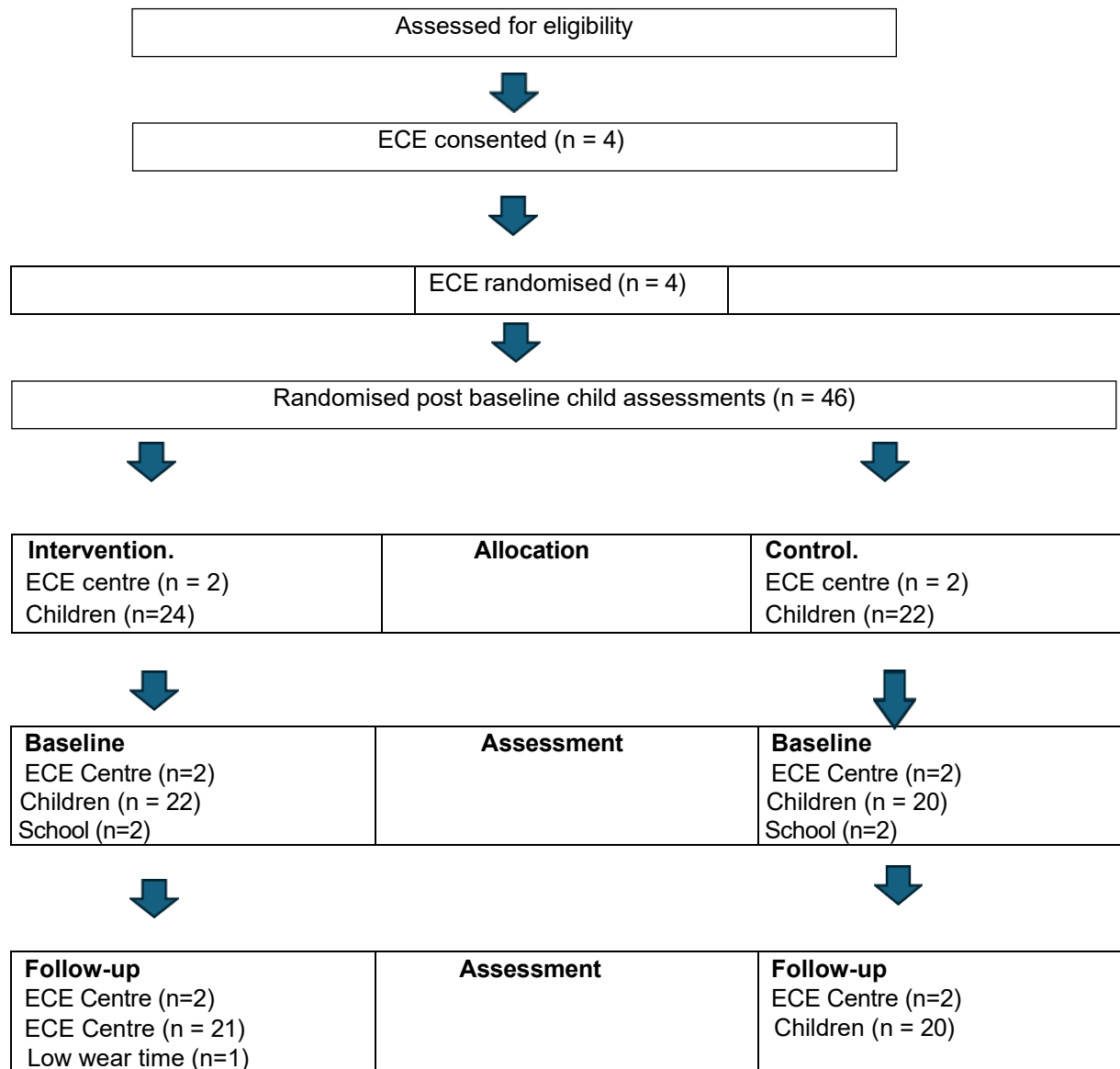


Table 4.6 MOVERS Tool – M.A.P.P Professional Development (PD)

MOVERS	M.A.P.P PD
Subscale 1 Curriculum, environment, & resources for physical development	M.A.P.P outline Planning for Physical Activity in ECE
Subscale 2 Pedagogy for physical development	Notice, Recognise and Respond to Physical Activity as Learning
Subscale 3 Supporting physical activity and critical thinking	Active Teaching
Subscale 4 Parent/ carers and staff	Physical Activity in ECE

Chapter 5

General Discussion

Summary

The aim of this thesis is to examine teacher self-efficacy, teacher practice and the physical activity environment in ECE and to determine the feasibility and potential efficacy of M.A.P.P. Organisation of my doctorate, as detailed in figure 1, demonstrated a sequential process towards a coherent thesis seeking to contribute to evidence-based practice in ECE. First, I examined literature, both globally and nationally underpinned by Bandura's Social Cognitive Theory with a narrative review (Bandura, 1986). A narrative review was selected as being particularly useful in my field of young child physical activity during the childcare day as the literature is diverse, complex, evolving and a holistic approach is needed to make sense of the research landscape. This review was carried out to provide a comprehensive summary and analysis of the current research. A narrative review approach is more flexible than a systematic review approach allowing for a broader and more interpretive discussion of literature (Baker, 2016). However, a systematic approach was taken to identify trends and gaps. Given the evolving work in this field, liberal criteria were used that allowed for inclusion of studies with diverse outcomes such as (physical activity, early childhood education, early childhood teachers) and a variety of research designs (randomised controlled trials, reviews, descriptive studies, longitudinal studies). These literature tables can be found in Appendix E. Second, I determined a cohort of NZ teachers' self-efficacy and practice in the promotion of physical activity in licensed ECE via self-reporting and determined the quality of the movement environment by independent observation by carrying out a cross-sectional study. Third, I refined M.A.P.P, a potentially scalable and sustainable online physical activity programme with end users, ECE leaders and teachers. Finally, and the primary outcome of my study, I determined the feasibility and potential efficacy of M.A.P.P on participant acceptability and fidelity, child physical activity levels, and the quality of the ECE movement environment.

Potential efficacy and feasibility designs have been used previously in my field by studies such as, Norman et al. (2024) to provide a base as formative research for a better-informed future full trial. Efficacy is a measure of '*can a treatment or intervention work*', therefore the concept of potential efficacy is '*can a treatment or intervention potentially work*' (Marley, 2000). Feasibility studies help determine whether a proposed intervention or research design is practical and sustainable within the given context, and efficacy studies provide early indications of whether an intervention is likely to achieve its intended outcomes (Abbott, 2014). Therefore, the design for my study was selected to address gaps in the literature by investigating the practicality and potential impact of M.A.P.P, in my emerging field of physical activity during the childcare day via teacher provision.

In summary, chapter one critically reviewed literature on young child physical activity within ECE and examined stakeholders that influence levels of child physical activity during the childcare day. Within ECE stakeholders include leaders, teachers and children. Findings indicate that globally and in NZ a large portion of the population under five years old attend ECE, child physical activity levels are low in this setting, and teachers report a need for more training on physical activity implementation and reducing sedentary behaviour (OECD, 2015; Tonge et al., 2020; World Health Organization, 2021). Further, ECE is complex and dynamic with minimal physical activity policy implementation and variation in the quality of movement environments (Aadland et al., 2020; Razak et al., 2020). These findings verify that there is more to be done in this sector, both nationally and globally to ensure positive health outcomes for children, and to provide for the next generation of physically active learners. My study contributes to determining a potential solution to increase the physical activity levels of children aged (3-5) years during the childcare day, particularly in a NZ context.

Chapter two determined the quality of the ECE movement environment and teaching practices in Aotearoa, NZ ECE. The environment was assessed via the Movement Environment Rating Scale (MOVERS) and teachers self-reported self-efficacy, via an online Early Childhood Educator Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen behaviours (ECE-COMPASS) questionnaire. Combining MOVERS' environmental rating with ECE-COMPASS's perceptual data allows for a multi-level indication of how teacher attitudes and structural conditions may impact physical activity provision for children during the childcare day. These two instruments used in conjunction in my study illustrate content overlap and were selected due to their complementary strengths in capturing both teacher-level and environmental determinants of physical activity promotion.

Findings indicate that our sample of teachers have above moderate self-efficacy in terms of physical activity facilitation and delivery and the quality of the ECE movement environment was adequate. From these findings and anecdotal thinking and literature, such as a growing number of studies that make a compelling case concerning the need to update early childhood tertiary training modules so that future teachers experience physical activity as a context within which one becomes physically active while being nurtured as a socially, cognitively, and emotionally healthy person (Diamanti et al., 2023). We can speculate that teachers require more training in the formative years, when in under-graduate training, a collaborative approach among the interrelated fields of child development and ECE is critical in addressing dilemmas stemming from societal beliefs around child development and the complex role of education in children's lives (Fulton & Myers, 2014). This, in turn, is expected to facilitate innovative thinking among future teachers about creating inclusive programs for all children, and ongoing professional learning to improve teacher practice and self-efficacy to have the confidence to

notice, recognise and respond to physical activity as learning (assessment for learning in ECE in NZ). It is conceivable that a lack of self-efficacy in engaging with physical activity leads to teachers making a narrow set of assumptions about behaviour in association with activity. The way to approach this behaviour might then be to approach physical activity in a way that helps the teachers to see and value children in their physical worlds in a different way, and this can include not being obstructed by assumptions about space in association with activity.

Once the scope of industry practice (teacher self-efficacy and practice of physical activity and quality of the ECE movement environment) was determined, a representation was beginning to emerge. Teachers report above moderate self-efficacy whereas the independent observation of the quality of ECE movement environment was adequate. Associations between these results were not examined, however the two data collection tools (ECE-COMPASS and MOVERS) had content overlap and when used in conjunction allowed a more comprehensive understanding of the scope of industry practice. By comparing overlapping data, I was able to identify consistencies such as the central role of the teacher in the provision of physical activity promotion during the childcare day.

Even though Te Whāriki celebrates the weaving of children's learning through all developmental domains, often only one domain is a focus, indicating more training is required to support teachers to weave all domains equally for the best outcomes for children. To support this training for teachers, chapter three constituted refining and introducing the physical activity programme and teaching resource, M.A.P.P. The final version of M.A.P.P was refined by ECE centres ($n = 2$) and teachers ($n = 4$) before utilising as an intervention in the pilot cluster-randomised controlled trial to investigate feasibility and potential efficacy.

M.A.P.P was developed as a result of experience, practice and underpinned by literature on current programmes and research, such as the 'Jump Start' intervention by Okely et al. (2020) the 'TEACH' intervention by (Tucker et al., 2022) and the Active Learning Norwegian Preschool(er)s (ACTNOW) study (Aadland et al., 2020). Experience includes my roles as a movement practitioner, ECE owner, professional learning facilitator within ECE settings and co-author of movement curriculum Move, Play & Learn with Smart Steps which was published in the USA in 2016 (Connell et al., 2016). Working alongside teachers, parents and children provided me with an invaluable insight into the significance of developing resources that are applicable as evidence based, but able to be easily translated into everyday practice. Teachers in ECE are often time poor and do not have the same opportunities as teachers in compulsory education settings such as primary school regarding non-contact time. Often non-contact time in ECE is unavailable due to licensing requirements of teacher/child ratio, which is impacted by such challenges as staff shortages and sickness, therefore teachers in these settings carry

out professional development, planning or writing up learning stories in their own time, after work hours or the weekend when the ECE is closed. Consequently, M.A.P.P was specifically designed to ensure teachers could access the programme at a time that was suitable to them during work hours and in small timeframe increments of 30-minutes once per week.

A further feature of the intervention design was a whole team approach to professional development as often a limitation is that only one or two teachers can attend professional development opportunities and then feedback learnings to the rest of the team. To effectively promote change within an ECE a whole team approach appears to be the most successful, this was confirmed by ECE leaders and teachers following participation in the M.A.P.P intervention.

A novel component of M.A.P.P is the infographic depicting the elements of a holistic view of a physically active learner, identifying the influencers that contribute to the success and development of a young child in an ECE. Further, the M.A.P.P characters of Movement Max, Active Ann, Physical Piri and Playful Pip are not only fun for children to view but also illustrate for teachers' important development information as to how to create a nutritious movement diet, made up of specific foundational movements, such as, rolling, hopping, hanging and skipping. Each character has their own action song and recommended books to promote active literacy, with the intent of moving teachers from sedentary to active behaviours, as worryingly 61% of teachers time during the childcare day is reported to be spent in sedentary behaviours (Tonge et al., 2017). As teachers are important daytime role models for children, active behaviour is crucial, consequently, active teaching (M.A.P.P Motivators) is a professional development component of the M.A.P.P programme.

Information in the pre-recorded, narrated webinars and readings on the iPad provided by the study was also delivered in hard copy. A hard copy of the intervention was provided to ECE as a result of the findings when refining M.A.P.P. Each reading followed a prescriptive narrative such as, what, why, when, how, finishing with a fun fact, critical thinking and actions for the week, as well as pre-recorded activities and map for the four days ahead, Monday, Tuesday, Wednesday, Thursday with Friday dedicated to M.A.P.P, where teachers and children choose their favourite activities of the week and co-create their own activity session. Interwoven within the M.A.P.P webinars and readings is Te Whāriki curriculum connections, and links to initiatives such as the Ministry of Health Active Play for Under 5's, ensuring that information for teachers to access was all in one place and always connected back to teacher practice on how to notice, recognise, and respond to physical activity as learning (Ministry of Education, 2017b; Ministry of Health, 2017a).

Potential efficacy was determined in my study by percentage of time children were active during the childcare day. Although our formative study was not fully powered to detect significant changes in efficacy outcomes, results signal a larger scale study may be warranted due to the significant interaction effect in moderate-physical activity ($P = 0.031$) and MVPA ($P = 0.013$). Additionally, there was an almost significant effect in vigorous-physical activity ($P = 0.051$), where sex interactions indicated a level of directionality change, girls scores increased, and boys scores decreased. Interestingly, findings from the NZ Report Card on physical activity for children and youth in NZ, 2022, report that there is a smaller proportion of girls meeting the threshold than boys or children and youth of another gender (Wilson et al., 2023). Similarly, Tonge et al. (2017) report that boys are more active than girls during the childcare day. Hence, M.A.P.P has potential to increase girls physical activity levels at a young age through teacher provision, and it is widely reported that participation in adequate levels of physical activity during the early years is important for health and development (Okely et al., 2020). However, boys' physical activity reduced, signalling potential sex related determinants of physical activity engagement, such as girls may respond positively to structured, intentional, teacher-led physical activity, when boys prefer to choose their own type of physical activity with their peers. Perhaps boys are more interested in their peers and girls are more interested in teacher expectations. Of interest, in our study 100% of teacher participants were female, thus raising the question, if this is representative of ECE nationally and globally, what impact does the majority female teacher environment have on how girls and boys engage with physical activity in ECE? Consequently, further examination is warranted to determine if the ways in which perceptions, constructions and experiences of sex contribute to sex specific inclinations/tendencies between girls and boys, and the percentage of teacher sex equity in ECE impacting the provision of physical activity via structured or unstructured experiences.

Certainly, over the last four years the literature on young child physical activity in ECE has increased and more studies on this topic are being published such as (Bruijns, Adamo, et al., 2022; Grady et al., 2024; Simpson et al., 2023; Tucker et al., 2022). I have been fortunate to connect with other academics around the world doing great work in this field such as Associate Professor Rachel Jones from the University of Wollongong in Australia, Professor Trish Tucker and Adjunct Professor Brianne Bruijns from Western University in Canada. These connections have deepened my knowledge of my subject area and provided the opportunity to include all three as co-authors on manuscript submissions for publication.

Significance of Findings

Throughout this study it is clear that encouraging lifelong participation in physical activity is essential and that physical activity during the first five years of life is fundamental to future health and wellbeing, furthermore, physical activity habits being early in life (Scott et al., 2020). However, the 2022 result of a C+ for children (5 – 18 years) from the report card on physical activity in NZ demonstrates that much work is needed to address inequities with targeted and population-specific strategies that support physical activity participation for all children and youth, especially girls, in Aotearoa, NZ (Wilson et al., 2023). Despite the influence of ECE and teachers on children's physical activity behaviours there is clearly a need to support and promote the development of policy in this setting. Further, policy is necessary to implement sustainable change in ECE to achieve high levels of fidelity and overcome barriers to implementation (Tonge et al., 2017), illustrating the requirement for a whole ECE approach to physical activity promotion during the childcare day supported by strong physical activity policy, professional development and training.

To increase physical activity levels in ECE our multi-component M.A.P.P intervention followed the view of Jerebine et al. (2024) that an intervention grounded in theory that utilises a systems approach to target multiple levels of influence on teacher behaviour, and are flexible and adaptable locally, are recommended. Each week of the 10-week intervention was made up of scaffolded learning for teachers giving them the opportunity to embed new knowledge via professional development, through narrated webinars, extra readings, activity videos to implement into everyday practice over the week. The first seven weeks of the intervention followed a prescriptive PD format, weekly webinar and activities over five days. The final three weeks of the intervention provided flexibility for teachers to revisit earlier PD or adapt their new knowledge to deliver their own daily version of M.A.P.P. Each ECE has a unique context and is culturally sensitive to their community which influences local curriculum delivery. Flexibility and adaptability of any intervention or programme is therefore of importance. This view is supported by Jago et al. (2023) who stated that for maximum impact all school-based interventions should be tailored to the local context.

The professional learning component of M.A.P.P was flexible as it was online and available for viewing (30-minute) duration at a time that is best suited to teachers in the day-to-day busyness of an ECE. Most teachers reported that they carried out the M.A.P.P professional learning at the beginning of the week at a time during the day that suited them. The daily delivery of M.A.P.P activities (15-minutes) or M.A.P.P character action songs (3-5 minutes) was also flexible in that they were able to be carried out by teachers at any time of the day and either indoors or out in support of existing curriculum plans, such as literacy and numeracy. On day five of the week teachers were encouraged to co-construct a M.A.P.P session based on child interest and favourite M.A.P.P activities in the programme. The M.A.P.P

PD encouraged teachers to adapt activities and action songs to respond to child interest, such as, delivering a session to a group of children, to only one child and setting up the ECE movement environment to promote a nutritious movement diet for all children.

In chapter two our cross-sectional study was undertaken which comprised teachers self-reporting their confidence in outdoor movement, physical activity, sedentary and screen behaviours via the Early Childhood Educator Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen behaviours (ECE-COMPASS) questionnaire (online) and an independent observation examining the quality of the ECE movement environment utilising the Movement Environment Rating Scale (MOVERS). To our knowledge, this is the first study that incorporates both teacher confidence self-reporting and independent observation of the quality of physical activity pedagogy, behaviours, and movement environment in ECE. Thus, the two data collection tools utilised provide original insight as they have not been used in conjunction before.

Although ECE staff view it as their role and professional responsibility to support children to be physically active while attending care, physical activity is also perceived to not be an issue for young children, potentially due to the misconception that 'children are active and full of energy' (Grady et al., 2024). Worryingly, children spend over 50%, and teachers 61% of their time in sedentary behaviours during the childcare day (Jones et al., 2019; Tonge et al., 2017). ECE have a professional responsibility to support children to be physically active while in attendance at care, however, many teachers describe low confidence in physical activity knowledge and delivery, World Health Organization (2019) , consequently, an opportunity exists to provide teachers in formative training the tools to support children to be physically active.

Interestingly, teachers in our study had above moderate scores of self-efficacy regarding physical activity behaviours during the childcare day and the movement quality of the ECE centre environments was adequate. This variation may be explained by the type of data collection tools, teachers self-reporting and independent observation, however utilising two different approaches to collect data provided an interesting and novel view of the scope of industry practice of ECE in our study. These tools used in conjunction provided an opportunity to identify overlapping consistencies, such as the centrality of the role of the teacher in physical activity promotion during the childcare day.

M.A.P.P is an innovative multi-component online intervention designed and developed following critical review of literature and over twenty years' experience as a practitioner, with the ambition to translate evidence into practice for positive health outcomes for children by increasing child physical activity levels during the childcare day via teacher provision.

Furthermore, the M.A.P.P design was inspired by the Māori health model Te Whare Tapa Whā, with a view to integrating a health model into an educational model to break down the current silo approach in NZ Government agencies, in the hope of providing an evidence based holistic approach to supporting the development of these young members of our population, through strong teacher practice and ECE policy.

An intentional component of chapter three was undertaking to refine M.A.P.P with end-users. The inclusion of end-user perceptions and experiences, (ECE and teachers), in scalability assessments is recommended, although, engagement and consultation with intervention end-users as part of scalability assessments is rarely undertaken. As ECE and teachers have tacit knowledge of the local context in which interventions are to be implemented and the barriers impacting implementation, their inclusion in assessments of intervention scalability will provide crucial perspective Grady et al. (2024), as such a strength of our study was refining M.A.P.P intervention with end-users to ensure being fit for purpose to best examine impact.

Limitations

There are several limitations in the thesis that should be noted. Recruitment was carried out at the beginning of the study via direct email to ECE from the publicly available education counts website (Ministry of Education, 2025). Often teachers within ECE do not have their own email address therefore study information disbursement to potential participants may have been impacted which resulted in a low recruitment rate. Additionally, the low recruitment participation rate may also be a result of the recent COVID-19 pandemic as reported by the NZ Education Review Office (Education Review Office, 2021). I am however incredibly grateful to those participants who agreed to contribute to my study.

My thesis is representative of a population sample in Hawkes Bay, NZ, with a population of 180,000 and deprivation index 6 (Ministry for Business Innovation and Employment, 2023). Therefore, potentially not representative of NZ population, and impacting generalization both in NZ and globally. However the MOE licensing criteria and regulations for operation of an ECE within NZ remains the same (Ministry of Education, 2008a, 2008b). Limiting participant inclusion to MOE licensed ECE further impacted recruitment and generalizability as there is a population of children aged (3-5) years attending other types of ECE, such as home-based care or playcentre. However, these ECE are not necessarily led by qualified and registered (provisionally or fully) teachers.

The accelerometry data collection tool in the main study of this thesis was changed from waist strap to wrist strap due to limited availability of waist straps during the study data collection timeframe at baseline and follow-up. Ethical approval for the study was confirmed on 12 April 2022 with the use of a waist strap to hold the accelerometer, this data collection

tool was further updated via an application for amendment to reflect the change in data collection tool to a wrist strap, approved on 5 July 2022. Unfortunately, the wrist strap proved to be a limitation in the main study due to it being reported as too big for some children, a previously identified issue (De Craemer et al., 2021). Teachers reported that children, particularly in the follow-up phase of the study were asking for the watch strap to be tightened or moved up their arm as it was too loose. Interestingly, children in my study viewed the wrist strap as a smartwatch and asked questions as to why the watch face was blank. Teachers responded to these questions and some placed stickers on the watch face to encourage children to remain interested in continuing to wear the wrist strap for the duration of baseline and follow-up data collection. Further, children that did not have consent to participate in the study also wanted to wear watch straps, so teachers created watches for them to strap onto their wrist, illustrating the impact of teacher behaviours to ensure that children have a sense of belonging when attending ECE.

Future Direction/ Implications

Recruitment of ECE and teachers in future studies could be improved by a different method to direct email, such as the use of social media including Face Book. This recruitment method was used successfully with parents of young children in a recent study (Norman et al., 2024). A study that includes a larger sample size would allow for statistical testing of data and increased generalizability.

There may be value in extending healthy behaviour outcomes in a future M.A.P.P study, such as testing motor skill and cognitive development. Further extending the scope of the study to include a 24-hour period would allow for a wider understanding of child physical activity levels across a whole day.

Accelerometry as used in our study to measure physical activity levels continues to be reported as the gold standard for children aged (3-5) years (Truelove et al., 2018). However, further information would be valuable on best practice for accelerometer location on the body, such as wrist or hip worn, and practicalities of this.

A future study would also benefit from more detailed participant characteristics data, as when interventions such as M.A.P.P are delivered by teachers their perceptions, attitudes and experiences are likely to play an important role in intervention success or failure (Sisson et al., 2017). Interestingly, a systematic review by Jerebine et al. (2024) provided examples from qualitative literature for the ways the social and physical environment influence teacher motivation and behaviour. Three widely reported barriers include competing time and priorities, policy tensions, particularly in relation to safety and weather and the practical challenges of

small indoor and outdoor spaces in ECE. These examples were consistent with qualitative findings in my study, confirming the complex and dynamic nature of stakeholders in ECE.

Feedback from ECE leaders and teachers on the final version of M.A.P.P confirms that there is further work to be done on refining the programme. This includes updating the narrated webinars and activity sessions to a more professional level and extending the character action songs into books and updated videos or app is also needed. Although such a comprehensive study would require considerable resources to implement, scalability and sustainability of the M.A.P.P programme that is fully developed will provide potential long-term benefits to child health. These benefits are likely to outweigh the costs. As my study progressed it became clear that physical activity policy in ECE centres was not a priority, further, policy development was not part of M.A.P.P, thus future development of M.A.P.P, professional development and templates related to physical activity policy that reflect unique ECE philosophy, culture and context may be of value.

Formative teacher training should incorporate the role of physical activity as an assessment for learning, empowering teachers to notice, recognise, and respond with confidence, to the movement behaviours of children during the childcare day. Consequently, writing a paper for undergraduate teacher training that reflects physical activity as learning will enable teachers to notice, recognise and respond to these behaviours. Therefore, working alongside tertiary institutions to develop and implement these papers is of importance.

Further, ECE are supported via strategic government initiatives to improve physical activity policy that reflects explicit information regarding the amount and type of physical activity to ensure the best outcomes for children and celebrates the unique individual philosophy of ECE and community to ensure a future of more active children via teacher provision. Accordingly, providing evidence-based information to MOE, and MOH that supports change via Government regulations and interventions or initiatives is a priority.

The size of wrist straps to record accelerometry data appear to be an important consideration when selecting data collection tools for children under five years. In future studies I would choose to use a waist strap to house the accelerometer in children of this age group, unless a smaller wrist strap was available. Potential co-development of a smaller wrist strap to house accelerometers for data collection in young children aged (3-5) years may be of value.

Due to the complex and dynamic nature of ECE future work should seek to address societal barriers, structural challenges in the sector, and the physical activity educational needs of teachers (Jerebine et al., 2024). Further research is needed to determine culturally and contextually appropriate and effective interventions, that include physical activity for preschool children (Ali et al., 2017). Therefore, future investigation is warranted, starting in NZ then

subsequently across countries with similar ECE environments, such as Australia and Canada. Once funding for a large-scale study has been secured and the M.A.P.P programme has been updated the goal is to begin a larger-scale study in NZ in the near future.

Conclusions

Findings indicate that globally and in NZ a large portion of the population under five years old attend ECE, child physical activity levels are low in this setting, and teachers report a need for more training on physical activity implementation and reducing sedentary behaviour (OECD, 2015; Tonge et al., 2020; World Health Organization, 2021). Further, ECE is complex and dynamic with minimal physical activity policy implementation and variation in the quality of movement environments (Aadland et al., 2020; Razak et al., 2020). These findings verify that there is more to be done in this sector, both nationally and globally to ensure positive health outcomes for our children, and to provide for the next generation of physically active learners.

The results presented in this thesis represent a contribution to the current body of knowledge on child physical activity levels in ECE during the childcare day. In chapter two a small cohort of NZ teachers report above moderate confidence in the promotion of PA behaviours during the childcare day and the quality of the ECE movement environment was adequate. A novel approach in using data collection tools ECE-COMPASS and MOVERS in conjunction provided an opportunity to identify consistency in the central role of the teacher in PA promotion in ECE.

In chapter three the novel M.A.P.P intervention was refined with end-users ECE leaders, teachers and children. M.A.P.P was reported to be flexible and adaptable within the ECE context and culturally sensitive.

In chapter four ECE leaders, teachers and children reported M.A.P.P worked well and would continue to be used in some form in the future. Although there was no overall intervention effect, there was a significant interaction sex effect where girls scores increased, and boys scores decreased. Further the quality of ECE movement environment signalled a level of directionality change where MOVERS scores increased.

Given the combination of ECE contexts being noteworthy sites of impact, and the escalating attendance of children in ECE, it makes sense that strategic approaches are focused on supporting teachers, and key stakeholders for young children (Brown et al., 2023). In support of this approach my thesis provides original insight into the feasibility and potential efficacy of M.A.P.P to impact the physical activity levels of children aged (3-5) years during the childcare day. This formative work provides a base on which to develop a full-scale study in the near future.

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Appendices

Appendix A: Ministry of Education consultation

RE: PhD ethics process, consultation, and feedback

Mōrena Wendy

Thank you for allowing me the opportunity to read through your proposed M.A.P.P framework.
My reflections;

- I love that M.A.P.P seamlessly aligns to Te Whariki strands and learning outcomes. What this does is supports Kaiako with the knowledge and understanding of how they can embed M.A.P.P in their daily routines but also how they recognise the learning for children, and how they can extend children.
- I believe in the current climate your proposal to allow kaiako to be able to participate in the online PLD sessions via 3- 30 minute sessions during non-contact time or at a time that suits them is sustainable and achievable.
- I love the concept of the four children/ role models/ tuakana teina. I believe Max, Ann, Piri and Pip will really appeal to tamariki as tuakana but also allow tamaiti to see themselves as capable.

A wondering;

- Have you considered incorporating more Te Reo Māori for movements (thinking about the language)
- Perhaps someone with more of a kauapapa Māori lens (not my area of expertise) may be able to offer suggestions.

Not sure if this is the kind of feedback you are looking for.

I am super excited to hear how the movement programme and your research evolves.

Do let me know if you are wanting any further specific feedback.

Hope we can do coffee sometime.

Ngā Mihi

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Appendix B: Sport New Zealand consultation

Charissa Barham <Charissa.Barham@sportnz.org.nz>

Kia ora Wendy

Thanks for sharing your mahi today and the opportunity to consult. I really enjoyed understanding and discussing your research.

From a Sport New Zealand lens where in my role we are focused on Sport and Rangatahi (12-18 years), I am part of a wider team that have different mandates they work from. We all have the overarching outcome of Everybody Active: <https://sportnz.org.nz/media/1316/2020-2021-strategic-priorities.pdf>

Some of the key insights/evidence/programmes that are part of our wider work at Sport New Zealand:

- Healthy Active Learning: <https://sportnz.org.nz/get-active/ways-to-get-active/physical-education/healthy-active-learning/> What is significant for me from this approach is three government agencies connected on this project (MOE, MOH and Sport NZ). Barrie Gordan from Victoria University is working alongside this team.
- Voice of Tamariki (came out last year). A key piece of information that landed with me, was the forming of their gender and physical competency at the age of 8 years, yet we are trying to solve a problem at 15 years (drop off in physical activity and sports participation). I will try and find that for you.
- Play – there is a big focus on play now and integrated even into spaces and places discussions. <https://sportnz.org.nz/get-active/ways-to-get-active/play/>
- Following on from our discussion regarding Te Tiriti o Waitangi – we are on a journey and our Rautaki Māori team are driving our strategic priority of partnership. <https://sportnz.org.nz/kaupapa-maori/te-tiriti-o-waitangi/#> Trina Henare at Sport Northland is also driving some key regional work. trinah@sportnorth.co.nz

From a health framework or a socio-ecological model, a young person is not broken down into separate environments, separate pillars, but as adults and key decision makers on funding and curriculum, it is important that all the key pillars of well-being and enablers and barriers are considered. I acknowledge my personal lens with a bias on physical activity – how do we consider a holistic approach to the teacher training, curriculum development and implementation and application of programmes that realise the potential of a framework like Te Whare Tapa Wha? Do we need to consider a more human centred design approach? I do not know the answers, but float the questions, even in my work. Moving from Mauri noho to Mauri ora.

The key enablers in any health framework or physical activity programme are the teachers. Considering the longer term health implications if our key influencers (teachers) in the early, formative years are not embracing the realms of physical activity within a broader holistic framework, the impact of this work will contribute to not only the teachers well-being and physical activity approaches, but the children and ultimately their long term well-being, providing the children with the ultimate ability to reach their potential and flourish through all stages of their lives. The role of the teacher/Kaiako can not be underestimated. The establishment of the Health Active Living Programme in primary schools has allowed an explicit focus on physical activity and well being by providing Tamariki with a skilled workforce to deliver the programme. I look forward to any further discussions we might have.

Good luck for your research 😊



Appendix C: Onward Consultants consultation



Conversation with Wendy Pirie PhD thesis 18/2/22

M.A.P.P.

The efficacy of a teacher-led, physical activity programme.

I have been a preferred professional development and learning provider for the Ministry of Education for 5 years. I also work in the private sector. My work extends to both Primary and Early Childhood Education. I am a registered teacher with extensive experience in education.

Wendy invited me to have a meeting with her to discuss her study and proposed framework of M.A.P.P.

Our discussion focussed on the language used in the framework, the potential design of the study, and what benefits it will have to the participants.

Physical activity and active movement are crucial for children's body and brain development to connect and make sense of their world. This framework resource would support a predominantly female teaching sector to deliver physical activities to groups of children. In my role as a professional development provider there is a need for specific information on child development and active movement. This knowledge would strengthen planning and appropriate assessment systems benefiting both the child and the teacher/Kaiako.

Further, engaging in the programme ensures the teachers/Kaiako are role models for movement and being active. Over time the teachers/Kaiako will become more confident to deliver physical activity thereby building capability, as well as growing in competence. I would imagine also that the learning would transfer into other learning in the ECE service including outdoor play, indoor and outdoor environments, and influence other systems such as internal evaluation or inquiry practices.

This discussion ended with changes to wording to ensure alignment with the New Zealand ECE Curriculum Te Whāriki. The framework was considered in line with beliefs, values and practices current in ECE education today. I believe our discussion will influence the language and the design of the framework.

Director: Frances van Dillen

DipTching ECE, Dip Tching Pri, BEd, Post Grad Leadership, Certificate Clinical Supervision EIT,
Registered Teacher

Appendix D: Parent consultation

Raun Haerewa <raun@hbcfct.org.nz>

Kia ora Wendy

Thanks for catching up with me yesterday, in regard to your study consultation, as I stated being a Maori father and my son being close to the age of the children that you will be using for your research, it is very important from my perspective to have a clear component or acknowledgement of Mātauranga Māori or te ao Māori in your consult process. The importance of cultural connection for my children is huge, if my son was to potentially be involved in a study like this, I would want to know what benefit this is going to have for my son, how much of a cultural component is involved with the study, and how are you going about incorporating the cultural component into the study.

I think it is a great project and look forward to staying in touch to help out how every I can.

Mauri ora
Raun

Raun Makirere-Haerewa Strength & Conditioning Coach Sports Performance & Programmes Lead ☎ 021 0264 6596 ✉ raun@hbcfct.org.nz 📱 EIT Institute of Sport & Health	 KIA KAHA TE REO MĀORI HAWKE'S BAY Sports Performance
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Appendix E: Literature Review Tables

Summary of Randomised Controlled Study Findings

Date	Author	Title	Measures	Result/ Conclusion
2103	Alhassan, S., et al.	A Pilot Study to Examine the Effect of Additional Structured Outdoor Playtime on Preschoolers' Physical Activity Levels.	Physical activity levels Actigraph accelerometry Assessed at baseline During week 4 For 7 consecutive days	Intervention Group Vigorous physical activity P=0.04 5.5 min increase in MVPA Sedentary physical activity P=0.01 9min decrease in sedentary behaviour Teachers enjoyed SPARK Programme Nap time increased
2009	Bundy, A. C., et al.	Sydney Playground Project: A Cluster-Randomised Trial to Increase Physical Activity, Play and Social Skills	Accelerometer measure Physical activity Counts per day MVPA (min) Sedentary time (min)	Intervention +9350 p=0.002 +1.8 p=0.006 -2.1 p=0.001 Effective for increasing MVPA during recess and demonstrated capacity to improve play opportunities in school playgrounds. safety and supervising limit physical activity opportunities.

2024	Bourke, M., et al.	The efficacy of the TEACH e-Learning course at improving early childhood educators' physical activity and sedentary behaviour self-efficacy, knowledge, intentions, and perceived behavioural control: a randomised controlled trial	Early Childhood Educators (n=209) Intervention (n=98) Control (n=111) Mean age 41.78 Female (97%)	Baseline, 4 weeks, 3-months The TEACH e-Learning course was found to be efficacious at improving all examined outcomes, with standardized effect sizes ranging from Self-efficacy $d = 0.58$ to $d = 0.65$ knowledge $d = 0.66$ to $d = 1.20$ intention $d = 0.50$ to $d = 0.65$ perceived behavioural control $d = 0.33$ to $d = 0.69$ post-Intervention
2021	Carroll, A. V., et al.	The Effect of a Teacher-Guided and -Led Indoor Preschool Physical Activity Intervention: A Feasibility Study	MVPA indoor time MVPA outdoor time	66 children 3-5 years 12 pre-school teachers $P=0.036$ $P= 0.002$ Teacher-led structured physical activity provides additional opportunities to be physically active during the school day that can compensate for various obstacles that may reduce or impact

				unstructured play time.
2019	Delaney, T., et al.	A cluster randomised controlled trial of an intervention to increase PA of preschool-aged children attending early childhood education and care: Study protocol for the 'everybody energise' trial	Primary Accelerometry MVPA mean minutes/ day Secondary Total daily physical activity while in ECE Total daily activity counts while in ECE Mean daily minutes in sedentary behaviour while in ECE. Cognitive function Early Years Toolbox Centre Characteristics Child & Parent Characteristics Usual Child Physical activity Preschool-age Children's Physical Activity Questionnaire ECEC Centre physical activity policies & practices Environment & Policy Assessment Tool (EPOA) Fidelity of delivery of energisers	Study protocol
2020	Andersen, E., et al.	Children's Physical Activity level and sedentary behaviour in Norwegian early childhood education and care: effects of a staff led cluster	Accelerometry total Physical activity (min) Sedentary MVPA (min)	P=0.02 Reduced but no significant difference. +12

		randomised controlled trial		P=0.02 Most encouraging that the least physically active at baseline increased the most. Most children do not attain or sustain high levels of physical activity for extended periods. Teachers focused on routines, environment, games, plays and activities that targeted general physical activity – staff did not have specific goals to increase MVPA behaviours. Physical activity guidelines for under 5 do not distinguish between moderate and vigorous MVPA. Baseline data in line with findings from other studies indicating an insufficient degree of physical activity in ECE. Some studies indicate increased physical activity in children can cause long time effects in term of lower blood pressure, improved aerobic fitness and cardiovascular health &
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				decreased body fat. A high degree of teacher professionalism and a combination of pedagogical and content knowledge relevant for facilitating physical activity in a collaborative and child-centred way.
2022	Engel, A., et al.	Effect of a Fundamental Motor Skills Intervention on Fundamental Motor Skill and Physical Activity in a Preschool Setting: A Cluster Randomised Controlled Trial	50 children Mean age=4.0 [0.6] 54% male 4 ECE centres 2 (I) and 2 (C) Baseline 12-weeks 24-weeks FMS competence (TGMD-2) MVPA	PLAYFun 12-week games-based programme delivered by external experts @12 weeks object control ($P<0.001$) Total FMS ($P=0.010$) @12 weeks Interaction effect girls ($P=0.004$) Improvements not maintained at 24 weeks.

2015	Finch, M., et al.	A pragmatic randomised controlled trial of an implementation intervention to increase healthy eating and physical activity-promoting policies, and practices in centre-based childcare services: study protocol		Study protocol
2019	Finch, M., et al.	A randomised controlled trial of performance review and facilitated feedback to increase implementation of healthy eating and physical activity-promoting policies and practices in centre-based childcare.	131 total ECE 68 intervention (I) 63 control (C) Telephone interview at baseline and 12-month follow-up ECE having written nutrition, physical activity and small screen recreation policies ECE providing information to families (healthy eating, physical activity, small screen time, breast feeding where relevant) ECE providing structured and specific learning experiences about health eating at least two times/week	0 ECE implementing all 6 policies @ baseline Few meeting all 6 at 12-month follow-up I n= 6 (9.7%) C n=8 (17.4%)
			ECE providing age-appropriate drinks to children (only water & milk) ECE conducting FMS activities for children 3-5 years everyday to at	

			least 90% of children ECE limiting use of small screen recreation by children 3-5 years to only educational and learning experiences	
2016	Goldfield, G.S., et al.	Effects of Child Care Intervention on Physical Activity and Body Composition	Six ECE Intervention (n=40) Control (n=43) Mean age 3.3 (0.6) Accelerometry Bioelectrical impedance	@ 6-months Total PA (P=0.002) Light PA (P=0.004) No change in MVPA between groups Body fat % (P=0.023) Fat mass (P=0.018)
2021	Harris, N., et al.	Feasibility and Provisional Efficacy of Embedding High-Intensity Interval Training into Physical Education Lessons: A Pilot Cluster-Randomised Trial	Two schools 84 students Intervention (n=53) Control (n=31) Mean age 11.9 (0.5) 8 weeks	Small intervention effect squat repetitions (0.20), exercise enjoyment (0.26), HIT self-efficacy (0.22) Medium effect for psychological difficulties score (0.41) Large intervention effect modified pull-ups (1.14) Intervention feasible and acceptable to both student and teachers.
2022	Harris, N., et al.	Impact of high-intensity interval training including	Eight schools (n=368, age range 11-13 years)	No clear effects

		Indigenous narratives on adolescents' mental health: a cluster-randomised controlled trial	16 weeks	
2015	Hinkley, T., et al.	Physical environments, policies and practices for PA and screen-based sedentary behaviour among preschoolers within childcare centres in Melbourne, Australia and Kingston, Canada	9 physical environments. 12 policies and practices Nutrition & Physical Activity Self-Assessment for Childcare (Canada) Environment & Policy Assessment & Observation (EPOA) Australia	Intervention children in Australia spent more time outside. Australian teachers had more PLD on PA. Due to climate children spent more time outside even if there was no PA policy Canada had more structured PA sessions, allowed children to take part in all types of active play indoors, physical activity policies. All Canada ECE are required to have and implement PA policy and guidelines from a national perspective, including active play opportunities, activities to promote gross motor skills and outdoor time. Key messages:

				Increasingly sedentary lifestyles place an imperative on centres to support PA & minimise sedentary behaviours.
2019	Houser, N. E., et al.	A loose-parts randomised controlled trial to promote active outdoor play in preschool-aged children: Physical literacy in the early years (PLEY) project	Accelerometry ECE n = 19 Intervention n = 11 Control n = 8 Children 3-5 years n = 183 Test of Gross Motor Skills-3 (TGMD-3) Pre-schooler Gross Motor Quality Scale (PGMQ)	Purpose Design Methodology Electronic community forum An intervention can be translated into an online PD program and disseminated on a large scale in a timely manner.
2013	Lyn, R., et al.	Nutrition and PA in childcare centres: the impact of a wellness policy initiative on environment and policy assessment and observation outcomes. (EPOA)	Environment and Policy Assessment and Observation Instrument (EPOA) Observations carried out Feb 2010 to April 2011	Intervention Total nutrition ($P < .001$) Total PA ($P < .001$) ECE significantly improved the PA environments of centres by enhancing: Active Play, Sedentary Environment,

				Portable Environment, Staff Behaviour, physical activity, Staff Training & Education Implementing wellness policies and training in caregivers in best practices for PA.
2017	McLachlan, C., et al.	Development of Teachers' Knowledge and Skills in Implementing a Physical Education Curriculum: A New Zealand Early Childhood Intervention Study	Untrained staff excluded Trained staff were assumed to have a body of knowledge with regard to PA. 30-minute semi-structured interview (audiotaped & transcribed independently, content & thematic analysis, constant comparative analysis): effect of PLD on Knowledge Skills Beliefs Practices Teacher questionnaires (pre & post) Determine knowledge and experience of PA Test of Gross Motor Development-TGMD-2	Not all teachers participated in either the Jumping Beans sessions or the 3 PLD workshops- so the implementation was affected. Teachers were unable to connect PA to Te Whāriki with any relevance. Few teachers had had any PLD in relation to PA following on from undergraduate teacher training. Most teachers talked about a go-with-the-flow approach to curriculum planning for PA. One ECE ran a parent education programme to get parents to

			Quality of intervention and PLD – 6-point rating scale 1 strongly disagree to 6 strongly agree	try the jumping beans activities. The need for more challenging resources was identified by teachers, seen as a negative finding as the focus had been to intend to help teachers use existing resources to good effect. An increased focus on PA and links to Te Whāriki for teachers to develop a more uniform approach and expectations.
2020	Okely, A., et al.	'Jump start' childcare-based intervention to promote physical activity in pre-schoolers: six-month findings from a cluster randomised trial	Primary outcome was min/hour physical activity. Actigraph accelerometers Baseline 85% (558) had valid accelerometer data, mean age 3.3 years, 52% boys. 6-months 508 (77%) had valid data	PA total $p > 0.001$ (0.78) Intervention was designed to be implemented by all staff. After 6 months the Jump Start intervention had no effect on physical activity levels during ECE, this was largely due to low implementation levels. Most ECE curriculum standards and frameworks mandate the provision of PA

				opportunities for children.
2021	Telford, R. M., et al.	A peer coach intervention in childcare centres enhances early childhood PA: The Active Early Learning (AEL) cluster randomised controlled trial	Accelerometry Total PA (+ 4.06 min/h, 95% CI [2.66 to 5.47], MVPA (+ 2.33 min/h, 95% CI [1.31 to 3.34]	Intervention p < .001 p < .001 On average, a child taking part in the intervention attending a childcare centre from 8 am to 3 pm performed 28 min more Total PA and 16 min more MVPA per day than children receiving usual practice care.
2018	Truelove, S., et al.	Preschoolers' health-related quality of life following the implementation of a childcare PA intervention	Baseline BMI Post intervention BMI and 6- & 12-month follow-up Health related quality of life (HRQoL) survey Paediatric Quality of Life Inventory Child/ Family demographic questionnaire	Physical HRQoL: p=0.24 Psychosocial HRQoL: p=0.33 Total HRQoL: p=<0.01 Pre-schoolers are more active outdoors. Higher levels of PA occur within the first 10 mins of outdoor play. Interventions that target the ECE environment including staff are the most effective with regards to

				increasing PA levels.
2017	Tucker, P., et al.	Impact of Supporting PA the Childcare Environment (SPACE) intervention on preschoolers' PA levels and sedentary time: a single-blind cluster randomised controlled trial.	Accelerometry Sedentary LPA: light physical activity MVPA: moderate to vigorous-intensity physical activity Total PA	Nil effect at 6 & 12 months Simply extending outdoor playtime no adequate for increasing PA levels.
2021	Vaughn, A. E., et al.	Evaluating a childcare-based social marketing approach for improving children's diet and PA: results from the Healthy Me, Healthy We cluster-randomised controlled trial	Accelerometry Non-sedentary time	Null results Practice: ECE providers need strategies, resources and simple messages to support work with parents Policy: promote consistent messaging through guidelines and standards that encourage partnership and collaboration between ECE and parents Research: Further needed to determine intensity required of intervention, and how to facilitate ECED provider/parent relationships.
2018	Wolfenden, L., et al.	Efficacy of a free-play intervention to increase physical activity during childcare: a	Accelerometry Six ECE services 231 children	No significant differences between groups MVPA

		randomised controlled trial	Mean age 4.1 to 4.0 years	
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Summary of Review Study Findings

Date	Author	Title	Measures	Result/Conclusion
2017	Blaiklock, K.	Is New Zealand a world leader in early childhood education?	An examination of the empirical evidence in recent reports.	Lack of empirical evidence to support this question/statement. May lead to complacency and a lack of willingness toward making evidence-based changes to improve wellbeing and learning of young children.
2014	Braithwaite, D.	Teaching of physical education in early childhood settings	Opinion article: Journal of Physical Education NZ	Aspirations for all children to grow up as competent and confident learners & communicators, healthy in mind, body & spirit, secure in their knowledge that they make a valuable contribution to society. (ERO) Teachers are expected to ensure materials & resources are available for sustained periods of time, to talk with children about appropriate challenges to test their skills, encourage mastery of skills, provide opportunities for a range of physical

				experiences, and minimise risk while providing a challenging environment. Formative assessment plays a key role in identity formation for children.
2021	Branca, F., et al.	How to tackle childhood obesity?	Evidence and policy implications from a STOP series of systematic reviews.	38.3 million children under 5 are obese No progress has been made in the last 15 years in reducing the spread of overweight
2017	Brown, J. M., et al.	Where Do the Children Play? An Investigation of the Intersection of Nature, Early Childhood Education and Play	Review	Mediating role of adults' beliefs about risk that lead to denial or provision or risky opportunities for children. Challenge of the regulatory environment on how children play – Norway promotes risky play and outdoors/ Australia denote risk.

2020	Coe, D. P.	Means of Optimizing PA in the Preschool Environment.	Themed review of 16 publications	The preschool years serve as a formative time for the development of movement skills and healthy, active behaviours. Currently 50% of children Participate in sufficient activity to meet recommendations. Factors that have been associated with PA levels within the preschool setting include the influence of caregivers, environment, outdoor play, motor skill development and competence.
2013	Coleman, B., & Dymment, J. E.	Factors that limit and enable preschool-aged children's PA on childcare centre playgrounds.	In-depth interviews were taped, transcribed with thematic coding, NVivo 8 qualitative data software, lasted 30 – 60 minutes, carried onsite at	Intervention Educators recognised lack of training and confidence in PA limited ability to deliver quality PA. ECE policies and practices regarding
2020	Culková, D., et al.	A Probe into a PA of Children in State Kindergartens (SK), Forest Kindergartens (FK)	Questionnaire Forest Kindergartens (FK) PA framework, free play, situational learning and spontaneous physical activities State kindergartens	Frequency of PA FK: everyday 81% SK: everyday 49% Time duration of PA: FK: 2- 4 hours, 81% SK: 2- 4 hours, 61% Organised PA

			(SK) PA framework Educational Program for pre-school education where organised PA.	FK: 33%, 10-30 mins = 63% SK: 75%, 10-30mins = 56% SK may have stronger impact on motor skills learning especially in first and second stage of motor learning, on development of flexibility, on being aware and understanding the context of importance and implementation physical activities in one's life. FK may dominate in motor skills learning in stage of stabilisation and automatisisation, may dominate in development of aerobic fitness and muscle fitness and motivation (especially the inner motivation and long-time motivation)
2018	Dyson, B., et al.	Physical education in Aotearoa New Zealand primary schools: Teachers' perceptions and policy implications	Review	External provision of programmes might be perceived as an expedient option for busy teachers, but a lack of alignment to the curriculum also disenfranchises teachers and may negatively influence curriculum achievement objectives

2015	Gibbons, A.	Kei Hea te Ora? The whereabouts of the health of children in the early childhood curriculum of Aotearoa New Zealand.	Overview	The role of health in an educational curriculum Lack of collaboration regarding what teachers should know and do or about how knowledge of health could and should be evident in the early childhood curriculum.
2015	Gray, C., et al.	What Is the Relationship between Outdoor Time and PA, Sedentary Behaviour, and Physical Fitness in Children?	A Systematic Review	Consistent evidence across all 28 studies that children who spend more time outside are more active and less sedentary. More time outside had a positive effect on movement behaviours. Incorporating time outdoors within structured setting such as an ECE setting as a means of promoting healthy active living.
2021	Goodyear, V. A., et al.	The influence of online PA interventions on children and young people's engagement with PA: a systematic review	Systematic Review 26 papers Target population <12 years School setting	Convincing rationale for the use of online interventions to support engagement with PA due to the positive effects on physical and affective outcomes.

2018	Leigh, M. V., & Patricia, T.	PA and sedentary behaviour legislation in Canadian childcare facilities: an update.	Document Review 13 provinces	All provinces provide general recommendations to afford gross motor movement, but the majority give no specific requirements for how much and at what intensity. Only 3 explicitly mention daily PA 1 province policy states that children need to be provided with 2 outdoor play periods per day. 1 province policy states that for every 6-hours in care children should be provided with 2 hours of outdoor play.
2007	Oliver, M., et al.	PA in Early Childhood: Current State of Knowledge	Research review: findings from a review of literature relating to PA in the early childhood years (children aged <5 years).	Increased PA may have positive health affect. Increased sedentary time may have negative influence on physical health. Knowledge regarding PA and early childhood health, development and learning is limited. Collaborative links between health & education providers and PA & health researchers to promote consistent messaging.

Summary of Descriptive Study Findings

Date	Author	Title	Measures	Result/ Conclusion
2019	Ajoke, R. O., et al.	Behavioral mapping of children's physical activities and social behaviors in an indoor preschool facility: methodological challenges in revealing the influence of space in play	6-month timeframe Geographic Information System (GIS) Behaviour maps MVPA, LPA and SED Equipment Play area	MVPA observed mostly with play involving the use of portable play equipment. LPA highest level with scattered blocks. SED were the most observed in the room. Most children who played with fixed equipment in the room stood still around them.
2022	Albertsen, H., et al.	Associations between the movement environment and preschooler's physical activity and sedentary time in Norwegian preschools	46 preschools 794 children 3-5 years Boys (n=405) Girls (n=344) Accelerometry data MOVERS score	Negative for sedentary behaviour Positive for LPA & MPA Generally minimal quality Higher quality of the preschool environment is associated with more movement and

				less sedentary time
2021	Ali, A., et al.	Fundamental Movement Skills and Physical Activity of 3-4-Year-Old Children with Early Childhood Centres in New Zealand	Test of Gross Motor Skills (TGMSD-2) Accelerometry	TGMSD-2 showed that as children got older their locomotor skills ($P < 0.001$, $r = 0.512$) and object control motor skills ($P < 0.001$, $r = 0.383$). Accelerometry showed children inactive 78.3% of the time.
2021	Ali, A., et al.	The Effect of a 10-Week PA Programme on Fundamental Movement Skills in 3–4-Year-Old Children within Early Childhood Education Centres.	Test of Gross Motor Skills (TGMSD-2)	Locomotor and object-control skills significantly improved in the EXP group, with typically no change in the CON group. The EXP group's locomotor and object-control skills were maintained at 3 months. The 10-week PA intervention successfully improved 3- and 4-year-old children's FMS.
2018	Brian, A., et al.	Actual and Perceived Motor Competence Levels of Belgian and United States Preschool Children	TGMD-2 Pictorial Scale of Perceived Movement Skill Competence for Young Children	In Belgium PA instruction starts at age 3 In US free play is medium to develop motor skills Belgium children scored higher on both locomotor and object control skills –

				demonstrating significantly higher levels of motor competency. US and Australia do not have mandated physical education in preschool, Belgium has specialist PA teachers and PA delivery in curriculum from 3 years.
2020	Bull, F. C., et al.	World Health Organization 2020 guidelines on PA and sedentary behaviour.	Global Population Guidelines	4-5 million deaths as a result of lack of PHYSICAL ACTIVITY. Every move counts. Global action plan 2018-2030 How do we move from guidelines to action?
2011	Bundy, A. C., et al.	The Sydney Playground Project: Popping the bubblewrap-unleashing the power of play: A cluster randomised controlled trial of primary school playground-based intervention aiming to increase children's PA and social skills.	tRIPS Tolerance of Risk in Play Scale for adults	Intervention risk re-framing workshop for teachers and parents
2021	Duncan, M. J., et al.	Pre-schoolers fundamental	Test of Gross Motor Development 2 -	FMS mastery at 4 years of

		movement skills predict BMI, PA, and sedentary behavior:	TGMD-2 (FMS)	age predicts children's BMI and time spent sedentary at 5 years of age The role of FMS as a precursor to PA, learning to move is necessary FMS in ECE shapes current and future levels of PA for children Moving more (quantity) comes first, moving better (quality)next.
2014	Gehris, J. S., et al.	Teachers' perceptions about children's movement and learning in early childhood education programmes	Focus groups	Teachers' views expressed in 4 major themes. 1: How movement influences learning 2: What types of movement experiences are most beneficial for children 3: What settings best support children's movement 4: Challenges related to children's movement More training may be required to help early childhood educators use movement experiences to teach academic

				concepts and improve children's spatial awareness. Future interventions could examine the impacts on children movement and learning of having teachers move with children during outdoor free play and including more natural features in the design of outdoor play areas.
2008	Elsevier, M	Play in occupational therapy for children.	Book (Second edition. ed.) 1, 23.	2 – 4 years: Symbolic play 4 – 7 years: Extension of social participation, shift from parallel to associative play.
2020	Haggerty, M., et al.	Shifts in Policy and Practice in Early Childhood Curriculum Priorities in Aotearoa-New Zealand: Entanglements of Possibility and Risk.	Analysis of national education policy reforms	Policy developments in the early childhood (EC) care and education sector in NZ have seen a shift in focus from children and play to learners and learning.
2023	Haugland, E., et al.	Multivariate physical activity association patterns for fundamental motor skills and physical fitness in preschool children aged 3–5 years	Cross-sectional multivariate PA intensity signatures associated with FMS and FIT in children aged 3–5 years	Results showed favourable associations between the PA intensity spectrum (and unfavourable associations between time

				spent in SED) and all FMS and FIT variables. The strongest associations were found for VPA, and marginally weaker for SED for all variables. This association pattern was consistent across age and sex groups.
2013	Iivonen, K. S., et al.	Relationship between fundamental motor skills and PA in 4-year-old preschool children. Perceptual & Motor Skills,	Evaluation 14 preschools 4 – 7-year-olds 20 girls 17 boys 5 consecutive days (3 ECE, 2 home) FMS: (7 test items) APM inventory manual PA: Actigraph GT3X accelerometry Sex Age BMI: anthropometry	Descriptive statistics carried out, children with the best motor skills were also the most active. Associations between FMS skills and PA in young children are far from clear and may be affected by a number of biological, psychological, and environmental factors such as perceptions of competence and opportunities to practice motor skills.
2023	Nilsen, A., et al.	Associations between educators' and children's physical activity and sedentary time in Norwegian preschools: A cross-sectional study	Examine the relationship between educators' and children's PA and sedentary time (SED) by including 1230 children (mean age 4.8 yrs, 48% girls) and 422 educators (mean age 42.4 yrs, 90% women) from 68 preschools in Western Norway	PA and SED were measured over 10 preschool days using hip worn ActiGraph GT3x+ accelerometers. The positive relationships between educators' moderate and vigorous PA and

				children's PA found herein suggest educators' PA behaviours should be addressed in future interventions.
2019	Stone, M. R., et al.	Accelerometry-measured PA and sedentary behaviour of pre-schoolers in Nova Scotia, Canada	Children 3-5 years 75 boys 49 girls Av time/ minutes/ day spent sedentary Av time/ minutes/day spent LPA Av time/ minutes/ day spent MVPA Total PA	193.5 min (29.2%) 253.3min (38.4%) 213.5min (32.4%) 466.7min (7.8 hours) Little time spent in sustained MVPA (under 10mins. Boys greater and longer bouts of MVPA than girls)
2020	Taylor, M. E., & Boyer, W.	Play-Based Learning: Evidence-Based Research to Improve Children's Learning Experiences in the Kindergarten Classroom	Descriptive reflection by authors.	Continuum from free play to play-based learning to direct instruction. Play-based learning defined as adult guided play.

				Adult guided collaborative play is found to be most effective.
2017	Sport New Zealand	The Importance of Play	Government Document	Children have a right to play – United Nations Convention on the Rights of the Child, Article 31 Benefits of play being physically active in a fun way that develops FMS. Play is the foundation of physical literacy.
2017	Sport New Zealand	The Five Phases of Play Development.	Government Document	Create play champions. Let's talk play. Let's plan for play. Let's empower play. Re-Play – monitor and evaluate
2018	Strooband, K. F. B., et al.	Support to enhance level of implementation in PA interventions:	Observational Study Level of Implementation (LOI) Statistical analyses were completed using SPSS Statistics (version 23.0).	An increase in the LOI by 17.5%

2021	Sumiya, M., & Nonaka, T.	Does the Spatial Layout of a Playground Affect the Play Activities in Young Children? A Pilot Study	Pilot Study N=6 (limitation) PA level Accelerometry Actigraph wGT3X Duration of different types of action	A significant increase in PA occurred after the spatial layout alteration of the playground. Post alteration Individual: $p=0.36$ Area: $p=0.13$ Children's mode of play in a playground can be altered by spatial re-arrangement of play equipment.
2020	Veldman, S. L. C., et al.	The association between staff intention and pre-schoolers' PA in early childhood education and care services	MVPA: accelerometry (actigraphs) 10 item observational instrument: intentional teaching score	$P=0.001$ Scores 6 -10 Educator's intentional teaching practices in relation to PA learning experiences were assessed. In centres with high intentionality scores children spent significantly more time in MVPA compared to those centres with lower intentionality (scores 0–5). In high intentionality scoring centres, educators consistently took an active

				participatory role rather than a passive role. This study highlights the importance of educator intentional teaching practices in relation to PA for pre-schoolers PA.
2021	Zhang, Z, et al.	Associations Between the Child Care Environment and Children's In-Care Physical Activity and Sedentary Time	19 ECE in Canada Toddlers (n=124) Preschoolers (n=118) Accelerometry MOVERS score Children's Physical Environments Rating Scale (CPERS5) Environment and Policy Assessment and Observation (EPOA)	For preschoolers, overall structure quality of the environment, in particular outdoor environment, and overall process quality of the environment, in particular curriculum and pedagogy, appear important for physical activity and sedentary time.

Summary of Longitudinal Study Findings.

Date	Author	Title	Measures	Result/ Conclusion
2016	Barnett, L., et al.	More active pre-school children have better motor competence at school starting age: an observational cohort study	Melbourne InFANT program Longitudinal Study 542 parent-child pairs 19 months N=193 Accelerometry MVPA (>4012 CPM) 3.5 years N=118 Accelerometry MVPA (>4012 CPM) 5 years Accelerometry MVPA (>4012 CPM) TGMD-2 (12 skills) Perceived Motor Competence (Pictorial Scale of PMSC)	The amount of time in MVPA is important to subsequent actual and perceived motor competence in children. 25.1 42.5 52.8 P=.117 P=.446
2021	Downing, K. L., et al.	Volume and accumulation patterns of PA and sedentary time: longitudinal changes and tracking from early to late childhood.	Longitudinal Study 3-5 years N=758 6-8 years N=473 9-11 years N=478 Accelerometry ActiGraph GT1M SED, LPA, MPA, MVPA	Overall time periods girls engaged in significantly more SED than boys $p<0.001$. Important to establish high levels of MVPA in ECE as children to ensure likelihood of maintaining higher levels over time. Children's activity patterns changed over time 3-9 years with total

				volumes and short bouts of PA and SED tracking more strongly than longer bouts. SED increased considerably more, potentially due to sedentary screen time.
2021	Estevan, I., et al.	Profiling children longitudinally: A three-year follow-up study of perceived and actual motor competence and physical fitness.	Longitudinal study Test of Gross Motor Skills (TGMD-3) Physical Fitness – leg power PA Questionnaire for children (PAQ-C) Body Mass Index (BMI) Waist circumference	3 years P<0.05 For highly perceived and capable children, there was a tendency for higher PA participation and lower body mass index and waist circumference over time compared to their counterparts who had medium and/or low levels in perception and actual MC and fitness

2014	Howie, E. K., et al.	The 3-year evolution of a preschool PA intervention through a collaborative partnership between research interventionists and preschool teachers.	8 preschools over 3 years Phase 1: 2008 – 2012 In-person to online delivery model Phase 2: 2013-2016 Modified online deliver model, 10 pilot preschools Replicated in 30 preschools. Phase 3: 2017-2019 818 teachers 228 ECE Centres Partnership/ collaboration with university-based interventionists and ECE teachers to design and implement a flexible and adaptive intervention, made up of Real world collaborative, facilitative approach to increasing PA will require teachers to implement the interventions. Intervention not a curriculum, but a framework, made up of components and approach. Move Inside – 10 mins/day. Move Outside – Two 20 minutes sessions per day, 5 min teacher-led.	Intervention adapted to individual centres however maintaining overall fidelity are more likely to be successful. Develop strategies and materials to address barriers that occurred during implementation. Teachers lacked understanding of high-quality PA, especially MVPA. Self-assessment tool for teachers, time, intensity, reach, encouragement Final phase 3 was: 1. 6 online models 2. Guidebook 3. 90 activities 4. Self-assessment techniques 5. Video library
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			Move to Learn – two 5-minute active lessons. PA Centres – play provocations (Yr. 1 only) Social Environment promoting teacher involvement and verbal feedback to children. Physical environment – resource kits and activity ideas Policy Environment Sustainability, owner	
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Appendix F: Ethics Approval (Chapters 2-3)

12 April 2022

Nigel Harris

Faculty of Health and Environmental Sciences

Dear Nigel

Re Ethics Application: **22/51 The feasibility and preliminary efficacy of a teacher/
Kaiako-led physical activity programme in Hawke's Bay Ministry
of Education licensed early childhood centres.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 12 April 2025.

Non-Standard Conditions of Approval

1. When it is finalised, please send through the survey as participants will see it, this needs to include the Information Sheet as the first block of the survey.

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be reviewed by AUTEC before commencing your study but please send through the survey for your file.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the [Auckland University of Technology Code of Conduct for Research](#) and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the

dates on the documents are updated.

8. AUTEK grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTEK Secretariat

Auckland University of Technology Ethics Committee

Cc: wendy@freshairforests.co.nz; Andrew Gibbons; scott.duncan@aut.ac.nz

Appendix G: Ethics Approval Amendment (Chapters 2-3)

5 July 2022

Nigel Harris

Faculty of Health and Environmental Sciences

Dear Nigel

Re: Ethics Application: **22/51 The feasibility and preliminary efficacy of a teacher/
Kaiako-led physical activity programme in Hawke's Bay Ministry
of Education licensed early childhood centres.**

Thank you for your request for approval of amendments to your ethics application.

The amendment to the data collection protocol (change from hip to wrist accelerometer) has been approved.

Standard Conditions of Approval.

1. The research is to be undertaken in accordance with the [Auckland University of Technology Code of Conduct for Research](#) and as approved by AUTC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.
8. AUTC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted. When the research is undertaken outside New Zealand, you need to meet all ethical, legal, and locality obligations or requirements for those jurisdictions.

Please quote the application number and title on all future correspondence related to this

project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTEK Secretariat

Auckland University of Technology Ethics Committee

Cc: wendy@freshairforests.co.nz; Andrew Gibbons; scott.duncan@aut.ac.nz

Thank you for completing this form – will you ask you parent/caregiver to sign here if they feel that you understand what the project is about and give this form back to your teacher at the centre tomorrow, please. Thank you.

Wendy Pirie

(signature)

(Date)

WHAT DO I DO IF I HAVE CONCERNS ABOUT THIS RESEARCH?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Wendy Pirie, wendy@freshhorizons.co.nz, 0273296776.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEC, ethics@aut.ac.nz, (+649) 921 9999 ext 6038.

Approved by the Auckland University of Technology Ethics Committee on type the date final ethics approval was granted, AUTEC reference number type the reference number.

THE FEASIBILITY AND PRELIMINARY EFFICACY OF A TEACHER-LED PHYSICAL ACTIVITY PROGRAMME IN HAWKE'S BAY

MINISTRY OF EDUCATION LICENSED EARLY CHILDHOOD CENTRES

INFORMATION SHEET AND ASSENT FORM FOR CHILDREN

(parents/caregivers please read to children)

This form will be kept for a period of 5 years

Hello – my name is Wendy Pirie. I would like to spend time at your early childhood centre/ preschool/kindergarten and will come to the centre 2 or 3 times.

It will be great to meet you and you will know who I am because of my photograph. I will also wear a badge with my name on, Wendy Pirie, when I am in your centre. This is my photo.

When I am there, I will do some writing and you will notice me. You will know that I am not one of your teachers. You can talk to me and we can get to know each other.

You can ask me about my work whenever you want to. Some tamarki at your ECE may wear a belt. This belt will tell me how much you move during the day. Here is a picture of what it looks like. We only have a few of these and not everyone will wear one.



Let me know how you feel about this by colouring in one of these words.

Happy *Fine*
Not Sure
Worried

If you are not sure or worried come and talk to me about it or ask one of your teachers or your parents about this.

I am finding out about physical activity – you might like to find out about this as well. I am not sure how to explain the words physical activity to you, but I have my movement friends, **Max**, **Ann**, **Pip** and **Pip** who love to dance, play and be active every day.



Please circle if you would like to take part in physical activity.

YES

Please circle if you do not want to do this

NO

Please circle if you are not sure. If you cannot decide that is fine because you can come along anytime and tell me or one of your teachers or your parents that you want to join in.

MAYBE

I hope we can do this together.

Appendix I: Participant Information Sheets (Chapters 2-3)

Information Sheet for ECE

Date Information Sheet Produced:

23 February 2022

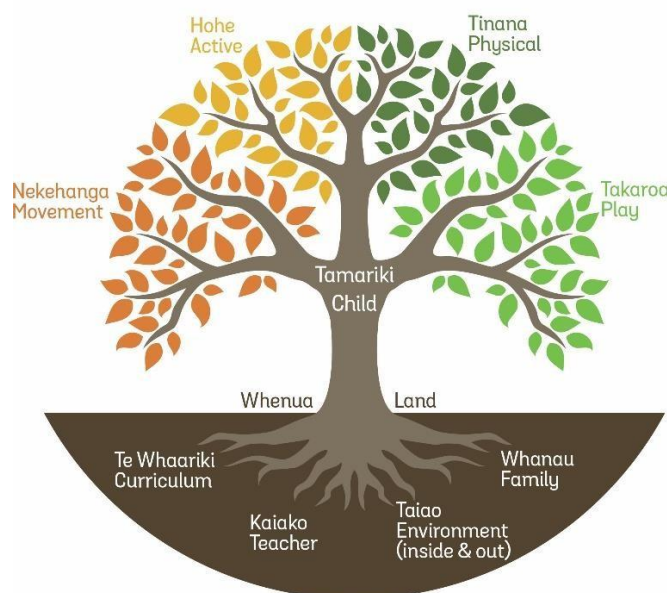
Project Title

The Feasibility and Preliminary Efficacy of a Teacher-Led Physical Activity Programme in Hawke's Bay Ministry of Education licensed Early Childhood Centres.

An Invitation

Kia ora ECE person responsible. My name is Wendy Pirie, and I am a PhD student at Auckland University of Technology (AUT) who lives in Hawke's Bay and is primary researcher on this study. My study is to investigate the effect of physical activity intervention Movement-Active-Physical-Play (M.A.P.P) delivered by ECE teachers/ Kaiako at your ECE.

Movement M.A.P.P



As part of investigating the effects of M.A.P.P I will be carrying out a scope of industry practice to research the current climate in ECE from an environmental and teaching perspective, refining the proposed physical activity M.A.P.P intervention and a pilot cluster randomised controlled trial. You are invited to be a part of this research through completing and returning the attached consent form to primary researcher Wendy Pirie wendy@freshairforests.co.nz. Recruitment will cease once consent forms (6) have been received from Ministry of Education licensed ECE.

This study has been supported by funding from the Hawke's Bay Community Fitness Centre Trust and Royston Health Trust. Since 2005 I have walked alongside ECE, teachers, tamariki and whanau on physical development and from 2017 to 2021 founded and opened a nature based ECE in Hawke's Bay. I no longer own or am connected to any ECE in Hawke's Bay.

What is the purpose of this research?

The Active Play initiative recommends that tamariki (3-5 years) take part in 180 minutes of physical activity, including 60 minutes of moderate to vigorous physical activity (MVPA) per day to gain health benefits, however many tamariki (3-5 years) do not reach these guideline levels. 87% of tamariki (3-5 years) in New Zealand access and participate in early childhood education and physical activity

is a key thread in the early years' curriculum Te Whāriki. Tamariki under five are not meeting physical activity recommendations and are spending much of their day in sedentary behaviour. In terms of global comparisons New Zealand children are also near the top of the league table for childhood overweight and obesity. Hence this research seeks to investigate an approach where ECE teachers/ Kaiako are upskilled to deliver M.A.P.P sessions that would fit and be part of the curriculum and the M.A.P.P characters Movement Max, Active Ann, Physical Piri and Playful Pip connect with tamariki in experiential movement adventures. The findings of this research may be used for academic publications and presentations.



How was I identified and why am I being invited to participate in this research?

ECE are invited to participate if,

- They are located in Hawke's Bay (approximately 225) within a 40-kilometre radius from the Hawke's Bay Community Fitness Centre Trust (HBCFCT)
- Meet (schedule 2) adult-to-child-ratios (minimum), which for tamariki two years and over require a ratio of 1 (adult) to 10 (tamariki)
- Have a roll of 40 – 80 tamariki and provide education and care for tamariki 0 – 6 years old
- Be either Ministry of Education licensed minimum standard (2.5m squared indoors, 5m squared outdoors), or above-minimum standard settings regarding activity spaces.

Following baseline data collection ECE will be randomly allocated to the intervention or standard practice control group. Stratified randomisation by the researcher will be carried out to ensure an equal or equivalent representation of minimum and above-minimum standard MOE teacher/ Kaiako led licensed ECE.

ECE is where tamariki (3-5 years) spend many of their waking hours, therefore ECE and ECE teachers/ Kaiako hold a critical role in delivering quality planned or unplanned physical activity experiences for children. This study seeks to understand the current climate in ECE in relation to physical activity, the feasibility and preliminary efficacy of physical activity M.A.P.P intervention, ECE teacher/ Kaiako and tamariki perceptions of M.A.P.P.

How do I agree to participate in this research?

You will need to complete the attached consent form and return via email to the primary researcher. Your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. You are able to withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

The study is made up of a scope of industry practice which includes completion of an online questionnaire by qualified and registered (provisional or full) ECE teachers/ Kaiako (100) to understand perceptions, education, and knowledge of teacher/ Kaiako-led physical activity in an ECE setting. The primary researcher will then carry out an on-site environmental assessment of ECE (6), three of these minimum standard settings and three above minimum standard.

Following completion of the above, the six ECE will be randomised into pre-pilot (2), intervention (2) and control (2). The two pre-pilot ECE (2) one of these minimum standard settings and 1 above minimum standard and ECE teachers/ Kaiako (8) will then work with the primary researcher to refine and pre-pilot the proposed M.A.P.P physical activity intervention. This will involve ECE teacher/ Kaiako carrying out a 30-minute online M.A.P.P professional learning session in non-contact work time and delivering M.A.P.P sessions for three weeks. The primary researcher will observe one ECE teacher/ Kaiako delivery of the M.A.P.P session in the third week and attend a ECE team meeting to discuss M.A.P.P sessions to collect feedback from ECE teachers/ Kaiako on both content of the M.P.P.P professional learning and delivery of M.A.P.P activity sessions. The direct observation by the primary researcher will be performed using the (Supportive, Active, Autonomous, Fair and Enjoyable – ‘SAAFE’) model. The observation simply provides brief written feedback on how the session delivery went, in order to support delivery in refining the M.A.P.P intervention.



Following this feedback from ECE teachers/ Kaiako the M.A.P.P framework and teaching resource will be refined for implementation in the pilot cluster randomised controlled trial.

Two ECE (2) will carry out intervention M.A.P.P physical activity framework for 10 weeks and two ECE (2) as a control ECE delivering standard physical activity curriculum. All tamariki at two intervention ECE will be invited to take part in ECE teacher/ Kaiako-led M.A.P.P activities however data will only be collected from tamariki 3-5 years who have provided assent and parental consent. ECE teacher/ Karakia will take part in six 30-minute online professional learning sessions in non-contact work time and deliver M.A.P.P activity sessions to tamariki. ECE intervention participants will provide enrolment data (with parental consent) on tamariki participants, age, ethnicity, attendance (days per week) and gender/ sex.

Two ECE (2) as a control ECE delivering usual physical activity curriculum. The two control ECE will receive the M.A.P.P intervention at the completion of the study.

Tamariki participants (intervention and control) will be asked to wear an accelerometer (see below) to measure physical activity quantity for five days at the beginning of the 10-week intervention and five days at the end of the intervention. This will be put on in the morning when tamariki arrive and taken off in the afternoon when tamariki leave with support from ECE teacher/ Kaiako and parents. Tamariki participants are asked to wear the accelerometer between 9am and 3pm over one week at the beginning of the study and 9am to 3pm over one week at the end of the study. The accelerometer will record movements only (lying, sitting, standing, and moving). It is like wearing a belt, so you do not have to take it off it's easy to keep safe but if you do lose it or it gets damaged just let us know, we do understand.

At the end of the 10-week intervention ECE leaders/ supervisors will take part in an interview to determine if they will continue to use the M.A.P.P framework as part of curriculum delivery. ECE teachers/ Kaiako will take part in an interview to determine what they enjoyed/ did not enjoy about the M.A.P.P framework and would they continue to use it. Tamariki participants will take part in a focus group to determine what they liked/ did not like about the M.A.P.P activities and characters and would they like to carry on with the activities and characters. We will record these interviews and focus groups to make sure that we don't miss anything.

A hip worn accelerometer.



The findings from this research will be published in academic journals and presented at conferences and could benefit anyone seeking to understand effective physical activity options for health for tamariki (3-5 years).

What are the discomforts and risks?

Some tamariki may experience slight discomfort in wearing the accelerometers as they will be a novel and interesting experience. ECE teachers/ Kaiako and parents will be alongside tamariki to put the accelerometer on and take it off. The primary researcher will show intervention tamariki participants the accelerometer and how it works at the invitation to participate hui at consenting ECE.

What are the benefits?

Goals of this study are to provide ECE teachers/ Kaiako with a physical activity framework and resource to be able to carry out the key curriculum thread of quality physical activity planned and unplanned experiences for tamariki, to improve tamariki physical activity levels and provide a platform for a lifelong love of being active. To also effect change in Ministry of Education regulations in relation to ECE licenses, space for tamariki and ECED teachers/ Kaiako and teacher/ tamariki ratios. You will get real experience of what it is like to contribute to research that will turn evidence into practice. This study is part of fulfilling my doctoral candidature at AUT and will contribute to the achievement of a Doctoral Degree (PhD).

What compensation is available for injury or negligence?

In the unlikely event of a physical injury as a result of participation in this study, rehabilitation and compensation for injury by accident may be available from the Accident Compensation Corporation, providing the incident details satisfy the requirements of the law and the Corporation's regulations.

How will my privacy be protected?

Research records will be kept in a locked file and sorted by number codes, not by names; only researchers involved in the study, will have access to records. Data will be stored for 10 years and will be permanently destroyed after this period. You can withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

The results of the study may be published or presented, but not in a way that would identify your ECE. We will not include information that will make it possible to identify your ECE or other participants. This study includes basic information about participating tamariki from your ECE such as ethnic group, age range, and sex/ gender and it is possible that this research could one day help people in the same groups.

Identifiable Information is any data that could identify your ECE (e.g., name, or address). Only the project supervisor and I will have access to your ECE identifiable information. To make sure personal information is kept confidential, information that identified your ECE will not be included in any report. Instead, your ECE will be identified by a code.

What are the costs of participating in this research?

There is no financial cost to participate in this study.

What opportunity do I have to consider this invitation?

Simply by considering this invitation and returning your response, either way, to me at the email address wendy@freshairforests.co.nz.

Will I receive feedback on the results of this research?

You will be provided with a plain English summary of research findings if requested, at the end of the study.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Wendy Pirie, wendy@freshairforests.co.nz, 0273296776.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, ethics@aut.ac.nz, (+649) 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Wendy Pirie, 0273296776, wendy@freshairforests.co.nz

Project Supervisor Contact Details:

Associate Professor Nigel Harris, (09) 921 9999 ext 7301, Nigel.harris@aut.ac.nz

**Approved by the Auckland University of Technology Ethics Committee on 12 April 2022,
AUTEK Reference number 22/51.**

Information Sheet for ECE Teachers/ Kaiako

Date Information Sheet Produced:

23 February 2022

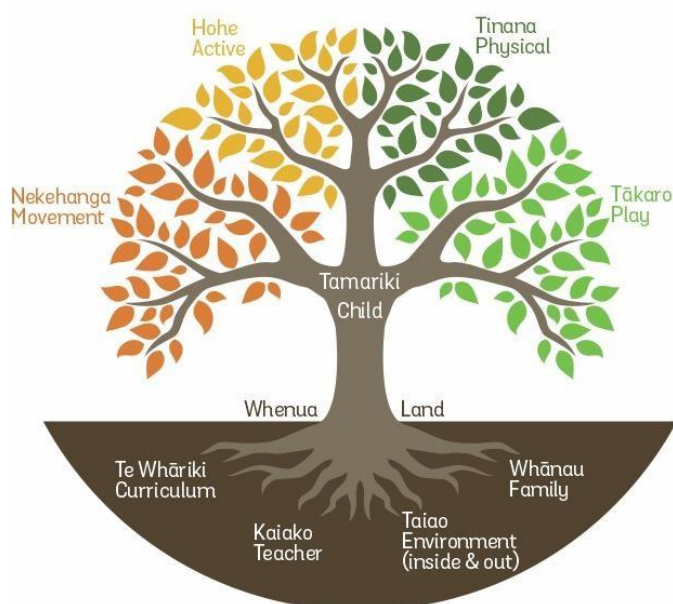
Project Title

The Feasibility and Preliminary Efficacy of a Teacher-Led Physical Activity Programme in Hawke's Bay Ministry of Education licensed Early Childhood Centres.

An Invitation

Kia ora ECE Teacher at Montessori 3-6 years. My name is Wendy Pirie, and I am a PhD student at Auckland University of Technology (AUT) who lives in Hawke's Bay and is primary researcher on this study. My study is to investigate the effect of physical activity intervention Movement-Active-Physical-Play (M.A.P.P) delivered by ECE teachers/ Kaiako at your ECE.

Movement M.A.P.P



As part of investigating the effects of M.A.P.P I will be carrying out a scope of industry practice to research the current climate in ECE from an environmental and teaching perspective, refining the proposed physical activity M.A.P.P intervention and a pilot cluster randomised controlled trial. You are invited to be a part of this research through completing and returning the attached consent form to the research AUT drop box in your ECE. Recruitment will cease once consent forms (32) have been received from ECE teacher/ Kaiako participants.

This study has been supported by funding from the Hawke's Bay Community Fitness Centre Trust and Royston Health Trust. Since 2005 I have walked alongside ECE, teachers, tamariki and whanau on physical development and from 2017 to 2021 founded and opened a nature based ECE in Hawke's Bay. I no longer own or am connected to any ECE in Hawke's Bay.

What is the purpose of this research?

The Active Play initiative recommends that tamariki (3-5 years) take part in 180 minutes of physical activity, including 60 minutes of moderate to vigorous physical activity (MVPA) per day to gain health benefits, however many tamariki (3-5 years) do not reach these guideline levels. 87% of tamariki (3-5 years) in New Zealand access and participate in early childhood education and physical activity is a key thread in the early years' curriculum Te Whāriki. Tamariki under five are not meeting physical activity recommendations and are spending much of their day in sedentary behaviour. In terms of global comparisons New Zealand children are also near the top of the league table for

childhood overweight and obesity. Hence this research seeks to investigate an approach where ECE teachers/ Kaiako are upskilled to deliver M.A.P.P sessions that would fit and be part of the curriculum and the M.A.P.P characters Movement Max, Active Ann, Physical Piri and Playful Pip connect with tamariki in experiential movement adventures. The findings of this research may be used for academic publications and presentations.



How was I identified and why am I being invited to participate in this research?

We have invited you as a qualified, registered or provisionally registered ECE teacher/ Kaiako in Hawke's Bay. ECE is where tamariki (3-5 years) spend many of their waking hours, therefore ECE and ECE teachers/ Kaiako hold a critical role in delivering quality planned or unplanned physical activity experiences for children. This study seeks to understand the current climate in ECE in relation to physical activity, the feasibility and preliminary efficacy of physical activity M.A.P.P intervention, ECE teacher/ Kaiako and tamariki perceptions of M.A.P.P.

How do I agree to participate in this research?

You will need to complete the attached consent form and return to the research AUT drop box in your ECE. Your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. You are able to withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

The study is made up of a scope of industry practice which includes completion of an online questionnaire by qualified and registered (provisional or full) ECE teachers/ Kaiako (100) to understand perceptions, education, and knowledge of teacher/ Kaiako-led physical activity in an ECE setting. The primary researcher will then carry out an on-site environmental assessment of ECE (6), three of these minimum standard settings and three above minimum standard.

Following completion of the above, the six ECE will be randomised into pre-pilot (2), intervention (2) and control (2). The two pre-pilot ECE (2) one of these minimum standard settings and 1 above minimum standard and ECE teachers/ Kaiako (8) will then work with the primary researcher to refine and pre-pilot the proposed M.A.P.P physical activity intervention. This will involve ECE teacher/ Kaiako carrying out a 30-minute online M.A.P.P professional learning session in non-contact work time and delivering M.A.P.P sessions for three weeks. The primary researcher will observe one ECE teacher/ Kaiako delivery of the M.A.P.P session in the third week and attend a ECE team meeting to discuss M.A.P.P sessions to collect feedback from ECE teachers/ Kaiako on both content of the M.P.P.P professional learning and delivery of M.A.P.P activity sessions. The direct observation by the primary researcher will be performed using the (Supportive, Active, Autonomous, Fair and Enjoyable – 'SAAFE') model. The observation simply provides brief written feedback on how the session delivery went, in order to support delivery in refining the M.A.P.P intervention.



Following this feedback from ECE teachers/ Kaiako the M.A.P.P framework and teaching resource will be refined for implementation in the pilot cluster randomised controlled trial.

Two ECE (2) will carry out intervention M.A.P.P physical activity framework for 10 weeks and two ECE (2) as a control ECE delivering standard physical activity curriculum. All tamariki at two intervention ECE will be invited to take part in ECE teacher/ Kaiako-led M.A.P.P activities however data will only be collected from tamariki 3-5 years who have provided assent and parental consent. ECE teacher/ Karakia will take part in six 30-minute online professional learning sessions in non-contact work time and deliver M.A.P.P activity sessions to tamariki.

Two ECE (2) as a control ECE delivering usual physical activity curriculum. The two control ECE will receive the M.A.P.P intervention at the completion of the study.

Tamariki participants (intervention and control) will be asked to wear an accelerometer (see below) to measure physical activity quantity for five days at the beginning of the 10-week intervention and five days at the end of the intervention. This will be put on in the morning when tamariki arrive and taken off in the afternoon when tamariki leave with support from ECE teacher/ Kaiako and parents. Tamariki participants are asked to wear the accelerometer between 9am and 3pm over one week at the beginning of the study and 9am to 3pm over one week at the end of the study. The accelerometer will record movements only (lying, sitting, standing, and moving). It is like wearing a watch, so you do not have to take it off it's easy to keep safe but if you do lose it or it gets damaged just let us know, we do understand.

At the end of the 10-week intervention ECE leaders/ supervisors will take part in an interview to determine if they will continue to use the M.A.P.P framework as part of curriculum delivery. ECE teachers/ Kaiako will take part in an interview to determine what they enjoyed/ did not enjoy about the M.A.P.P framework and would they continue to use it. Tamariki participants will take part in a focus group to determine what they liked/ did not like about the M.A.P.P activities and characters and would they like to carry on with the activities and characters. We will record these interviews and focus groups to make sure that we don't miss anything.

A wrist worn accelerometer.

The findings from this research will be published in academic journals and presented at conferences and could benefit anyone seeking to understand effective physical activity options for health for tamariki (3-5 years).

What are the discomforts and risks?

Some tamariki may experience slight discomfort in wearing the accelerometers as they will be a novel and interesting experience. ECE teachers/ Kaiako and parents will be alongside tamariki to put the accelerometer on and take it off. The primary researcher will show intervention tamariki

participants the accelerometer and how it works at the invitation to participate hui at consenting ECE.

What are the benefits?

Goals of this study are to provide ECE teachers/ Kaiako with a physical activity framework and resource to be able to carry out the key curriculum thread of quality physical activity planned and unplanned experiences for tamariki, to improve tamariki physical activity levels and provide a platform for a lifelong love of being active. To also effect change in Ministry of Education regulations in relation to ECE licenses, space for tamariki and ECED teachers/ Kaiako and teacher/ tamariki ratios. You will get real experience of what it is like to contribute to research that will turn evidence into practice. This study is part of fulfilling my doctoral candidature at AUT and will contribute to the achievement of a Doctoral Degree (PhD).

What compensation is available for injury or negligence?

In the unlikely event of a physical injury as a result of your participation in this study, rehabilitation and compensation for injury by accident may be available from the Accident Compensation Corporation, providing the incident details satisfy the requirements of the law and the Corporation's regulations.

How will my privacy be protected?

Research records will be kept in a locked file and sorted by number codes, not by names; only researchers involved in the study, will have access to records. Data will be stored for 10 years and will be permanently destroyed after this period. You can withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

The results of the study may be published or presented, but not in a way that would identify you. We will not include information that will make it possible to identify you. Identifiable Information is any data that could identify your ECE (e.g., name, or address). Only the project supervisor and I will have access to your identifiable information. To make sure personal information is kept confidential, information that identified you will not be included in any report. Instead, you will be identified by a code.

What are the costs of participating in this research?

There is no financial cost to participate in this study. We anticipate the M.A.P.P professional learning taking 30 minutes per session (minimum 1 session, maximum 6 sessions), implementing M.A.P.P session (15 minutes per day/ per week) up to 15 hours across 10-weeks (please note teacher-led physical activity is part of standard curriculum), interview 30 minutes, so in total up to 19 hours.

What opportunity do I have to consider this invitation?

Simply by considering this invitation and returning your response (consent form), either way, in the AUT drop box at your ECE.

Will I receive feedback on the results of this research?

You will be provided with a plain English summary of research findings if requested, at the end of the study.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Wendy Pirie, wendy@freshairforests.co.nz, 0273296776.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH, ethics@aut.ac.nz, (+649) 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Wendy Pirie, 0273296776, wendy@freshairforests.co.nz

Project Supervisor Contact Details:

Associate Professor Nigel Harris, (09) 921 9999 ext 7301, Nigel.harris@aut.ac.nz

**Approved by the Auckland University of Technology Ethics Committee on 12 April 2022,
AUTEC Reference number 22/51.**

Information Sheet for Parents/ Guardians

Date Information Sheet Produced:

23 February 2022

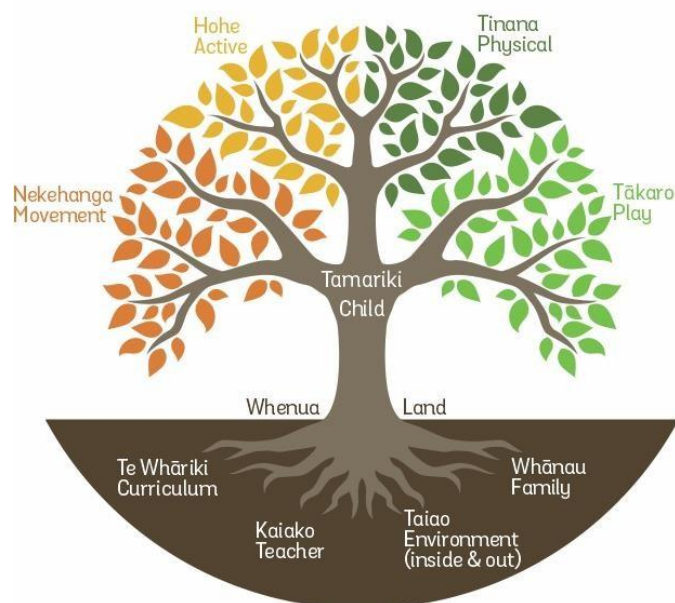
Project Title

The Feasibility and Preliminary Efficacy of a Teacher-Led Physical Activity Programme in Hawke's Bay Ministry of Education licensed Early Childhood Centres.

An Invitation

Kia ora, my name is Wendy Pirie, and I am a PhD student at Auckland University of Technology (AUT) who lives in Hawke's Bay and the primary researcher on this study. My study is to investigate the effect of physical activity intervention Movement-Active-Physical-Play (M.A.P.P) delivered by ECE teachers/ Kaiako at the ECE your child attends.

Movement M.A.P.P



As part of investigating the effects of M.A.P.P I will be carrying out a scope of industry practice to research the current climate in ECE from an environmental and teaching perspective, refining the proposed physical activity M.A.P.P intervention and a pilot cluster randomised controlled trial. Your child is invited to be a part of this research. Please complete and return the attached consent form to the research AUT drop box in your ECE. Recruitment will cease once consent forms (40-80) have been received from parents have been received.

This study has been supported by funding from the Hawke's Bay Community Fitness Centre Trust and Royston Health Trust. Since 2005 I have walked alongside ECE, teachers, tamariki and whanau on physical development and from 2017 to 2021 founded and opened a nature based ECE in Hawkes Bay. I no longer own or am connected to any ECE in Hawke's Bay.

What is the purpose of this research?

The Active Play initiative recommends that tamariki (3-5 years) take part in 180 minutes of physical activity, including 60 minutes of moderate to vigorous physical activity (MVPA) per day to gain health benefits, however many tamariki (3-5 years) do not reach these guideline levels. 87% of tamariki (3-5 years) in New Zealand access and participate in early childhood education and physical activity is a key thread in the early years' curriculum Te Whāriki. Tamariki under five are not meeting physical activity recommendations and are spending much of their day in sedentary behaviour. In terms of global comparisons New Zealand children are also near the top of the league table for

childhood overweight and obesity. Hence this research seeks to investigate an approach where ECE teachers/ Kaiako are upskilled to deliver M.A.P.P sessions that would fit and be part of the curriculum and the M.A.P.P characters Movement Max, Active Ann, Physical Piri and Playful Pip connect with tamariki in experiential movement adventures. The findings of this research may be used for academic publications and presentations.



How was I identified and why am I being invited to participate in this research?

ECE is where tamariki (3-5 years) spend many of their waking hours, therefore ECE and ECE teachers/ Kaiako hold a critical role in delivering quality planned or unplanned physical activity experiences for children. This study seeks to understand the current climate in ECE in relation to physical activity, the feasibility and preliminary efficacy of physical activity M.A.P.P intervention, ECE teacher/ Kaiako and tamariki perceptions of M.A.P.P.

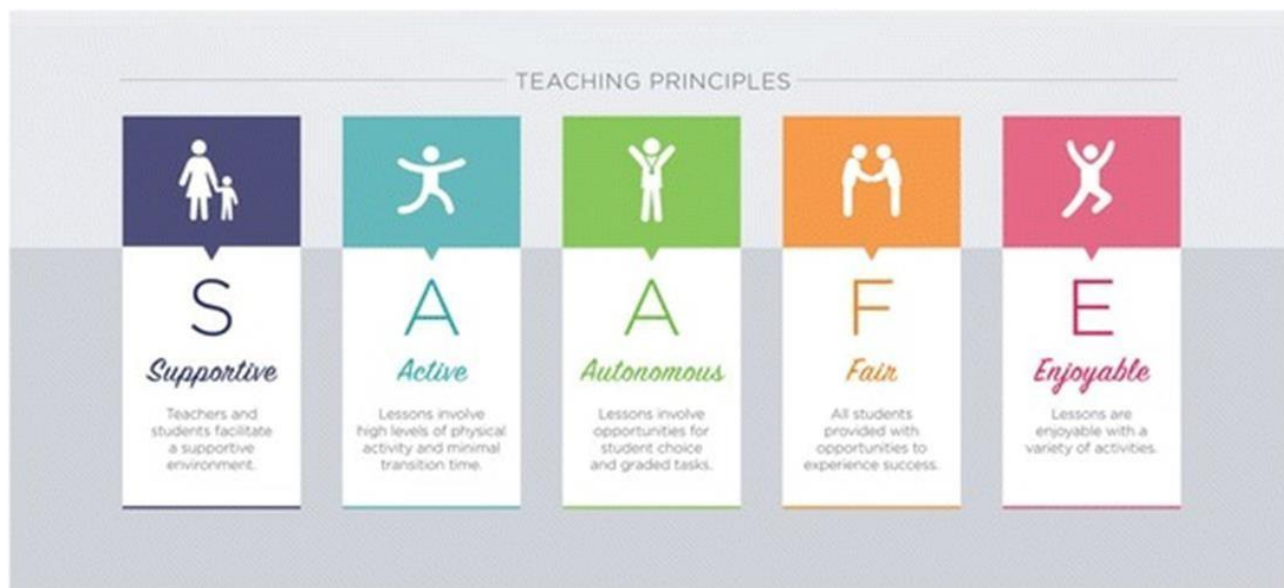
How do I agree to participate in this research?

You will need to complete the attached consent form and support your child to complete as assent and information form and return to the primary researcher in a AUT drop box in your ECE. Your consent to your child participating in this research is voluntary (it is your choice) and whether or not you choose to consent to your child participating will neither advantage nor disadvantage you or them. You are able to withdraw your child from the study at any time. If you choose to withdraw your child from the study, then you will be offered the choice between having any data that is identifiable as belonging to your child removed or allowing it to continue to be used. However, once the findings have been produced, removal of your child's data may not be possible.

What will happen in this research?

The study is made up of a scope of industry practice which includes completion of an online questionnaire by qualified and registered (provisional or full) ECE teachers/ Kaiako (100) to understand perceptions, education, and knowledge of teacher/ Kaiako-led physical activity in an ECE setting. The primary researcher will then carry out an on-site environmental assessment of ECE (6), three of these minimum standard settings and three above minimum standard.

Following completion of the above, the six ECE will be randomised into pre-pilot (2), intervention (2) and control (2). The two pre-pilot ECE (2) one of these minimum standard settings and 1 above minimum standard and ECE teachers/ Kaiako (8) will then work with the primary researcher to refine and pre-pilot the proposed M.A.P.P physical activity intervention. This will involve ECE teacher/ Kaiako carrying out a 30-minute online M.A.P.P professional learning session in non-contact work time and delivering M.A.P.P sessions for three weeks. The primary researcher will observe one ECE teacher/ Kaiako delivery of the M.A.P.P session in the third week and attend a ECE team meeting to discuss M.A.P.P sessions to collect feedback from ECE teachers/ Kaiako on both content of the M.P.P.P professional learning and delivery of M.A.P.P activity sessions. The direct observation by the primary researcher will be performed using the (Supportive, Active, Autonomous, Fair and Enjoyable – 'SAAFE') model. The observation simply provides brief written feedback on how the session delivery went, in order to support delivery in refining the M.A.P.P intervention.



Following this feedback from ECE teachers/ Kaiako the M.A.P.P framework and teaching resource will be refined for implementation in the pilot cluster randomised controlled trial.

Two ECE (2) will carry out intervention M.A.P.P physical activity framework for 10 weeks and two ECE (2) as a control ECE delivering standard physical activity curriculum. All tamariki at two intervention ECE will be invited to take part in ECE teacher/ Kaiako-led M.A.P.P activities however data will only be collected from tamariki 3-5 years who have provided assent and parental consent. ECE teacher/ Karakia will take part in six 30-minute online professional learning sessions in non-contact work time and deliver M.A.P.P activity sessions to tamariki. ECE intervention participants will provide enrolment data (with parental consent) on tamariki participants, age, ethnicity, attendance (days per week) and gender/ sex.

Two ECE (2) as a control ECE delivering usual physical activity curriculum. The two control ECE will receive the M.A.P.P intervention at the completion of the study.

Tamariki participants (intervention and control) will be asked to wear an accelerometer (see below) to measure physical activity quantity for five days at the beginning of the 10-week intervention and five days at the end of the intervention. This will be put on in the morning when tamariki arrive and taken off in the afternoon when tamariki leave with support from ECE teacher/ Kaiako and parents. Tamariki participants are asked to wear the accelerometer between 9am and 3pm over one week at the beginning of the study and 9am to 3pm over one week at the end of the study. The accelerometer will record movements only (lying, sitting, standing, and moving). It is like wearing a watch, so you do not have to take it off it's easy to keep safe but if you do lose it or it gets damaged just let us know, we do understand.

At the end of the 10-week intervention ECE leaders/ supervisors will take part in an interview to determine if they will continue to use the M.A.P.P framework as part of curriculum delivery. ECE teachers/ Kaiako will take part in an interview to determine what they enjoyed/ did not enjoy about the M.A.P.P framework and would they continue to use it. Tamariki participants will take part in a focus group to determine what they liked/ did not like about the M.A.P.P activities and characters and would they like to carry on with the activities and characters. We will record these interviews and focus groups to make sure that we don't miss anything.

A hip worn accelerometer.



The findings from this research will be published in academic journals and presented at conferences and could benefit anyone seeking to understand effective physical activity options for health for tamariki (3-5 years).

What are the discomforts and risks?

Some tamariki may experience slight discomfort in wearing the accelerometers as they will be a novel and interesting experience. ECE teachers/ Kaiako and parents will be alongside tamariki to put the accelerometer on and take it off. The primary researcher will show intervention tamariki participants the accelerometer and how it works at the invitation to participate hui at consenting ECE.

What are the benefits?

Goals of this study are to provide ECE teachers/ Kaiako with a physical activity framework and resource to be able to carry out the key curriculum thread of quality physical activity planned and unplanned experiences for tamariki, to improve tamariki physical activity levels and provide a platform for a lifelong love of being active. To also effect change in Ministry of Education regulations in relation to ECE licenses, space for tamariki and ECED teachers/ Kaiako and teacher/ tamariki ratios. You will get real experience of what it is like to contribute to research that will turn evidence into practice. This study is part of fulfilling my doctoral candidature at AUT and will contribute to the achievement of a Doctoral Degree (PhD).

What compensation is available for injury or negligence?

In the unlikely event of a physical injury as a result of your participation in this study, rehabilitation and compensation for injury by accident may be available from the Accident Compensation Corporation, providing the incident details satisfy the requirements of the law and the Corporation's regulations.

How will my privacy be protected?

Research records will be kept in a locked file and sorted by number codes, not by names; only researchers involved in the study, will have access to records. Data will be stored for 10 years and will be permanently destroyed after this period. You can withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

The results of the study may be published or presented, but not in a way that would identify your child. We will not include information that will make it possible to identify you or your child. Identifiable Information is any data that could identify your child (e.g., name, date of birth, or address). This study includes basic information about your tamariki from their ECE such as ethnic group, age range, and sex/ gender and it is possible that this research could one day help people in the same groups.

Only the project supervisor and I will have access to your child's identifiable information. To make sure your child's personal information is kept confidential, information that identified your child will not be included in any report. Instead, your child will be identified by a code.

Due to the nature of the study, other people may be aware that your child is taking part, and the teacher/ Kaiako may guess who is participating in the research; however no personally identifiable data from the study will be shared with others. The records of this study will be kept private. You and your child will be given access to any information we collect about your child.

What are the costs of participating in this research?

There is no financial cost to participate in this study. We anticipate the 30 minutes to read the information sheet, ask the primary researcher any questions (either via telephone, email or in-person) and complete consent form.

What opportunity do I have to consider this invitation?

Simply by considering this invitation and returning your response, either way, to the AUT drop box at your child's ECE.

Will I receive feedback on the results of this research?

You will be provided with a plain English summary of research findings, if requested (see consent form), at the end of the study.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Wendy Pirie, wendy@freshairforests.co.nz, 0273296776.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH, ethics@aut.ac.nz, (+649) 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Wendy Pirie , 0273296776 wendy@freshairforests.co.nz

Project Supervisor Contact Details:

Associate Professor Nigel Harris (09) 921 9999 ext 7301 Nigel.harris@aut.ac.nz

**Approved by the Auckland University of Technology Ethics Committee on 12 April 2022,
AUTECH Reference number 22/51.**

Appendix J: Consent Forms (Chapter 2-3)

Consent Form ECE

Project title: *The Feasibility and Preliminary Efficacy of a Teacher-Led Physical Activity Programme in Hawke's Bay Ministry of Education Licensed Early Childhood Centres.*

Project Supervisor: *Associate Professor Nigel Harris*

Researcher: *Wendy Pirie*

- ☐ I have read and understood the information provided about this research project in the Information Sheet dated 23 February 2022.
- ☐ I have had an opportunity to ask questions and to have them answered.
- ☐ I understand that identity of my fellow participants and our discussions in the focus group and interview is confidential to the group, and I agree to keep this information confidential.
- ☐ I understand that notes will be taken during the focus group and interview and that it will also be audio-taped and transcribed.
- ☐ I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.
- ☐ I understand that I will provide tamariki participant enrolment information to the primary researcher age, ethnicity, sex/gender, and attendance (days per week) with parental consent.
- ☐ I understand that if I withdraw from the study then, while it may not be possible to destroy all records of the focus group and interview discussion of which I was part, I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.
- ☐ I understand all personal information on my ECE is kept confidential, and privacy is protected.
- ☐ I agree to take part in this research.
- ☐ I wish to receive a summary of the research findings (please tick one): Yes ☐ No ☐

Participants signature :

.....

Participant's name :

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Participant's Contact Details (if appropriate) :

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.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on 12 April 2022

AUTEC Reference number 22/51.

Consent Form ECE Teacher/ Kaiako

Project title: *The Feasibility and Preliminary Efficacy of a Teacher-Led Physical Activity Programme in Hawke's Bay Ministry of Education Licensed Early Childhood Centres.*

Project Supervisor: *Associate Professor Nigel Harris*

Researcher: *Wendy Pirie*

- ☐ I have read and understood the information provided about this research project in the Information Sheet dated 23 February 2022.
- ☐ I have had an opportunity to ask questions and to have them answered.
- ☐ I understand that identity of my fellow participants and our discussions in the focus group and interview is confidential to the group, and I agree to keep this information confidential.
- ☐ I understand that notes will be taken during the focus group and interview and that it will also be audio-taped and transcribed.
- ☐ I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.
- ☐ I understand that if I withdraw from the study then, while it may not be possible to destroy all records of the focus group and interview discussion of which I was part, I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.
- ☐ I understand all personal information is kept confidential, and privacy is protected.
- ☐ I agree to take part in this research.
- ☐ I wish to receive a summary of the research findings (please tick one): Yes ☐ No ☐

Participant's signature :

.....

Participant's name:

.....

Participant's Contact Details (if appropriate):

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.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on 12 April 2022

AUTEC Reference number 22/51.

Note: The Participant should retain a copy of this form.

Parent/Guardian Consent Form

Project title: *The Feasibility and Preliminary Efficacy of a Teacher-Led Physical Activity Programme in Hawke's Bay Ministry of Education Licensed Early Childhood Centres*

Project Supervisor: *Associate Professor Nigel Harris*

Researcher: *Wendy Pirie*

- ☐ I have read and understood the information provided about this research project in the Information Sheet dated 23 February 2022.
- ☐ I have had an opportunity to ask questions and to have them answered.
- ☐ I understand that notes will be taken during the focus group and that they will also be audio-taped and transcribed.
- ☐ I understand that taking part in this study is voluntary (my choice) and that I may withdraw my child/children and/or myself from the study at any time without being disadvantaged in any way.
- ☐ I understand that if I withdraw my child/children and/or myself from the study then I will be offered the choice between having any data that is identifiable as belonging to my child/children and/or myself removed or allowing it to continue to be used. However, once the findings have been produced, removal of our data may not be possible.
- ☐ I understand all personal information on me, and my child is kept confidential, and my privacy is protected.
- ☐ I agree to my child/children taking part in this research.
- ☐ I agree to my child/ children ECE providing enrolment information, age, sex/gender, ethnicity, attendance (days per week).
- ☐ I understand that my child is able to refuse to give assent to take part in this research.
- ☐ I wish to receive a summary of the research findings (please tick one): Yes ☐ No ☐

Child/children's name/s :

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.....
.....

Parent/Guardian's signature :

.....

Parent/Guardian's name :

.....

Parent/Guardian's Contact Details (if appropriate) :

.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on 12 April 2022

AUTEC Reference number 22/51.

Note: The Participant should retain a copy of this form.

Appendix K: ECE-COMPASS Questionnaire



Early Childhood Educators' Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen behaviours (ECE-COMPASS) Questionnaire

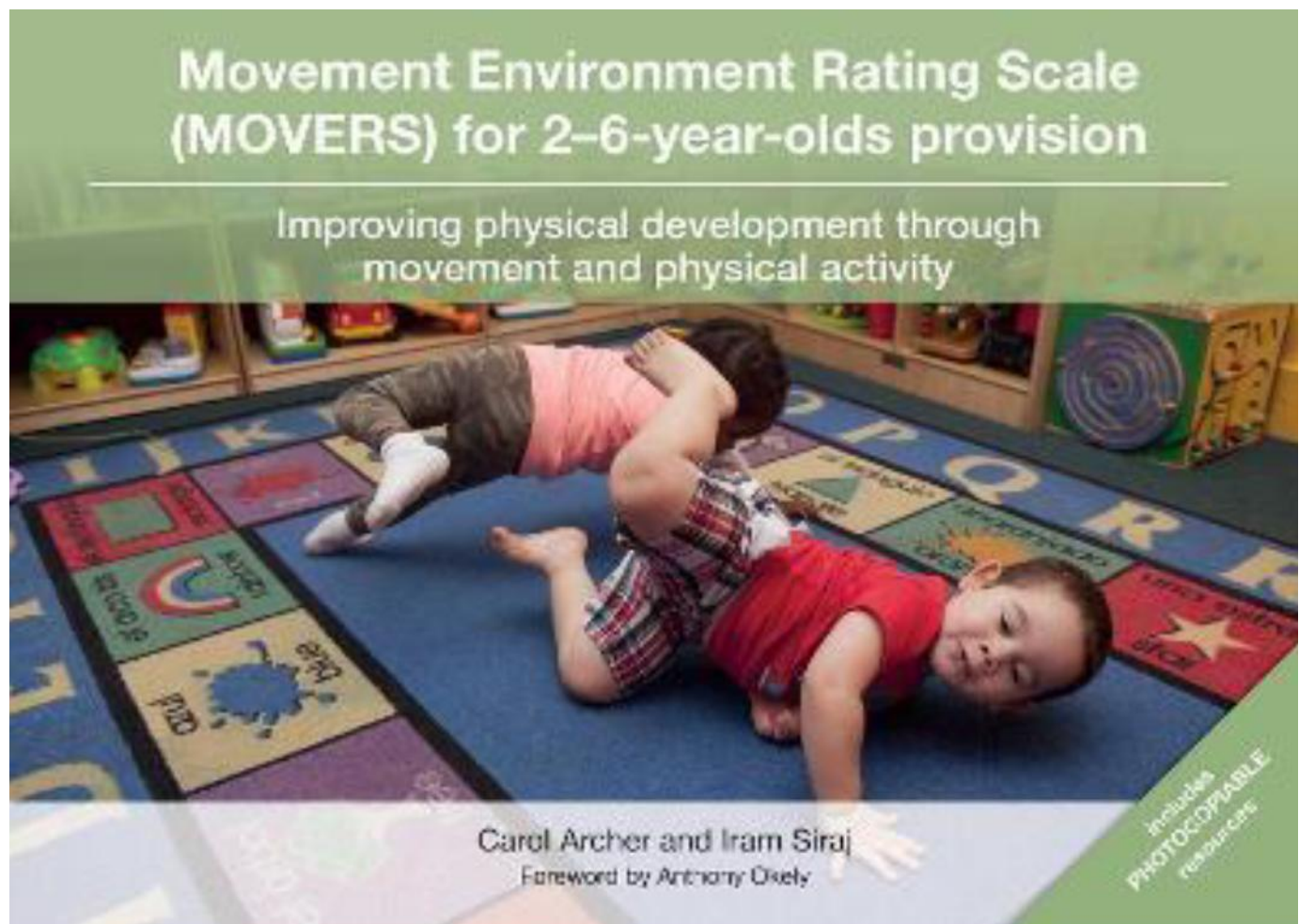
Physical Activity Sedentary/Screen Time Outdoor/Risky Play

Please indicate, on a scale from 0 (not confident at all) to 10 (completely confident), how confident you are in your ability to perform the following during your childcare day:

0	1	2	3	4	5	6	7	8	9	10
Not confident at all					Moderately confident					Completely confident
TASK Self-Efficacy										
Program opportunities for at least 120 min/day of physical activity <u>at any intensity</u>										
Facilitate <u>higher intensity physical activity</u> (i.e., activities that induce sweating and heavy breathing) for children in my care everyday										
Lead activities that promote children's development of physical literacy (e.g., including running, jumping, balancing, throwing, catching)										
Adapt physical activities for different developmental abilities										
Support children's motivation to move through verbal encouragement										
Incorporate movement into your curriculum (e.g., literacy and numeracy)										
Facilitate opportunities for unstructured (i.e., child-directed) active play each day										
Lead structured (i.e., educator-facilitated) physical activity each day										
Create an environment that supports children's active play										
Teach children about the health benefits of physical activity										
Communicate about children's physical activity and physical literacy with families										
Develop organizational policies for physical activity										
Serve as a positive role model for children's physical activity by participating in movement-based activities										
Develop organizational policies for screen time										

Serve as a positive role model for children's sedentary behaviours by limiting your own sitting during care hours
Serve as a positive role model for children's screen behaviours by limiting your own screen use during care hours
Minimize long periods (>60 minutes) of sitting time among the children in my care
Incorporate physical activity opportunities (e.g., active breaks and transitions) to minimize prolonged sitting time
Avoid children's use of screen-based technology during childcare hours
Engage children in age-appropriate risky play (i.e., adventurous play that tests children's limits but involves a chance of minor injury; e.g., play at heights, high speeds)
Provide children with multiple outdoor play opportunities everyday
BARRIER Self-Efficacy
Lead structured physical activities <u>in a small/limited space</u>
Encourage physical activity <u>when my colleagues/superiors do not value it</u>
Program opportunities for physical activity <u>even when there are time constraints</u>
Minimize children's sedentary behaviour <u>when they are tired</u>
Provide outdoor playtime <u>even when the weather conditions are not favourable, but not extreme</u>
Facilitate children's <i>active</i> play indoors <u>when extreme weather prevents outdoor play</u>
Facilitate opportunities for age-appropriate risky play <u>even when met with resistance from parents/other educators</u>
Facilitate outdoor active play opportunities <u>even when I am tired</u>
Facilitate outdoor active play opportunities <u>even when transitions are difficult</u>
Facilitate outdoor active play opportunities <u>even when it takes additional time to get children dressed</u>

Appendix L: MOVERS observation tool



Appendix M: ASPA conference poster

THE PHYSICAL ACTIVITY ENVIRONMENT IN AOTEAROA, NEW ZEALAND EARLY CHILDHOOD EDUCATION

Wendy Pirie¹, Andrew Gibbons², Scott Duncan¹, Rachel Jones³, Patricia Tucker⁴, Brianne Bruijns⁵, Nigel Harris¹

¹ Auckland University of Technology, School of Sport & Recreation, Auckland, NZ

² Auckland University of Technology, School of Education, Auckland, NZ

³ University of Wollongong, School of Education, Australia

⁴ University of Western Ontario, School of Occupational Therapy, Canada

⁵ University of Western Ontario, School of Health & Rehabilitation Sciences, Canada



BACKGROUND

- Early Childhood Education (ECE) is a setting that has potential to influence physical activity (PA) participation in preschool children¹.
- Two factors that have been associated with PA levels within an ECE setting are the influence of ECE teachers, and the quality of the movement environment including the quality of the child's physical experience, and movement pedagogy².

The aim of this study was to determine ECE teachers' self-efficacy in the delivery of PA behaviours in an ECE setting, and the quality of the ECE movement environment in Ministry of Education (MOE)-licensed, teacher-led ECE in Aotearoa, New Zealand (NZ).

METHODS

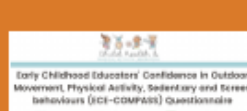
- Qualified and registered ECE teachers n = 42 ECE settings n = 6
- ECE teachers' task and barrier self-efficacy were assessed using the Early Childhood Educators' Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen Behaviours Questionnaire (ECE-COMPASS). ECE teachers' total task (21 items) and barrier (10 items).
- Self-assessment was on a rating scale of 0 (not confident at all) to 10 (completely confident).
- The ECE movement environment, including structure (e.g., resources) and process quality (e.g., activities), was assessed by a trained researcher using the Movement Environment Rating Scale (MOVERS). Movement environment characteristic scores derived from 11-item MOVERS instrument.
- Rated on a 7-point scale of 1 (inadequate) to 7 (excellent).
- Descriptive statistics, (M ± SD) and Median (IQR) were calculated.



RESULTS



MOVERS		
Movement Environment Rating Scale (MOVERS)		M ± SD
Subscale 1		4.0 ± 1.1
Subscale 2		4.0 ± 0.4
Subscale 3		3.8 ± 0.6
Subscale 4		4.0 ± 0.6



ECE COMPASS		
Early Childhood Educators' Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen Behaviours (ECE-COMPASS)		M ± SD
Task Self-Efficacy		7.2 ± 2.3
Barrier Self-Efficacy		7.0 ± 2.5

CONCLUSION

- ECE-COMPASS task and barrier ECE teacher self-efficacy responses indicate relatively high confidence to deliver PA behaviours during their childcare day.
- Quality of the ECE movement environment as assessed with the MOVERS score was minimal.
- Disparity between teacher self-perception and independent observation.
- Potential for improvement in professional learning
- ECE-COMPASS and MOVERS instruments provide original insight in PA behaviours in ECE.
- A wider scale study including a large sample of NZ ECE settings may be of value.

REFERENCES

- Kazmierka-Kowalewska, K. M., et al. (2021). A validation and reliability study of the Movement Environment Rating Scale (MOVERS). *European Early Childhood Education Research Journal*, 29(5), 733-746. <https://doi.org/10.1080/1350293X.2021.1968464>
- Zhang, Z., et al. (2021). Associations between the childcare environment and children's in-care physical activity and sedentary time. *Health Education and Behavior*, 48(1), 42-53-53. <https://doi.org/10.1177/1090198120972689>

ACKNOWLEDGEMENT

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Want to connect with Wendy Pirie? wendy@freshairforests.co.nz



Appendix N: Clinical Trial Registration

From: info@anzctr.org.au <info@anzctr.org.au>
Sent: Tuesday, June 18, 2024 7:10 PM
To: Wendy | Fresh Air Forests <wendy@freshairforests.co.nz>
Subject: Your ACTRN (registration number):

ACTRN12624000754549 Dear Wendy Pirie,

Re: The feasibility and preliminary efficacy of a physical activity programme in New Zealand Early Childhood Education: A pilot cluster-randomized controlled trial

Thank you for registering your trial with the ANZCTR. Your trial has been successfully registered and assigned the registration number **ACTRN12624000754549** (<https://www.anzctr.org.au/ACTRN12624000754549.aspx>) on 18/06/2024.

****Please note that as your trial was registered after the first participant was enrolled, it does not fulfil the criteria for prospective registration and will therefore be marked as being Retrospectively Registered on our website.****

Actions required over the course of your trial:

- Include your trial registration number in conference abstracts and trial results publications. This follows the guidelines set by the Consolidated Standards of Reporting Trials ([CONSORT](#)) and International Committee of Medical Journal Editors ([ICMJE](#))
- Send a copy of at least one approval letter from the Ethics Committee to info@anzctr.org.au
- Update trial registration details when there are any changes to your trial. Updates can be made at any time. It is your responsibility as the trial sponsor or representative to ensure quality and accuracy of trial information. Instructions on how to update trial information can be found at '[How to update](#)'. Both the original information provided at the time of trial registration and any subsequent changes will be publicly available on the ANZCTR

If you have any questions, please contact us at info@anzctr.org.au or +612 9562 5333.

Kind
regards,
ANZCTR
Staff



The ANZCTR is recognised as a [Primary Registry](#) in the WHO registry network and [ICMJE](#) accepted registry. T: +61 2 9562 5333; E: info@anzctr.org.au; W: www.ANZCTR.org.au