A curriculum-integrated dance programme in the New Zealand primary school context: observation, evaluation, and recommendations

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Thesis Abstract

Movement constitutes an integral component of children's early learning and development. Dance is one form of movement which involves the amalgamation of physical, mental, aesthetic, and creative components and is likely to aid in the holistic development of a child. Literature has suggested that dance may benefit primary children's academic performance, social bonding, creativity and neurocognition. As such, when embedded into school teaching it is likely to create a synergy for deeper learning among children.

In Aotearoa/ New Zealand, dance is not applied as a modality of teaching in primary schools and is taught to few children as an optional art form, with limited class teacher involvement. This may be due to teachers' lack of exposure towards dance-embedded teaching. Dance Education itself is an under-researched area and there is a dearth of empirical evidence on the impact of dance on primary schoolchildren and teachers. By utilising a mixed methods approach, this thesis aims to evaluate a curriculum-integrated dance programme across four New Zealand primary schools by determining (1) programme logistics, feasibility, and acceptability and (2) the effects on children's academic performance, wellbeing, classroom behaviour and physical activity.

Chapter two explains the design, development, and delivery of the curriculum-integrated dance programme across four primary schools in Auckland (New Zealand). The dance programme involved the participation of 101 primary schoolchildren and four teachers, lasting six weeks in each school. The programme was delivered by a dance educator, wherein most of the sessions centred around curricular learning. These sessions covered topics such as bar graphs, plant life cycles, handwriting and Māori legends through dance and creative movement. Such a learning module was envisaged to not only benefit children, but also serve as professional learning development for teachers. This study also discusses the feasibility and logistics of embedding dance and creative movement into New Zealand primary school teaching.

Chapters three to six constitute the evaluation part of the curriculum-integrated dance programme, by comparing a Dance Group (DG) class with a Control Group (CG) class from each school. Chapter three evaluated the curricular learning outcomes of the dance programme through the triangulation of two academic performance questionnaires (mathematics and reading), teacher interviews, children's focus

interviews and children's journal writing. There were no significant intervention effects in children's Mathematical abilities; however, the intervention had positive effects on reading for DG children with special needs and those of Asian descent. Moreover, exploration of qualitative data suggested that DG children drew connections between curricular learning, dance and creative movement.

Chapter four presents the wellbeing outcomes of the curriculum-integrated dance programme by triangulating findings from a wellbeing questionnaire, children's focus interviews and children's journal writing. Quantitative findings revealed significant intervention effects for DG on overall wellbeing and in health and lifestyle subdomain of wellbeing. Furthermore, qualitative findings complemented quantitative findings and themes related to wellbeing and fitness overlapped with curricular learning and creative movement.

Chapter five presents the behavioural outcomes of the dance programme, evaluated through a teacher-reported questionnaire. Although there was no significant intervention effect on total difficulties, the programme resulted in significant reduction in hyperactivity and increase in prosocial behaviour among DG. The conjoint findings of chapters two, three and four suggest that dance-embedded learning may be beneficial for children's curricular learning and in turn may have cumulative effects on their wellbeing and classroom behaviour.

Chapter six evaluated the dance programme on physical activity outcomes. Children were requested to wear an accelerometer device as a belt for one week at baseline and post-intervention timepoints. Sedentary, light, moderate, vigorous and moderate-to-vigorous intensities of physical activity were compared between the CG and DG at post-intervention. There were no significant intervention effects on step counts or PA levels between the two groups. Possible factors for insignificant results are discussed with implications for future research.

This body of work demonstrates the feasibility and benefits of a curriculum-integrated dance programme, through a comprehensive discussion of qualitative and quantitative findings across four primary schools. This thesis is posited to make novel contributions on the effects of a curriculum-integrated dance programme on (1) teachers' professional learning development and (2) children's learning, behaviour and wellbeing. It is hoped the original information contained within this thesis will contribute to the field of dance education in the primary school context, and deepen the

value of embedding dance and creative movement into primary school teaching. The recommendations provided within each study may provide inspirations for further research and application of dance in primary schools.

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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 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.

Geeta Sharma

Co-authored works

Chapters 2-6 of this thesis are either published in peer-reviewed journals, under review, or in preparation for submission. The percentage contribution of each author is presented below.

Chapter	Publication reference	Contribution
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Background

Schools play a crucial role in shaping the overall development of the child, wherein children spend more than half of their waketime (McGall et al. 2011). Schools are not only centres for learning, but also a prime site for children to develop social skills, creativity and fitness (Resaland et al. 2016; Richard 2013). As such, the primary school curriculum in Aotearoa or New Zealand places high emphasis on children's holistic learning (NZ Ministry Of Education 2007c). Besides entailing subject learning- like mathematics, reading or social sciences- learning areas in the arts, technology and physical education are also part of the curriculum. Primary educators also attempt to develop some essential life skills such as financial literacy, cultural respect and cyber responsibility in children (Jones et al. 2004; Forman et al. 2008). With diverse learning areas to be covered in a school term, primary educators creatively devise activities which may encompass more than one learning area (NZ Ministry Of Education 2007c). For example, an activity on cultural studies may entail development of Māori language, environmental protection, visual art, and cultural respect.

Arts-embedded teaching has the potential to tap into the various learning areas of the NZ curriculum. Amongst all the art forms- drama, music and visual arts- dance is least embedded into classroom teaching and may be applied as a connecting link with the Health and Physical Education curriculum (New Zealand Ministry of Education 2000b). With empirical evidence suggesting the numerous benefits of dance in primary schools- as a creative art form, a form of psychotherapy, a form of exercise and as a teaching tool- dance has the potential to provide an enriched learning experience for children (Makopoulou et al. 2020; Bungay and Vella-Burrows 2013; Alotaibi et al. 2017). Teachers are met with challenges such as lack of awareness and little opportunities for professional learning development, and as such dance continues to take a back-seat in primary school teaching and learning (Snook 2012b; Buck 2003).

The NZ primary school curriculum is influenced by evidence-based policies and empirical evidence is required to consider which form of school-based intervention may promote children's learning and development (Forman et al. 2008). Several studies have interlinked children's effective learning at school with physical activity, behaviour and wellbeing; dance has the potential to tap into these facets of children's learning and development at school (Donnelly et al. 2009; Bremer et al.

2016; Koshland and Wittaker 2004). The next section will synthesise various school-based investigations on children's academic performance, wellbeing, behaviour and physical activity- which form the key outcome measures of this thesis. The next section is envisaged to provide a wider context of this research by juxtaposing school-based interventions from the international context with the New Zealand primary school context and more specifically towards dance-embedded learning.

School-based interventions for academic performance

Assessment of academic performance in New Zealand

Academic performance from the primary school context may be defined as the term used to describe children's knowledge and understanding towards certain learning areas (Liem 2019). In New Zealand primary schools, children are assessed mainly on eight learning areas: English, the arts, health and physical education, learning languages, mathematics and statistics, sciences, social sciences, and technology (NZ Ministry Of Education 2007c). Learning area assessments are usually conducted by the child's classroom teacher either through verbal (e.g teacher observations during class), written (e.g utilising standardised testing procedures such as AsTTle) and/or practical methods (e.g group demonstrations in class). At a class level, assessments can provide a teacher information on the academic performance of his/her class, inform their summative assessment and later their formative assessment. This in turn informs their teaching practice and assists in devising appropriate lesson plans on par with children's learning levels (Education Review Office 2018). However, a constant challenge for primary teachers is to teach in a class with children of similar learning abilities. The VARK model suggests that there are four different kinds of learners in the classroom- Visual, Auditory, Read/Write and Kinesthetic (Fleming and Mills 1992). This challenge is further accentuated with the need to meet varying cognitive and language needs of the children. Although New Zealand primary schools have individualised learning programmes in place for children, bringing about an effective teaching strategy for the entire class remains a constant teaching issue (Mitchell et al. 2010).

Physical activity and academic performance

Research in the domain of physical education and public health suggest that children's academic performance can be influenced by physical activity, irrespective of socio-economic background (Gouws 2015; Gall et al. 2018; Basnet and Basnet 2017). Besides, these studies have also suggested increased concentration performance (Gall et al. 2018), classroom behaviour (Gouws 2015) and interaction effects on gender (Basnet and Basnet 2017). Another study suggested that physical activity may be particularly effective for children struggling with low numeracy scores (Resaland et al. 2016). Recognising these benefits, studies have evaluated the effects of embedding movement as part of classroom teaching (Watson et al. 2017; Norris et al. 2015). The combined findings from two review papers found improvements in academic performance, on-task behaviour and reduction in classroom disruptions (Watson et al. 2017; Norris et al. 2015). However, these review papers have not investigated the influence of gender, socioeconomic status, or special needs on the changes in academic performance. Moreover, there is a lack of information on the role of teachers in delivering and embedding movement into their teaching practice.

However, one study did find significant effects of movement-based intervention, when predominantly run by teachers (Mullender-Wijnsma et al. 2015). Initially developed by researchers, this curriculum-integrated intervention was tailored by the teachers to meet the numeracy and literacy contents of their respective primary school curricula. This study suggests that a school-based learning intervention can be successful when designed from an existing curriculum, and when teachers are provided more ownership. It is likely that the intervention acted as a form of Professional Learning Development (PLD) and corroborates with studies evaluating the effects of a arts-based intervention on children and teachers (Greenfader and Brouillette 2013; Christa Mulker Greenfader and Liane Brouillette 2017; Greenfader et al. 2015).

The role of arts in academic performance

Arts education has been suggested to impact children's academic performance (Lloyd 2017) and constitutes part of primary schools across many countries (D. Russell-Bowie 2004). Experimental studies on curriculum-based drama interventions have been suggested to enhance children's language skills, pronunciation and learning retention rate (Subasi et al. 2016; Ulas 2008; Walker et al. 2011). These studies suggest that enactment of characters from story sequences may equip non-native speakers to

develop their vocabulary and comprehension (Ulas 2008). Music- another aspect of arts education – may also contribute to children's literacy and numeracy levels. Although there is lack of empirical evidence on the effect of curriculum-based music learning, studies suggest that children's participation in music at school could help their neurocognition and in turn help with academic performance (Arnaud et al. 2013; Holochwost et al. 2017; Perlovsky et al. 2013). Data from a meta-analysis study suggest that participation in music classes may increase short-term memory and have knock-on effect on other learning areas such as science, history or environmental science (Arnaud et al. 2013). Two longitudinal studies evaluating the impact of learning musical instruments revealed contradictory findings in its impact on academic performance. Although both studies involved participants of lower socio-economic backgrounds, one study found improvements in self-esteem levels, but no differences in test scores (Costa-Giomi 2004); while another found increase in literacy, numeracy, short-term memory and neurocognition (Holochwost et al. 2017). With some researchers suggesting that listening to music may help with cognitive dissonance – the phenomenon of having to deal with two strong internal conflicts- this mechanism is specifically yet to be studied and warrants further empirical evidence (Perlovsky et al. 2013). Nonetheless, these findings on music education and drama-based learning deepen the application value of arts in schools.

Dance-embedded learning and academic performance

Dance education plays an integral component of the arts curriculum both in the New Zealand (NZ Ministry Of Education 2007c) and international context (OMA Design Team Members et al. 2012; Smith 2009). In primary schools, the participation in dance has the potential to provide children the combined benefits of physical activity (Gouws 2015; Gall et al. 2018; Basnet and Basnet 2017), drama (Subasi et al. 2016; Ulas 2008; Walker et al. 2011) and music (Arnaud et al. 2013; Holochwost et al. 2017; Perlovsky et al. 2013). As such, empirical evidence supports the association of dance with increased children's academic performance (Adams 2016; Mohn 2004; Moore and Linder 2012; Nikitina 2003; Makopoulou et al. 2020). These findings suggest the interplay of multiple mechanisms, closely resonating with Gardner's Theory of Multiple Intelligence (Gardner and Hatch 1989). Given that dance education can potentially tap into logical, linguistic, musical, spatial, kinesthetic and interpersonal forms of intelligence, dance may provide all-round development of children (Gardner

and Hatch 1989). Figure 1-1 represents the benefits of dance in children and the need to promote dance-based learning programmes in schools.

Gardner's Theory of Multiple Intelligence resonated in Gilbert's seminal work BrainDance (Gilbert 2006, 2003) which contributed significantly to research in dance education (Hanna 2008; Leandro et al. 2018). The underlying principle of BrainDance is that dance and creative movement can be instrumental in transmitting a deeper learning experience for children (LaMotte 2018). Besides improvement in literacy and numeracy (Deans and Cohrssen 2015; Adams 2016; Moore and Linder 2012), studies have suggested that BrainDance can effectively be embedded in other learning areas such as science, social science and cultural studies (Werner 2001; Mohn 2004; McIntyre 2005; Simpson Steele et al. 2016). Moreover, dance-embedded learning may develop English literacy among non-native speakers (Greenfader et al. 2015), promote social skills (Leandro et al. 2018) and develop academic interest among children with special needs and lower socio-economic backgrounds (Catterall et al. 2012). Further research triangulating findings from teachers perceptions, children perceptions and test scores are warranted to garner a holistic understanding of dance-embedded learning in primary schools (Christa Mulker Greenfader and Liane Brouillette 2017; Makopoulou et al. 2020).

Another seminal work in the field of Dance Education is the contribution of Kassing and Jay's book *Dance Teaching Methods and Curriculum Design: Comprehensive K-12 Dance Education* (Kassing and Jay 2002a). Focussing on the pedagogical applications of dance in schools, this book acts as a resource for primary educators, dance educators and physical educators who plan to embed dance into their practice. Comprehensive information on lesson planning, development and assessment is provided and the application of genre-specific dance forms (jazz, ballet, folk dance) into school teaching may also be understood. Overall, this book contextualises the applications of dance as another modality of teaching in schools and adds another dimension towards dance education.

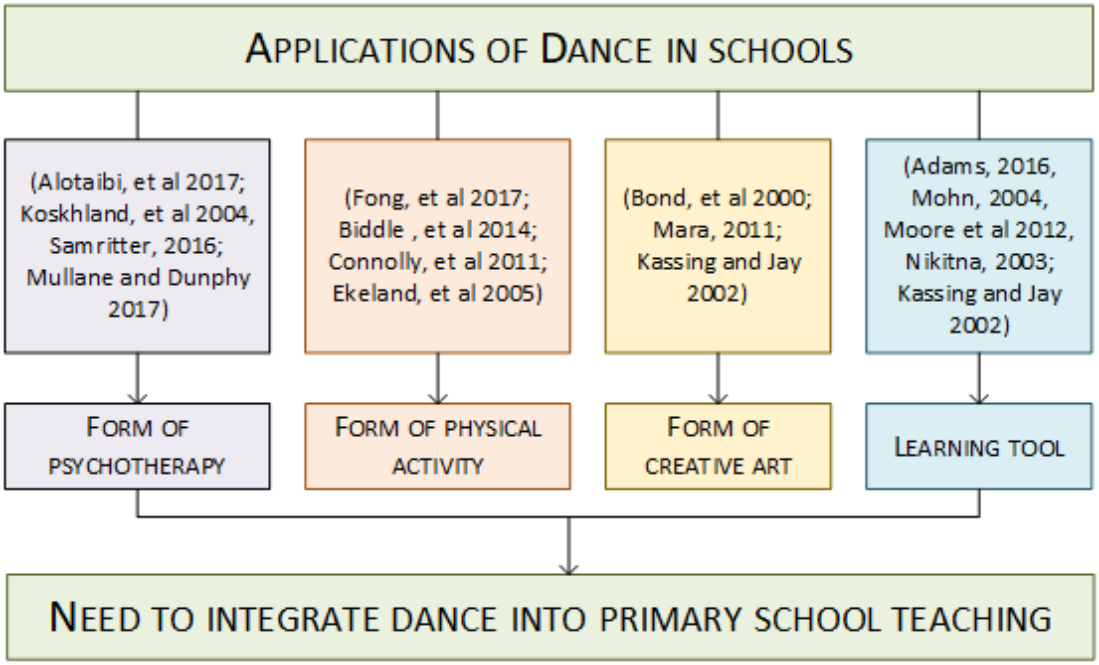


Figure 1-1. schematic representation of applications of dance

School-based interventions for children's wellbeing

Assessment of wellbeing in New Zealand

According to the New Zealand Health and Physical Education curriculum, wellbeing *(Hauora)* is a component encompassing physical *(Taha tinana),* mental and emotional *(Taha hinengaro),* social *(Taha whanau)*, and spiritual dimensions *(Taha wairua)* of health (New Zealand Ministry of Education 2000b). Children's wellbeing is a key policy priority in New Zealand and is informed by policy-based research (Children's Commissioner 2020). Evidence gathered from a NZ report, indicated that children perceive wellbeing as "being happy, confident and not living in poverty" (Children's Commissioner 2020). Recognizing that children's learning at school is predominantly influenced by their happiness and satisfaction, NZ primary schools have implemented several policies on student wellbeing (Education Review Office 2016; Mental Health Foundation of New Zealand 2001; Education Review Office 2015). Some of these include development of anti-bullying policies, school-based wellbeing assessment and timely referral to school counsellor when appropriate (Education Review Office 2016; Mental Health Foundation of New Zealand 2001; Education Review Office 2015).

School-based wellbeing assessments play a crucial role in informing school policy makers and developing national policies. Both quantitative and qualitative

assessment evaluation have been utlised in NZ surveys; quantitative findings providing data on the wellbeing levels of primary children (New Zealand Council for Educational Research 2018) and qualitative findings exploring children's perceptions on student wellbeing (Commissioner and Tamariki 2019). For example, data from The Wellbeing@School assessment reported the effectiveness of utlising a Whole School Approach towards tackling bullying (New Zealand Council for Educational Research 2018). This report collated and compared data from teachers and children. It was found that in comparison to European and Asian ethnic groups, children from the Pasifika ethnic descent had higher sense of wellbeing, while Māori children had the lowest levels of wellbeing (New Zealand Council for Educational Research 2018). Schools with a wellbeing component embedded into their teaching (e.g. teaching conflict resolution, practicing strategies for support) had students report higher sense of wellbeing in comparison to other schools. Findings from this report thus suggest that strategies to promote wellbeing are effectively supporting most children; however, different strategies may need to be in place specifically for Māori children (New Zealand Council for Educational Research 2018). Consequently, another report garnering children's and young people's perceptions across NZ found that Māori children were subject to casual racism, felt a sense of prejudice and sought empathy. They also requested for better support to help reduce stress and acknowledged the importance of education (Commissioner and Tamariki 2019). These findings collectively provide scope for a well-rounded understanding on the need to develop and implement new strategies to ensure the wellbeing of all children (Commissioner and Tamariki 2019).

Arts and wellbeing

Research suggests that regular participation in art-based programmes can influence an individual's wellbeing, tapping into both hedonic (enjoyment) and eudaimonic (fulfilment) facets of wellbeing (Bidwell 2014). Art-based activities such as music, (Hampshire and Matthijsse 2010) visual arts, dance or drama (Bungay and Vella-Burrows 2013) may promote children's self-esteem, improve their social skills and enhance creativity (Bidwell 2014; Zarobe and Bungay 2017). This sense of wellbeing at school may in turn increase their focus in class, thereby helping them learn and understand their subjects better (Education Review Office 2015). Literature also derives associations between art and The Five Ways to Wellbeing model- connect, take notice, keep learning, be active and give (Bidwell 2014).

A study evaluating the effects of *SingUp* children's choir programme suggested increase in social skills, confidence, pride and achievement (Hampshire and Matthijsse 2010). However, this programme was not part of the school curriculum and children's singing practice was outsourced to an external drama company. Given the logistics of the travel and the nature of the longitudinal study, attrition rate for this study was high. Children also perceived a sense of "disconnect" (p. 711) and found difficulty to manage other after- school activities (Hampshire and Matthijsse 2010). However, these findings may not be applicable to other art-based programmes embedded within a school curriculum and taking place during school timings. For example, an experimental study investigating the effect of music education on primary schoolchildren found significant improvements in social skills, literacy and numeracy (Said and Abramides 2020). These results may also be due to the six-month time period of the study, suggesting that art-based interventions may be most effective when integrated into the school curriculum and conducted for a long period of time.

A review associated the effects of art-based activities on health- related outcomes among youth (Bungay and Vella-Burrows 2013). Besides promoting wellbeing and improving behaviour it was found that some of these interventions- targeting health education- found participants to be more aware about mental health, obesity and sexual health. As such, the author suggests that further empirical evidence is needed to evaluate dance and drama as effective tools for instilling life skills and promoting youth awareness. Yet another review with studies on community-based art programmes associated the involvement of art-based activities as contributing to developing resilience (Zarobe and Bungay 2017). A common finding from both reviews is the impact of arts on children from lower socio-economic backgrounds and youth at-risk. Also, these reviews derived many studies from community-based programmes and more research on evaluating school-based art programmes are warranted (Zarobe and Bungay 2017; Bungay and Vella-Burrows 2013).

Wellbeing through the interplay of physical activity and the arts

With physical wellbeing constituting another dimension of wellbeing, empirical evidence suggests that participation in regular PA may reduce mental health issues, increase happiness and fulfilment and thus promote wellbeing (Netz et al. 2005; Hernandez et al. 2017). For primary schoolchildren, this effect may decrease body dissatisfaction and depressive symptoms (Olive et al. 2019). A longitudinal study

involving a one-year movement-based intervention showed decrease in mental health indicators after a one-year intervention. However, there were no retention effects of the programme when children were evaluated again after a four-year timepoint. Moreover, the study showed an increase in depressive symptoms among girls, suggesting that physical activity plays a key component in the healthy development of children (Olive et al. 2019).

There is another growing body of literature suggesting that arts-based programmes and health promotion may go hand in hand (Bungay and Vella-Burrows 2013). For example, an evaluation looking at the effectiveness of an art-based community programme *Be Creative Be Well* suggested that the promotion of wellbeing may be more sustained when artists and health professionals collaborate. The authors suggest more long-term community projects intertwining art with health promotion through creative strategies, such as involvement of community leaders (Cameron et al. 2013). Encompassing physical activity, creativity and art, dance might be one effective technique of promoting and maintaining wellbeing in schools and in the wider community as well.

Dance and wellbeing

There is a vast body of literature suggesting that dance-based programmes, both in the wider community and in schools may be beneficial for wellbeing (Bungay and Vella-Burrows 2013; Olga et al. 2018; Burkhardt and Brennan 2012). Involving a blend of team work, creative movement and peer support, these dance-based interventions may also promote social skills and emotional intelligence among children (Zitomer 2016; San-Juan-Ferrer and Hípola 2019). Moreover, dance as a form of psychotherapy – Dance Movement Therapy (DMT) has been suggested to help children with cognitive, physical and social challenges (Martin 2014; Bläsing 2017; Takahashi et al. 2020). Similar to other art-based and PA-based interventions, dance may be helpful for children and youth at-risk (Catterall et al. 2012). For example, a dance programme involving hip-hop sessions suggested multiple benefits among youth hailing from lower socio-economic backgrounds. These included an increased sense of wellbeing, creativity, respect and enhanced academic learning (Beaulac et al. 2010).

The Oxford Handbook of Dance and Wellbeing compiles the discussion from various authors on creative movement and wellbeing both for adults and children. Part Three specifically discusses dance as a form of applied learning and as dance movement therapy (Karkou and Oliver 2017). As pointed out by the editors, wellbeing and learning are intertwined in the school setting and dance-based interventions have the potential to meet both. Another common thread among all contributors of this section is the malleability of DMT: beneficial for children with learning disabilities (Alotaibi et al. 2017), as a catalyst for learning among children with special needs in the primary context (Mullane and Dunphy 2017), academicians as stress-relief (Wengrower 2017) or effectiveness as embedding into the school system to prevent children's drop-out and aid children at-risk (Schaub-Moore 2017). These authors collectively suggest the need to promote dance into teaching either at the primary or tertiary level.

An experimental study which evaluated Bharatnatyam[1] as a form of DMT found significant impact on children's physical health (Parab et al. 2019). The 12-week intervention which took place among children with Down Syndrome found significant differences in their BMI, cardiorespiratory fitness, strength, and balance. With Bharatnatyam involving a blend of semi-squat (Aramandi), full squat (Muzumandi), hand gestures (Mudras) through feet stomping and hand stretching, it is likely that the sessions further activated the body muscles. Although largely a devotional art form, some basic concepts (called Adavus) encompassing strength training and flexibility may be applied by schools as well. Researchers may consider investigating the feasibility and applicability of integrating such traditional dance forms into primary schools. With Bharatnatyam and Ballet involving some common fundamental

[1] A classical dance form, originating from South India
https://en.wikipedia.org/wiki/Bharatanatyam

movements, Western researchers may consider developing school-based interventions with an amalgamation of different art forms.

In NZ primary schools, children's wellbeing is provided utmost importance and dance has the potential to tap into the multiple facets of *Hauora*. Figure 1-2 represents the connection between dance and wellbeing as outlined by the Health and Physical Education Curriculum (New Zealand Ministry of Education 2000b). Although research and governmental reports have gathered children's perspectives on wellbeing, there is lack of research on the impact of arts education in the promotion of wellbeing (Education Review Office 2015, 2016). More specifically, the immediate and long-term effects of dance on primary children's wellbeing is yet to be researched.

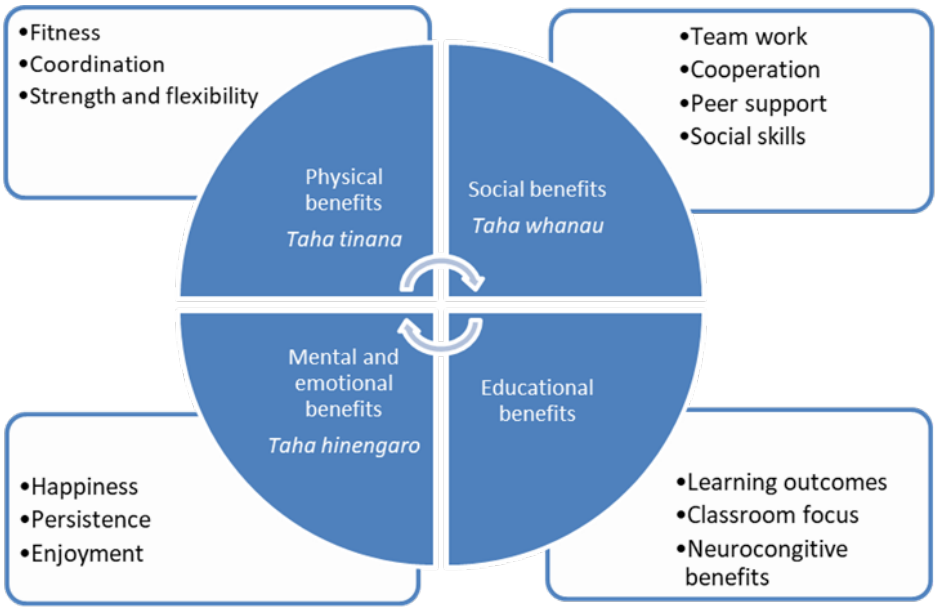


Figure 1-2. Benefits of dance and its' alignment to NZ concept of wellbeing *(Hauora)*

School-based interventions on behaviour

Behavioural interventions in New Zealand

In New Zealand, mainstream primary schools comprise of children with and without special needs. For teachers, catering to the learning needs of all children may be challenging and this is further accentuated by behavioural disruptions in class. However, children with behavioural needs are identified at an early stage, are provided appropriate help through a special educator and are managed in the classroom through

effective strategies. Some schools apply strategies from programmes such as PB4L-SW (Positive Behaviour for Learning- School Wide) (Ministry of Education 2017).

The PB4L–SW are a series of strategies which are aligned with the New Zealand curriculum and are aimed to promote self-regulated learning behaviour in children. Many of these strategies – reflection, enquiry, collaboration, support and problem solving- revolve around positive reinforcement; punitive actions are applied only as a final resort for behavioural reinforcement (Ministry of Education 2017). An evaluation of the PB4L–SW in NZ schools suggested that the programme may be more effective with the involvement of families and ongoing professional learning development for teachers (Savage et al. 2011). Other strategies such as *Good Behaviour Game* and *Child Development Project* have also been suggested by the NZ Ministry of Education. Further research on the effectiveness, sustainability and strategies of these strategies are warranted.

Art-based interventions influencing behaviour

Figure 1-3 represents the overlap of previously discussed literature with school behaviour. Collectively, these studies suggest that art-based and PA-based interventions can influence school behaviour, thus promoting wellbeing and increasing academic performance. Figure 3 corroborates with findings from a review paper on art-based therapies in primary schools (Moula et al. 2020). This review paper collating studies on visual arts, music and dance suggested that (1) application of visual arts may be effective for migrant children to transition into a school, help overcome language barriers and build self-esteem; (2) visual arts may help children with behavioural and emotional difficulties improve resilience and self-expression; (3) music-based therapy may help children with aggressive behaviour, attention problems and withdrawn behaviours; (4) DMT may help children with self-control and wellbeing. Significant improvement in self-expression and a reduction of behavioural complaints at school is a common outcome which the author observed in the review (Moula et al. 2020). Another art-based intervention called *The Prodigy Programme* found similar outcomes. Targeting adolescents at-risk of mental, physical, emotional and economical obstacles towards school learning, the study found significant differences in behaviour and self-efficacy (Rapp-Paglicci et al. 2011). *The Prodigy Programme* applied visual, performing, musical, media, and theatre arts to develop strategies on anger management, develop social skills and enabled problem- solving

skills. These studies suggest that art-based therapy may be highly beneficial for children and youth experiencing behavioural, social, and academic challenges at school.

Classroom behaviour and PA

Besides art-based therapy, movement and exercise may also help children with special needs. A review found that exercise may help children and youth diagnosed with autism (Bremer et al. 2016). This review found that involvement in structured activities such as martial arts, swimming, jogging or dance may increase children's focus, decrease behavioural issues, and improve cognition. Similarly, a review on primary schoolchildren suggested that movement-based learning may promote cognition and classroom focus (Daly-Smith et al. 2018). Besides, the review synthesising 17 studies suggested that regular breaks in the classroom through movement-based activities may improve children's behaviour. Individual studies have also suggested associations between PA, sport participation and classroom behaviour (Watson et al. 2019; Brusseau and Burns 2018). Collectively, these studies suggest the need for more robust evaluation of behaviour using long-term PA-based interventions.

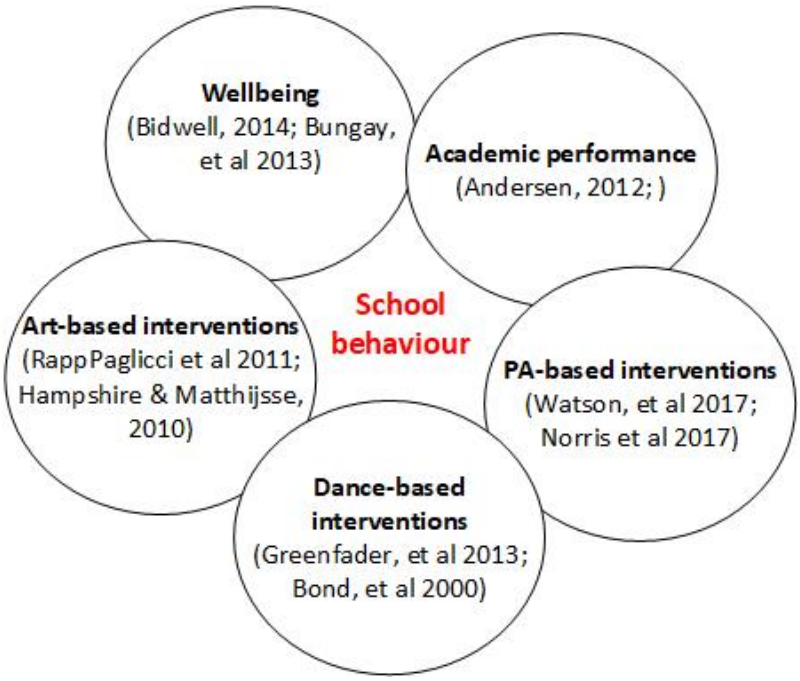


Figure 1-3. Possible influencers of school behaviour

School-based interventions on Physical Activity

PA-based interventions in overseas schools

Research has suggested that school-based interventions involving physical activity (PA) can have numerous benefits for children. These benefits include physical benefits- such as increased motor co-ordination, fitness, flexibility (Boreham and Riddoch 2001; Fong Yan et al. 2017); academic benefits- such as increased academic performance, classroom behaviour and focus; neurocognitive and wellbeing benefits (Käll et al. 2015; Netz et al. 2005; Gall et al. 2018). Some studies have also suggested that regular PA can benefit children of lower socio-economic backgrounds- academically, physically and mentally (Gall et al. 2018; Brusseau et al. 2016). Thus PA-based activities at school may benefit all children, particularly youth at-risk.

Abundant research has taken place to understand the effects of PA-based interventions in primary children and adolescents alike (Kriemler et al. 2011). A review conducted on PA-based interventions in primary schools found significant improvements in children's PA levels at post-intervention timepoint (Dobbins et al. 2009). The review which covered 26 studies looked into various forms of interventions: movement-based learning, teacher-led-PA sessions, increased activity during physical education lessons. Besides finding significant increase in the intensity and time of MVPA (moderate-to-vigorous physical activity) the review also found improvements in children's cholesterol levels, blood pressure and BMI. The findings from this review suggest that PA-based interventions in school may help to tackle childhood obesity. Another review not only found health-related outcomes, but also suggested the need to create awareness among primary educators, schools and also families of children (Naylor et al. 2015). This review suggested that a school-based approach towards embedding PA maybe more effective, although factors such as school support system, availability of resources and lesson scheduling may interfere. Movement-based learning maybe another effective and sustainable technique to embed PA into primary schools.

Teachers and movement-based learning

Research suggests that teachers can play an important role in promoting PA in children by embedding movement into their classroom (Donnelly et al. 2009; Donnelly et al. 2013; Donnelly and Lambourne 2011). *Physical Activity Across the Curriculum*

(PAAC) was a three-year longitudinal research project which evaluated the effects of embedding movement-based lessons on children's physical and academic outcomes. Encompassing a range of learning areas such as math, language arts, geography, history, spelling, science, and health, the lessons were delivered by primary educators with little to no exposure in delivering PA-based lessons. The intensity of PA varied according to the nature of the lesson and schools were requested to embed atleast 90 min of moderate-to-vigorous physical activity (MVPA) per week. A total of 24 primary schools participated in the project, out of which 14 schools received the PAAC intervention and the remaining 10 were the control. Evaluation of the PAAC project showed promising results. Over the three-year period, children involved in the PAAC project showed significant reduction in BMI, increase in MVPA and improvements in literacy and numeracy. BMI changes were influenced by the duration of movement-based lessons, i.e. PAAC schools which had more than 75 min of PAAC lesson per week showed significantly less increase in BMI over the three- year period (Donnelly and Lambourne 2011). The PAAC project was well-received by the teachers given that it was inexpensive, malleable according to their class timings and easily manageable. Another study embedding movement into mathematical lessons, found significant improvements in numeracy, improvements in aerobic fitness but found no significant changes in BMI (Vetter et al. 2018). This six-week RCT which took place in one school, specifically involved the topic *Time Tables* as a core element of the intervention. The researchers suggest that higher dosage interventions in future research and strongly recommend that physical education classes should not be replaced by movement-based learning.

Another US-based research project *Texas I-CAN!* (Initiatives for Children's Activity and Nutrition) approach was developed to help primary school children of lower socioeconomic status (John B Bartholomew and Jowers 2011). Teachers received training towards embedding PA into their lessons across curricular subjects and were asked to embed *I-CAN!* into their teaching. Schools which had embedded *I-CAN!* method of teaching into their curriculum had significantly higher levels of MVPA (approximately 3 min more/day) and step counts (approximately 530 steps/day) in comparison to the CG schools (John B. Bartholomew et al. 2018). However, there were no significant effects when adjusted for socioeconomic status, race, gender, BMI or fitness levels. This may suggest that PA is equally received for all participants, despite varying demographic profiles and contradict other studies

suggesting that school-based PA maybe particularly useful for children at-risk (Gall et al. 2018; Brusseau et al. 2016).

The collective findings from the PAAC and *I-CAN!* projects suggest that even with little training, teachers can effectively apply movement-based learning into their teaching (Donnelly and Lambourne 2011; John B Bartholomew and Jowers 2011). Low attrition rate was observed among teachers who participated in these studies, and approximately 95% continued to embed movement into their teaching beyond the duration of the study (Donnelly and Lambourne 2011). These studies suggest that PA maybe efficiently disseminated in schools through teachers. Although empirical evidence is available from the international context, movement-based learning is under-researched in New Zealand primary schools.

PA-based interventions in New Zealand primary schools

Although Physical Education constitutes one of the eight learning areas in the New Zealand curriculum (New Zealand Ministry of Education 2000b) movement-based learning is severely under-researched in primary schools. Specifically, its impact on children's PA levels are unknown, although some studies have taken place to promote PA in children. From the primary school setting, these interventions have included nutrition-based (Duncan et al. 2019; Duncan et al. 2011) and movement-based evaluations (Kulinna et al. 2018)

The *Healthy Homework* pilot project evaluated the effects of a six-week intervention wherein children completed health-related tasks as part of their school homework (Duncan et al. 2011). Some tasks included walking around neighbourhood, limiting television time and increasing intake of fruits and vegetables. The involvement of parents and family was encouraged. It was found that children who participated in the *Healthy Homework* project (n=97) had significantly higher step counts of 2830 steps/day in comparison to a CG school (n=40). The *Healthy Homework* project was again conducted on a larger scale across 16 NZ primary schools and 675 participants. As an eight-week intervention, children were mainly evaluated on step counts and BMI. There was a significant increase in step counts, particularly among children from lower socio-economic backgrounds. Overall, while the evaluation results from the *Healthy Homework* do suggest the effect on step counts, the effect on various levels of PA is unknown (Duncan et al. 2019).

Another study evaluated changes in selective attention from a movement-based intervention at a primary school (Kulinna et al. 2018). Children participated in a PA-based intervention facilitated by teachers and based on an aerobic programme titled *Jump Jam.* Changes in selective attention were also assessed using d2 Test of Attention and PA was monitored using accelerometers and attached only during the intervention. Each *Jump Jam* session lasted roughly 45 minutes and facilitated by the teachers at their convenience. Although it was found that the *Jump Jam* sessions may have improved children's attention, it is unknown whether there were any changes in PA levels outside the intervention timings. Studies evaluating changes in PA from movement-based interventions, particularly from the NZ primary school context are warranted.

Thesis rationale

The previous section collated information on school-based interventions mostly from the international context. The review suggested that arts and PA at school may enhance academic performance, promote wellbeing, decrease disruptive behaviour and increase physical activity (Arnaud et al. 2013; Cameron et al. 2013; Kriemler et al. 2011; Vetter et al. 2018). With dance involving a combination of both arts and PA, it is not surprising that numerous studies have suggested the benefits of dance-based programmes on children (Karpati et al. 2015; Huang et al. 2012; Romero 2012). Moreover, research on dance-embedded learning suggest significant improvements in children's academic performance, corresponding to research on movement-based and arts-based learning (Makopoulou et al. 2020; McMahon et al. 2003; Moore and Linder 2012). However, it is unknown whether dance-embedded learning can influence wellbeing, behaviour and physical activity which are equally important to primary schoolchildren. This thesis endeavours to evaluate a dance-embedded learning programme on academic, physical, wellbeing and behavioural outcome measures, utilising quantitative and qualitative evaluation procedures.

Furthermore, the data collated in Table 1-1 elucidates the need to conduct evidence-based research which may help NZ children. With NZ children ranked quite low on academic, wellbeing and physical measures, this research was conducted to investigate whether dance may act as an effective mechanism to improve these outcomes (UNICEF Office of Research 2018). Furthermore, the influence of gender,

ethnicity and special needs may be investigated in order to assess changes within these sub-groups. This research is the first of its kind to evaluate the effects of a dance-embedded learning programme for children with special needs in a primary school setting across various measures. With NZ-based surveys suggesting that Māori and Pasifika students show lower sense of wellbeing, increased chances of behavioural difficulties and lowered academic performance, this research was warranted to investigate whether dance could help these children (Education Review Office 2015, 2016; Commissioner and Tamariki 2019).

	Measure	Results	Reference
Academic performance	High performance gap ir reading comprehension	NZ primary children ranked 30 out of 31 OECD countries	(UNICEF Office Research
	Inequality in primary school education	NZ children ranked 28 out of 31 OECD countries	2018)
Wellbeing	Good health and wellbeing	NZ children (below 15 years) ranke 38 out of 41 OECD countries	(UNICEF Office of Research
	Quality education	NZ children (below 15 years) ranke 15 out of 41 OECD countries	2017)
Physical Activity	Physical inactivity	87% prevalence of insufficient physical activity among NZ adolescents	(Guthold et al. 2020)
Classroom behaviour	Total difficulties through the SDQ questionnaire	Children of Māori descent more likely to show higher score for behavioural difficulties	(NZ Ministr of Health 2018)

Table 1-1: Data gathered from reports on outcome measures

Primary schools in New Zealand mainly integrate dance into their school curriculum either as an art form or form of physical activity (Kulinna et al. 2018; Melchior 2011). Although many primary school teachers are aware of the benefits of dance-embedded learning, few teachers embed dance and creative moment as part of their teaching practice. Researchers suggest that this may be due to a lack of professional learning development and a feeling of "lack of expertise" in dance and creative movement (Snook and Buck 2014). As such, another facet of this thesis was developing and delivering a dance programme with the active involvement of teachers. This was envisaged to serve as PLD for all four teachers who took part in the

programme and covered the learning areas outlined in the NZ curriculum. Teacher perceptions were gathered, understanding the applicability and feasibility of embedding dance into an existing curriculum.

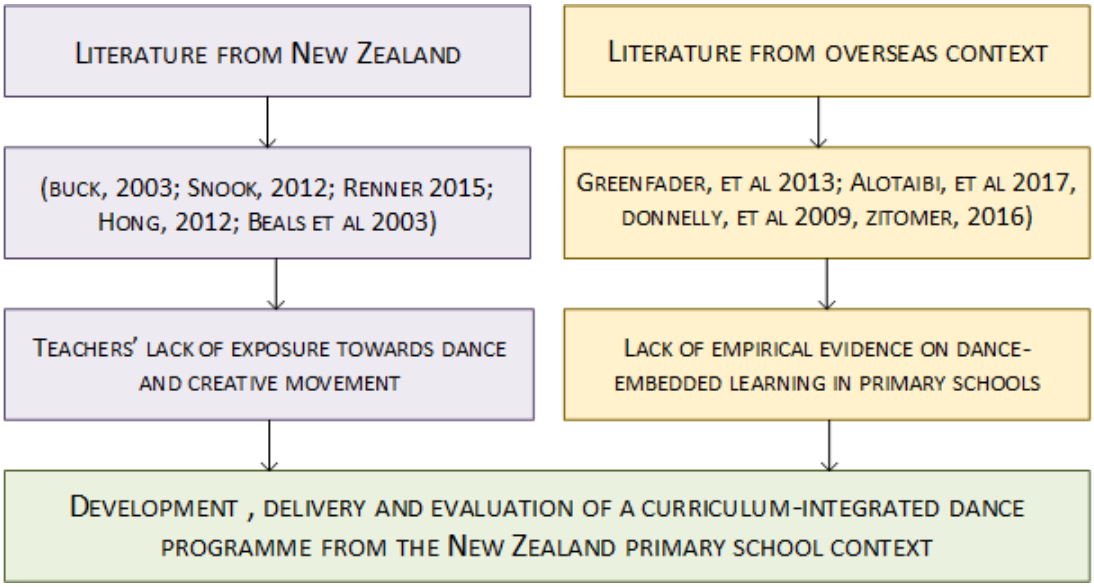


Figure 1-4. rationale for current research

Overall, this thesis was aimed at evaluating a dance programme in the New Zealand primary school context, by garnering empirical evidence from both teachers and children. The findings from this thesis are posited to make novel contributions to the field of Dance Education in the New Zealand and overseas context. The recommendations are envisaged to assist in the development of evidence-based strategies towards children's learning and development for future consideration.

Thesis organisation

This thesis consists of seven inter-related chapters, of which three have been submitted as scientific papers. Figure 1-5 summarises the overall organisation of the thesis. An introduction of the literature and a rationale for the thesis has been covered in Chapter 1. Chapters 2 to 6 are either published in peer-reviewed journals, under review or in preparation for submission. Consequently, these are written as stand-alone articles and unavoidable repetition of some information occurs (e.g., participants, methods). Each chapter begins with a preface, which aims to explain the sequential progression of findings, and aid the cohesiveness of the thesis. Each chapter should be thought of essentially independent, with its own focused literature review and discussion. It

should be noted that Chapters 5 and 6 were written in the format of Short Communication and are shorter in length than the other chapters.

The dance programme which formed a key aspect of this research has been explained separately in Chapter 2. Chapters 3-6 form the evaluation section of this thesis, wherein quantitative and qualitative findings are presented. The general discussion in Chapter 7 provides a summary of key findings, and discusses study limitations, wider implications, and future research directions.

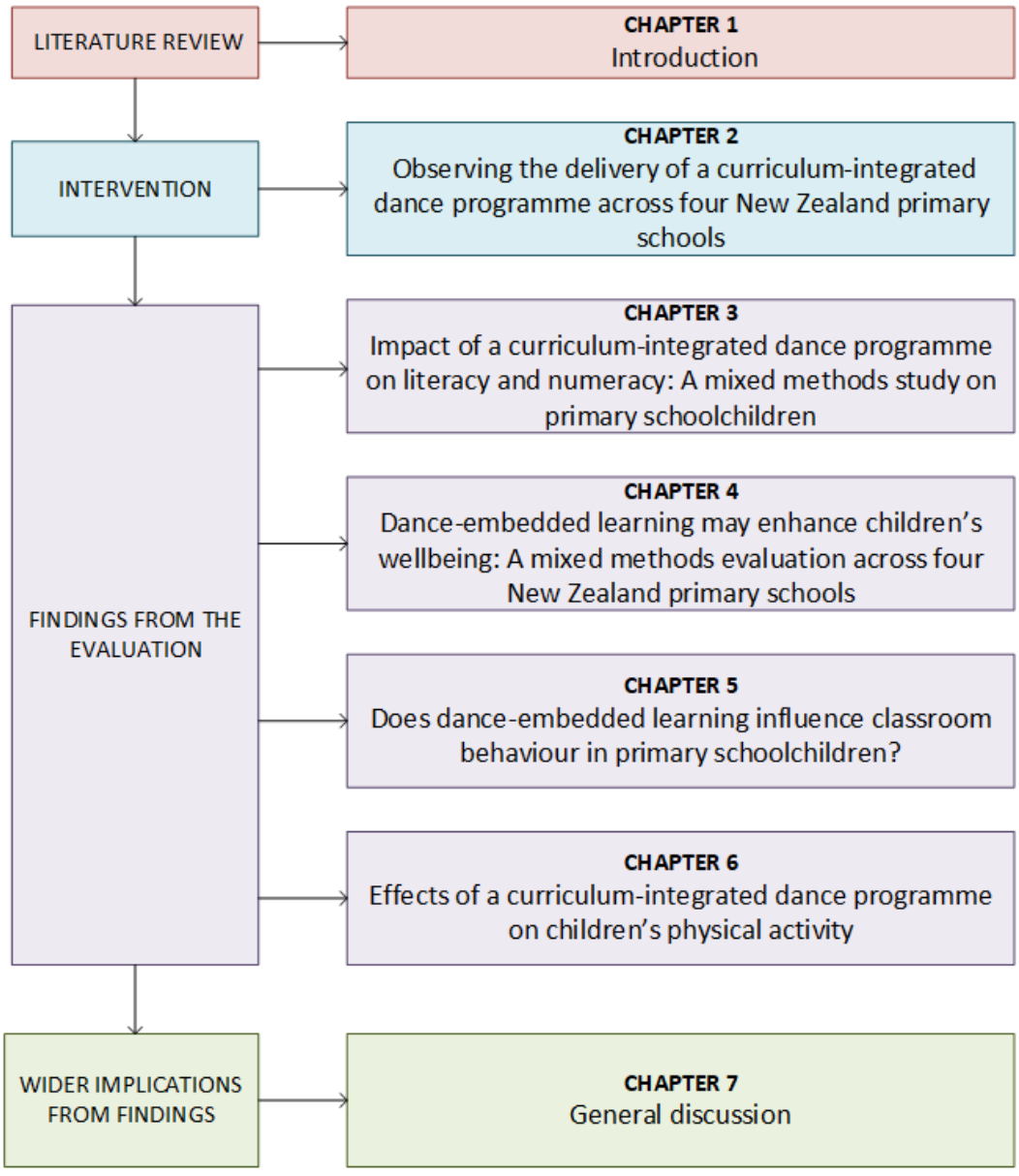


Figure 1-5. Structure of the thesis

Chapter 2 : **Observing the delivery of a curriculum- integrated dance programme across four New Zealand primary schools**

Preface

Dance constitutes an integral part of the New Zealand Arts curriculum and is taught across many primary schools, mainly as an art form. When applied as a teaching tool, dance can leverage children's curricular learning and may develop a holistic approach towards learning. However, NZ primary teachers are not fully aware of the pedagogical applications of dance as they have limited practical exposure. Thus, dance-embedded learning does not form part of the teaching and learning at many schools since many teachers feel inadequately experienced. This study describes the delivery of a curriculum-integrated dance programme across four NZ primary schools involving the joint effort of four teachers, a dance educator and a researcher. The dance programme was mainly delivered by a dance educator, with active participation from four teachers and 101 children across four schools. This study was novel as it provided professional learning development for all participating teachers, who played a pivotal role in helping to develop, deliver and embed the dance programme into their teaching practice. This study served as the intervention for the candidate's PhD and the evaluation results constitute subsequent chapters of this thesis. The full paper from this study is currently published in the Nov 2019 issue of the *New Zealand Journal of Educational Studies* (Appendix 16).

Abstract

This study explains the design, development and delivery of a curriculum-integrated dance programme across four primary schools in Auckland, New Zealand (NZ). Four teachers and their respective classes (101 children in total) were part of the programme. Each class participated in 18 dance sessions at their schools during school hours. The dance educator delivered the dance programme and collaborated with each class teacher for planning and implementation. Various topics related to science, mathematics, English and Māori culture were covered in accordance with the term focus of each class teacher. The core values from the NZ primary school curriculum and NZ arts curriculum were embedded in the dance programme. The applicability, transferability (to other participant groups), challenges (such as time and venue) and evaluation design associated with the dance programme are discussed. Teachers' reflections are embedded with researcher observations as they describe the significance of the dance programme.

Background

The current study describes a curriculum-integrated dance programme that was implemented across four primary schools in Auckland (New Zealand) to investigate the integration of dance education into the NZ primary school curriculum. Creative movement - a form of movement using the body as a learning tool - formed an integral part of the dance programme as it has the potential to enhance student learning (Dow 2010; Leandro et al. 2018).

Dance as a teaching tool

Research in dance education has suggested that dance and creative movement may be effective in teaching curricular subjects such as geometry, literature or science, as children may develop a deeper understanding of the theory and application of abstract concepts (Koff and Warner 2001; Moore and Linder 2012; Richard 2013). Embedding creative movement with dance-based teaching can potentially ignite cognitive learning in children, since physical movement deepens neural connections (Richard 2013; Dow 2010; Simpson Steele et al. 2016). Dow uses the term "vehicle" to describe dance as an effective teaching tool and affirms the pedagogical benefits of creative movement as a specific dance activity that fosters integrated learning (Dow 2010). She proposes that dance and creative movement could be embedded seamlessly into curricular teaching and tailored to fit any venue. Furthermore, Hanna suggests that dance can be considered

economical in comparison to other art forms, such as music or visual arts, since "(the) students' own bodies are their instruments" (Hanna 2015).

A US-based research project Teaching Artist Programme (TAP) found arts-based learning improved English oral skills among Hispanic children (Greenfader and Brouillette 2013). Primary teachers from a large school district in California (USA) were part of this two-year programme to aid the integration of creative drama and dance into their teaching practice. During the first year, teachers and artists co-taught a total of 28 arts-based lessons (14 theater and 14 dance) and each lesson lasted 50 minutes. By the second year, teachers were able to develop and deliver arts-based lessons independently. Children who participated in TAP had significantly higher scores on the California English Language Development Test (CELDT) than control group students. Two other studies evaluating TAP have also demonstrated the benefits on other ethnic groups, particularly those with limited English-speaking ability (Greenfader and Brouillette 2013; Greenfader et al. 2015).

Another school-based study found the benefits of creative movement among children, where nine children had special needs (Skoning 2008). It was observed that when literature was taught through creative movement, children understood abstract ideas by transferring and applying their concrete knowledge of the subject. The author opines that generalist teachers can seamlessly integrate dance into their teaching, without prior experience or training in dance. She also suggests that teachers may develop a dance-embedded assessment despite lacking the ability to move creatively themselves (Skoning 2008). These studies suggest that creative movement can be applied and further developed by NZ primary school teachers in their classrooms, despite the teachers' minimal exposure to dance education and creative movement. Figure 2-1 contextualises the overlap the effective teaching pedagogies outlined in the NZ curriculum with some of the principles of dance education.

Current status of dance in New Zealand primary schools

Dance education researchers in the NZ context have emphasized both the benefits and need for generalist teachers to implement dance into their teaching practice (Beals et al. 2003; Hong 2012; Snook 2012a; Snook and Buck 2014; Renner 2015). Most studies have shown that NZ primary teachers feel inadequate to embed dance into their teaching (Ashley 2010; Buck 2003; Snook 2012b). On the contrary, another study has shown that NZ primary teachers reported medium to high levels of self-efficacy towards dance and

did not perceive dance as a challenge to teach (Renner 2015). However, all these studies acknowledge that pre-service and in-service teacher training have a pivotal impact on teaching practice (Ashley 2010; Snook 2012a, 2012b; Buck 2003). Lack of funding, heavy workload, tight teaching schedules and little time for planning may also be contributing factors for the integration of dance into curricular teaching (Beals et al. 2003; Snook 2012a; Buck 2003). Hence, in many primary schools dance is taught by a dance artist or dance educator for few interested students with minimal teacher involvement and curricular cross-over (Snook 2012a, 2012b; Snook and Buck 2014). A sustainable and effective approach towards embedding dance with a curricular crossover could be through a dance-integrated teaching model delivered by the generalist teacher.

Upon release of the revised 2001 NZ Arts Curriculum, teachers across NZ were provided with Professional Learning Development (PLD) to facilitate the implementation of Arts, i.e. dance, drama, music and visual arts in their respective school curricula (Beals et al. 2003). The PLD occurred through after-school workshops which were facilitated by artists. Prior to the PLD, teachers were less confident in the implementation of dance as part of their teaching practice. Beals' assessment found the PLD had an impact on teachers' method of teaching, both as a reflective and curriculum-embedded form of learning. Teachers also reported a 25% increase in literacy and an increase in students' confidence and enthusiasm towards the Arts in general. Teachers further requested training and resources to facilitate the implementation of Arts, particularly dance (Beals et al. 2003).

Besides providing PLD to teachers, the NZ Ministry of Education released several resources to aid the integration of dance into the curriculum. Some of these were Dancing the Long White Cloud (DLWC), Kiwi Kids Dance, Discovering Dance-Teachers' Notes and the Dance Wall Charts (Ashley and Anderson 2002; New Zealand Ministry of Education 2005; NZ Ministry of Education 2002). Among these, the DLWC was specifically filmed to assist primary educators embed dance into their teaching practice (Ashley and Anderson 2002). This video resource was sent to every school in NZ along with supplementary reference booklet. Teachers from eleven Auckland schools were recruited to assist in the filming of the video resource, along with their classes. One class from each school participated in a dance-embedded learning programme developed by their respective class teacher and filmed as lessons. Outline of lesson planning, unit planning and learning assessment were covered in the supplementary reference booklet. Since the DLWC programme, there have been no large-scale PLD programmes to

facilitate dance education at a national level. The reprinting of the resource stopped after lack of government funding and currently the DLWC is not easily accessible to NZ primary educators (O'Brien, P, personal communication, Oct 10, 2019).

A dance-integrated classroom teaching model has the potential to meet the teaching strategies mentioned in the NZ curriculum such as: supportive learning environment, reflective thought and action, shared learning and teaching as learning (NZ Ministry Of Education 2007b) and this has been represented in Figure 2-1. Despite recognising and acknowledging its benefits, dance is mainly perceived as an art form, rather than a form of learning (Snook 2012b). Even with little exposure to dance education, primary teachers can be supported to embed creative movement into their practice effectively.

Effective Pedagogy (NZ curriculum)		**Principles of dance education**
Creating a supportive learning environment	↔	Team work
Encouraging reflective thought and action	↔	Self-critique of dance learning and movement
Enhancing the relevance of new learning and connecting to prior learning experiences	↔	Application of dance movement to classroom learning
Facilitating shared learning	↔	Reciprocal learning
Providing sufficient opportunities to learn	↔	Exposure to age-appropriate challenging dance tasks
Teaching as enquiry	↔	Proactive, creative and challenging tasks associated with dance education

Figure 2-1. Alignment of the NZ curriculum to core principles of dance education

Dance educator and classroom teacher collaboration

A partnership-based model between artists and teachers can provide teachers practical experience towards embedding dance and creative movement into their practice. This will not only act as a means of their PLD, but can potentially leverage kinesthetic learning among their class students (Christa Mulker Greenfader and Liane Brouillette 2017;

Moore and Linder 2012). In the context of programmes in the USA, several such partnership-based models have been germinated as a means of PLD for teachers across several states. The Visual and Performing Arts programme at San Diego schools (VAPA), Changing Education Through the Arts (CETA) by the Kennedy Center, Opening Minds through the Arts programme at Tucson Unified School District, The Teaching Artist Project (TAP) are a few examples of such a partnership-based model (Christa Mulker Greenfader and Liane Brouillette 2017; San Diego Unified School District ; Smith 2009). Here, artists and class teachers co-taught a series of curriculum-integrated dance classes, tailored to each teacher's term focus. Initially, teachers received the support of an artist to incorporate creative movement into their teaching practice. Over a period of time, they gradually developed confidence to independently plan and deliver dance-embedded lessons. Depending on the tenure of the respective programme, the training time for the teachers ranged from a few weeks to up to two years like the VAPA programme and TAP. Children who participated in these programmes, demonstrated an increase in academic learning, creativity and sustained interest towards the Arts (Christa Mulker Greenfader and Liane Brouillette 2017).

The Dance for Children programme was a collaboration between Montclair State University and Bradford School where BA (dance) students had placement in schools as part of their course requirement (E. McPherson 2014). Here they collaborated with class teachers to co-teach classes, which embedded curricular learning. As part of their course the students shared their experiences with their peers, school staff and professor to reflect and learn. Their learning was later assessed at the end of the placement. This "experiential learning" provided "deeper artistic experiences" for teachers and school children alike (McPherson 2014, p.5).

In another study, a teacher and dance educator collaborated to develop and deliver dance-integrated geometry sessions (Moore and Linder 2012). Students demonstrated their understanding of geometric concepts through dance performances which they had developed in groups. Learning was assessed in reference to a rubric developed by their teacher. The sessions not only enhanced children's application knowledge of geometry but also enhanced reciprocal learning, social skills and provided a platform for critical appreciation of dance. In the NZ context, a similar collaborative model could be one strategy to ensure the sustainability of dance education in primary schools. This raises two crucial questions: 1) How can a curriculum-integrated dance programme be

effectively delivered in NZ primary schools? 2) What are the perceptions of NZ teachers who participate in a curriculum-integrated dance programme?

Rationale and significance of the study

The current study was formulated to address the above questions by observing the development, delivery, applicability and transferability of a curriculum-integrated dance programme in NZ primary schools. The dance programme which took place between Oct 2016-Dec 2017 was a collaborative effort between the participating teachers, a dance educator and the primary author. It was constantly refined based on the reflections from the teachers, dance educator, children and primary author. Finally, it was evaluated using a mixed methods approach (Clark 2007; Giguere 2015). The programme reflected the four interrelated strands of the NZ Arts curriculum: Understanding the Arts in Context, Developing Practical Knowledge in the Arts, Developing Ideas in the Arts and Communicating and Interpreting in the Arts (New Zealand Ministry of Education 2000a). It was closely aligned with the principles of effective pedagogy and many of the learning areas (such as science, English, social science, mathematics and statistics) of the NZ primary school curriculum (NZ Ministry Of Education 2007b). Unlike previous studies that focused on dance-embedded learning towards a single learning area, the dance programme from the current study covered a range of subjects (Leandro et al. 2018; LaMotte 2018; Moore and Linder 2012).

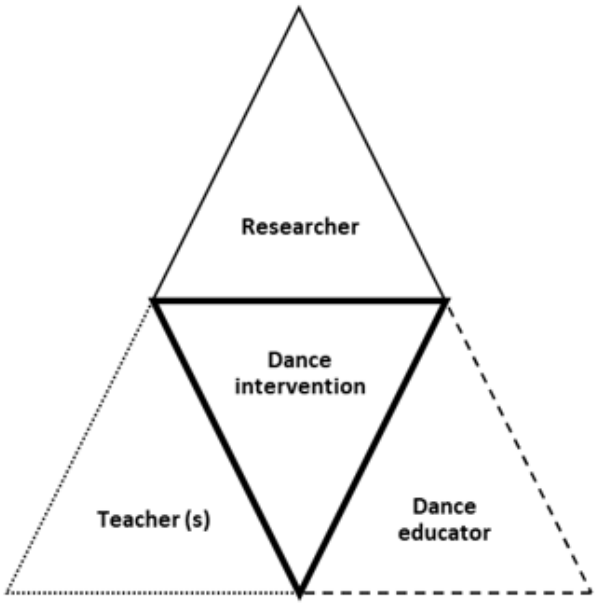


Figure 2-2. Collaborative nature of the dance programme

The dance programme provided teachers with exposure to a curriculum-embedded dance module and served as a unique approach to their PLD (Buck 2003; Beals et al. 2003). It acted as a catalyst for a cross-curricular approach towards learning and further emphasised the need for including dance as a curriculum-integrated activity in NZ primary schools (Snook 2012b). Although artist-teacher collaborations have taken place in the NZ context, few studies have specifically evaluated a dance programme (Ashley 2010; Beals et al. 2003). Moreover, there is a gap in literature surrounding the acceptability and delivery of a curriculum-integrated dance programme in NZ primary schools (Snook 2012b; Buck 2003). Figure 2-2 represents the collaborative nature of the dance programme.

The current paper describes the planning, delivery and feasibility of a curriculum-integrated dance programme across four NZ primary schools. The activities covered across all four schools are explained in tandem with children's acceptability of the programme. Teachers' perceptions of the dance programme are explored along with observations from the research team. The programme was evaluated using a mixed methods approach and the following section describes this in detail.

Design of the Study

Evaluation design

The recruitment of schools for this study commenced after seeking ethical approval (reference number 16/303) from the Auckland University of Technology Ethics Committee (AUTEC). This study was part of the primary author's PhD project, where she evaluated a curriculum-integrated dance programme in the NZ context. Eight primary school teachers across four primary schools participated in this project with their class children and the teachers decided the Dance Group (DG) class and Control Group (CG) class. The DG class took part in the dance programme with their class teacher, while the CG class did not participate in the dance programme but were evaluated on the same quantitative measures as the DG class. The DG teachers made it compulsory for all their children to participate in the dance programme, as it involved curricular learning and was part of their term focus. DG (n=101) and CG (n=86) children were part of the evaluation only after obtaining parental consent and child assent. Separate evaluation reports were

sent to the school principals, teachers and parents. Photos in this study have been used after obtaining parental consent and child assent.

A mixed methods evaluation design was used to evaluate the dance programme, since the impact of the dance programme needed to be understood holistically through quantitative and qualitative measures. This is similar to previous studies in the NZ and overseas context (Beals et al. 2003; Christa Mulker Greenfader and Liane Brouillette 2017; Renner 2015; Werner 2001). Quantitative evaluation procedures were conducted at baseline and post intervention intervals for both DG and CG participants. Academic performance, psychological wellbeing, classroom behaviour and physical activity were evaluated through the Assessment Tools for Teaching and Learning (AsTTle) questionnaire, Assessing Well-being in Education (AWE) questionnaire, Strengths and Difficulties Questionnaire (SDQ) and Actigraph accelerometer, respectively. In order to understand children's perceptions of the dance programme, DG children were asked to journal their learning experiences either through Google Docs or SeeSaw[2]. About five children from each school were chosen by their teacher to participate in a focus group interview in their school. Teachers were interviewed separately, where they reflected upon the dance programme and its applicability to their teaching practice. The findings of these evaluation procedures are discussed in the subsequent studies of this thesis.

Intervention design

In addition to previous research in dance education, the researcher (PhD student) coined a definition based on the observations and reflections gathered throughout the dance programme conducted in this study (Leandro et al. 2018; Moore and Linder 2012; Skoning 2008). Thus, researcher's applied definition describes a curriculum-integrated dance programme as a series of dance sessions, encompassing various curricular activities

[2] *SeeSaw* is an online platform, where children share their learning through written reflections, videos or pictures amongst peers, teachers and parents

using the principles of dance education and creative movement. The dance programme was informed by cycles of action research learning for the primary author and dance educator in response to participants (children and teachers). Applied reflection (or reflexivity) on the part of the primary author and dance educator between one school (in one term) and the next over four terms played a significant role in this study (Kalendra and Cook 2017) and stages of reflexivity has been represented in Figure 2-3. Discussions were held with the participating teacher and dance educator usually each week. This significantly added to the improvisational approach of reacting with presence and responsiveness to the children's needs and suggestions (Giguere 2015). It also fostered ongoing reflective journaling that cumulatively informed, not only individual lesson plan but also pedagogical approaches and thematic ties with the classroom curriculum in the dance programme throughout and between school terms (Marsick and Gephart 2003). Many activities were repeated, applied and transferred to other schools (see table one). The dance activities were derived from various texts; few were created by the dance educator (Ashley 2014; Kaufmann and Dehline 2014).

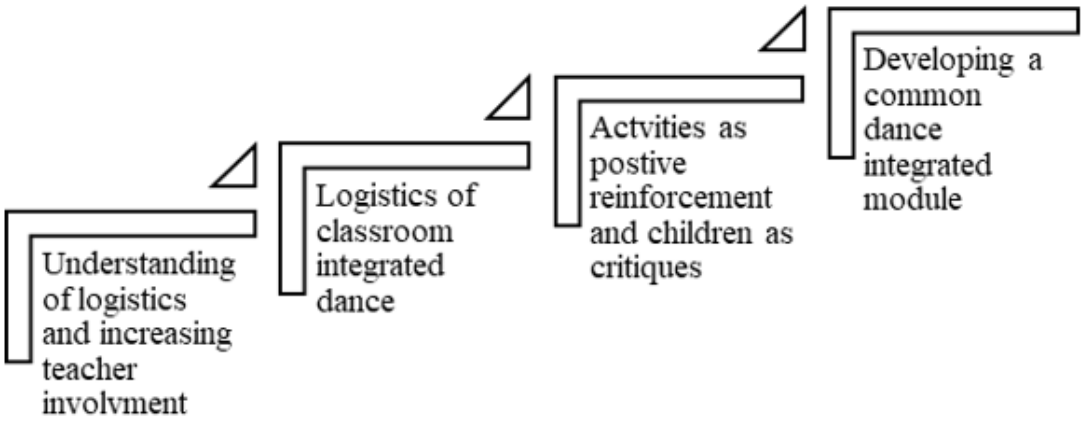


Figure 2-3**.** Stages of reflexive cycles in all four schools

Prior to the start of the dance programme, detailed discussion took place between participating class teachers, the dance educator and the primary author regarding the theme of the dance module. Previously, artists have tailored PLD according to teachers' and children's needs both in New Zealand and overseas (Beals et al. 2003; Werner 2001; Richard 2013). While the dance educator provided structure and content to the dance programme, the class teacher shared her expertise on curricular subjects, children's learning behaviour and special needs. The teacher also helped with logistics associated with the programme such as booking the school hall, bringing children to the hall and

supplying props for specific activities. Physical activity, teamwork, critical appreciation, reciprocal learning and choreography were part of the dance programme in varying intensities and frequencies (Kassing and Jay 2002b). The sessions took place at times that suited the teacher and dance educator, usually in the school hall.

The dance sessions were designed bearing in mind children's special needs and comforts. For example, a child with autism who did not want to lie on the floor and represent the motion of a bicycle through his legs was encouraged to use his arms instead. By making the dance programme a compulsory part of their term focus and teaching, the Dance Group (DG) class teachers ensured all children in their class actively participated in the dance programme. The dance module had certain common activities for all schools but varied in theme according to each teacher's term focus and requirements and has been represented in Figure 2-4. The dance educator and primary author sought feedback continuously from the participating teacher to ensure curricular learning and applicability.

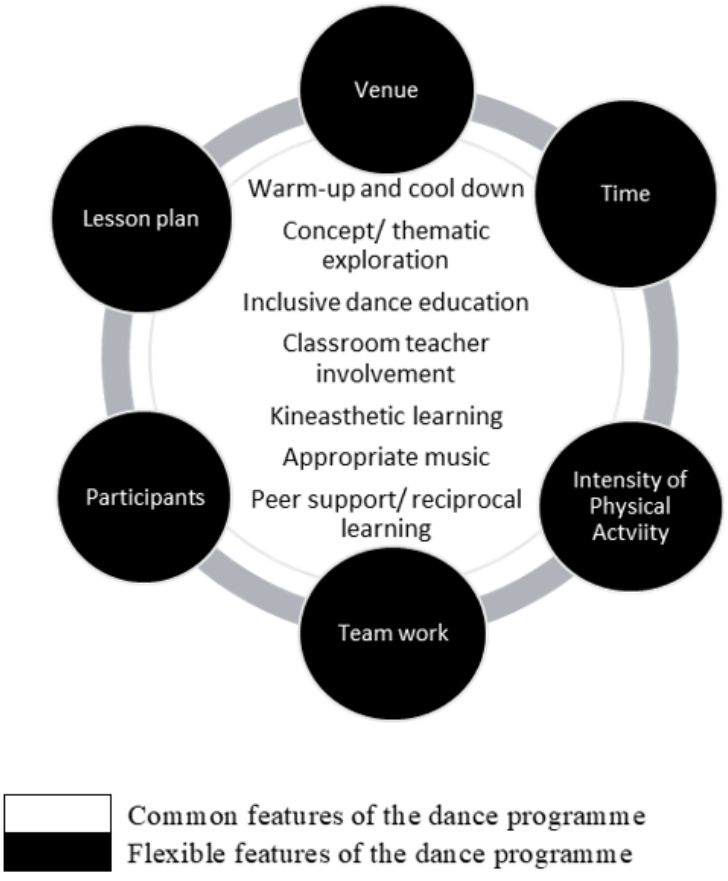


Figure 2-4. Salient features of the dance programme

During the first dance session at each school, the dance educator and children outlined five important ground rules. Appropriate management strategies such as-positive enforcement (marbles in the jar) strict warning and punishment (time-out) were decided by the teacher, according to children's age and special needs (Clark 2007). The dance educator and relief teacher would enforce these management strategies during the class teacher's absence. Activities were tailored according to the density of the class (usually 25 children per class) and location (either classroom or hall). Children's creative movements were enthusiastically praised, thus providing a sense of autonomy, ownership, critiquing ability and pride (Bradley and Szegda 2012; Contant 2015; Dow 2010; Richard 2013).

Children's active participation in the dance programme played a pivotal role in this research. Their written reflections helped to explore the children's perceptions of these activities and determined its applicability to the subsequent sessions. Teachers played a vital role in the enquiry towards these activities, either before, during or after the dance sessions. For example, Teacher Four prompted children's journal writing through questions like "How were the first three dance sessions? What did you enjoy the most?" Also, regular discussions and timely feedback from teachers ensured that the dance sessions were effective for all children.

The dance educator kept the children engaged during the dance activities and teachers applied the activities in their classroom teaching. This ensured that both teachers and children remained in touch with the activities in between dance sessions. For example, Teacher Two generated enquiry towards the Bar Graph activity by first explaining the requirement and use of a bar graph in the classroom. Children then plotted their hip-hop slides in a bar graph, which had been physically represented and measured in a dance session. Later, the entire class represented the plotted bar graph of a single child and were asked to reflect upon the activity through See Saw. This is represented in Figure 2-5.

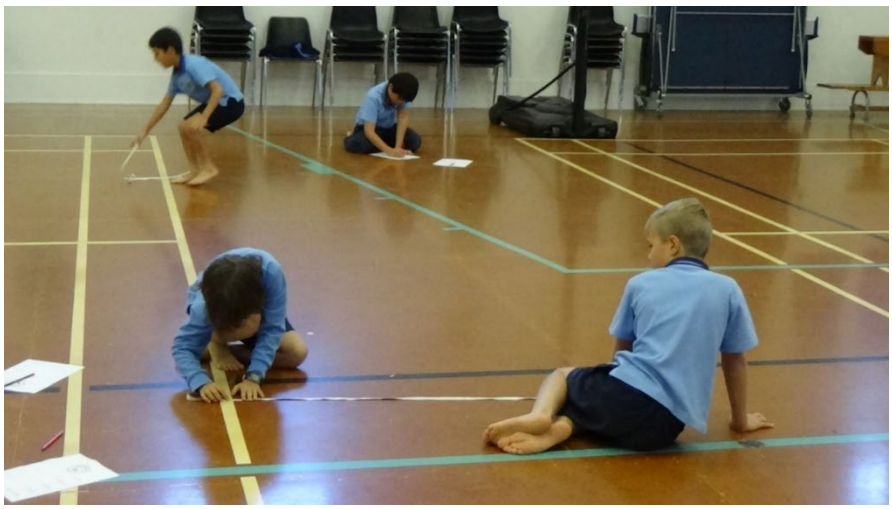


Figure 2-5. Children measuring their partners' hip-hop slide, which was later plotted in a bar graph

All four DG teachers appreciated the collaborative nature of the dance programme and felt "it served as professional learning and development" (Teacher Three interview, 29 Sep 2017).

> *I think it was a real strength that you [primary author] and Jane [dance educator] worked with me. You didn't come in and say 'these are what the sessions are going to look like'. It was more of how it can back up what I was doing in the classroom….(Teacher Four interview, 11 Dec 2017)*

A weekly update on the activities and observed learning outcomes was e-mailed to the DG teacher. Frequent meetings between the teacher, dance educator and primary author enabled continuous refinement of the dance programme. Dance sessions were video-recorded, appropriate documentation were taken; copies of videos and photographs were handed over to the DG teacher at the end of the dance intervention. This not only served as a source of reference but also as a means of enquiry, reflection and rich source of data (Richard 2013).

Feasibility and logistics associated with the dance programme

Prior planning of activities ensured that the dance sessions could be conducted either in the school hall or in a classroom. Each dance session lasted 45 minutes, three times per week for a period of six weeks. Hence, each DG class was exposed to a total of 18 dance sessions. If the DG teacher was on leave or had other teaching duties, a relief teacher would be appointed by the school to assist managing the children (see Figure 2-6). In

School Two, the participating DG teacher was away for many sessions, and the relief teacher played a prominent role in facilitating the dance programme. Although the teacher took primary responsibility for behaviour management and discipline, the dance educator also utilised a few activities that yielded positive reinforcement to keep the children engaged and motivated.

Figure 2-6. Relief teacher from School Two assisted in dividing the children into rows and columns

The first few dance sessions in every school started with the Name Game activity. In this activity DG children, class teacher, dance educator and primary author stood in a circle and consecutively said their names accompanied by a movement. Others mirrored him or her. This activity served as a means of introducing the children to the dance educator and primary author, while also providing their first choice of creative movement.

Dance Detective was a “popular” and “fun” activity used frequently throughout the dance programme, either for warm-up or cool-down (Teacher Four interview, 11 Dec 2017). A leader silently led various movements amongst the circle of dancers, while the detective- unaware of what the leader was doing- had three chances to identify the leader of movements. The DG class teacher decided the leader and detective as a means of reinforcing positive behaviour. She also chose the theme of creative movement such as animal movements (e.g. frog jump), high movements (e.g. waving arms on tiptoe) or robotic movements (e.g. stiff movement of limbs and trunk) for each round. Table 2-1 provides an overview of the activities common and different to each school. Activities were transferred and applied to subsequent schools, according to nature of participants, term focus and time.

<table>
<tr><th>School One

Oct-Dec 2016</th><th>School Two

May-July 2017</th><th>School Three

July-Sep 2017</th><th>School Four

Oct-Dec 2017</th></tr>
<tr><td colspan="4">Name Game</td></tr>
<tr><td colspan="4">Letter construction and name solos</td></tr>
<tr><td colspan="4">Travelling</td></tr>
<tr><td>States of Matter (morph)</td><td>Kenwood says</td><td>States of Matter (Morph)</td><td>Prefix Game</td></tr>
<tr><td>Representation of geometrical shapes</td><td colspan="3">Dance detective</td></tr>
<tr><td rowspan="5">Prefix Game</td><td>Vertebrates activity</td><td>Maui and the Sun; Battle of the Mountains</td><td>Plant Life Cycle</td></tr>
<tr><td>Frog life cycle</td><td colspan="2">Canon and Unison for multiplication and division</td></tr>
<tr><td>Measurement activity</td><td colspan="2">Place value activity</td></tr>
<tr><td>Butterfly life cycle</td><td colspan="2">Hello!</td></tr>
<tr><td>Seven sisters of Matariki</td><td>Clockwise and anti-clockwise</td><td>Festivals across the world</td></tr>
</table>

Table 2-1. Activities covered in the dance programme

The venue of a dance session played an important role in deciding the activities to be covered. At Schools Two and Three, due to unavailability of school hall, six sessions took place in the classroom. Activities such as Frog and Butterfly Life Cycle, a series of creative movements depicting life cycles of a frog and butterfly; Letter Construction, representing letters through body movements; Kenwood Says, choreographic representation of a rabbit's lifestyle and habitat were covered in the classroom. The restricted space was not a hindrance to the dance programme, but further ignited children's creativity. For example, a boy from School Two utilised the camera tripod to represent his "burrow" from Kenwood Says. Another example is represented in Figure 2-7.

Figure 2-7**.** Children utilising their sweaters as props to represent the cocoon stage of a Butterfly Life Cycle

The DG teachers started integrating dance and creative movement into their teaching practice and found the activities transferrable to other spheres of their teaching. For example, Teacher One used Name Solos as an eye break (brief five minute interval from desk-based school work); Teacher Two further developed the Vertebrates activity, by asking children to create a representation of their favourite animal; Teacher Three incorporated mathematical concepts into her art lessons. They were all keen to start their own activities keeping the taught dance activities as a template. For example, Teacher Three planned an activity to represent flow of electricity using The Life Cycle activity template. The dance sessions were video recorded, photographs were snapped and weekly outline of the activities were documented; all were shared with the DG teacher. These provided a reference which could be further improvised to align with their respective teaching styles and curriculum objectives.

Children's energy and curiosity were plainly evident throughout the dance programme. For example, during the States of Matter activity (a choreographic piece representing the various states of matter) a boy from School One imagined and demonstrated plasma in front of the entire class. Another example from School Three is represented in Figure 2-8.

Figure 2-8. Children representing "gas" state where particles are in high energy

Transferability to other NZ schools

Prior to the dance programme, DG teachers had very little or no training in dance education. Their involvement before, through planning and preparation; during, through participation; and after the dance programme through regular debriefs and interviews provided them a holistic understanding of what a curriculum integrated dance session could look like.

> *I wish dance education was like that [the dance programme] across the board rather than a teacher that just takes 'dance' or I guess like anything that they go out for with our specialist teachers and it was really integrated into my classroom programme and vice-versa… I changed my programme to suit where we were going with dance as well (Teacher Four interview, 11 Dec 2017)*

This is similar to another NZ study, where teachers preferred someone with whom they could work, learn and discuss their programmes as opposed to outsourcing it to an expert in dance (Snook and Buck 2014). The authors raised the concern of generalist teachers perceiving artists as "cut above" meaning slightly higher up in the dance teaching hierarchy (Snook and Buck 2014, p.22). The authors recommend for "dance education artists to be employed within schools" (Snook and Buck 2014, p.25). While this may seem feasible from a short-term perspective, long-term sustainability is a concern.. Teachers may rely on dance educators, as opposed to being in control themselves. This could in turn, limit dance being taught during specific timings only, as opposed to being

an integral part of the teacher's practice. The hierarchical model will therefore continue; and teachers will continue to take a back-seat. Also, funding is a major challenge particularly for teaching arts in NZ primary schools (Beals et al. 2003; Snook 2012b). Hence, employing a dance education artist within a school may not be economically feasible.

However, a non-hierarchical, peer-mentored and curriculum-oriented approach (similar to this study) could be a more effective means of achieving a more sustainable model towards dance integration in primary classrooms. Since long-term funding of a dance education expert across all schools poses a possible barrier, short-term hiring for teachers' PLD could be considered instead. Ongoing discussion with other teachers and peer support should constitute an integral component during and beyond the PLD. If school funding permits, the dance educator could facilitate a follow-up session.

In this project, the hiring of a dance educator had multiple benefits. Primarily, she acted as a catalyst and ignited dance embedded learning in the four participating schools. Secondly, her involvement with the participating DG class teacher prior, during and after the dance sessions acted as PLD for the teacher. Finally the hiring of a dance educator provided teachers with the opportunity to reflect on their teaching methods, observe the children, evaluate their learning and apply the activities into their teaching practice.

> *… it's just the team building sort of thing and having a bit of fun… working with them and being one of them was quite good. They could have a bit of fun with me rather than me just being the teacher (Teacher One interview 15 Dec 2016)*

In NZ primary schools, children's learning is assessed holistically and not just through report cards. The school assembly was one such platform where children demonstrated their learning and were assessed by their teacher. Besides, it also provided a platform for DG teachers to demonstrate the children's learning from the dance programme to the entire staff and parents. Teacher Four added:

> *For the teachers it showcased that dance doesn't have to be traditional dancing, that it can be just movement to a piece of music that is related to a piece of our learning as well (Teacher Four interview, 11 Dec 2017)*

Proactive participation, timely feedback and input of innovative ideas from the teachers played a prominent role in the dance programme. This lies in similarity to a previous NZ-based study where the author observed the teachers found "…strategies in constructivist teaching approaches, past experiences, school relationships and resources to teach dance" (Renner 2015, p.160). In the absence of the dance educator, the teachers and primary author worked together to deliver some of the dance sessions. Arguably, a similar dance module could be utilised and integrated into other NZ schools.

Challenges and limitations of the dance programme

Limited time to plan and execute the dance programme was a major challenge for the DG class teacher and dance educator. Fitting a six-week dance intervention into a nine-week school term proved challenging, particularly when the dance educator had to plan a dance programme specific to the curricular and thematic variations of different schools and terms. On several occasions, the dance sessions barely lasted 20 minutes because of other school activities and confusion in hall bookings. Understanding and applying school subjects into dance-embedded activities in only six weeks was a major challenge for the dance educator, especially in Schools One and Two. Catering to children's learning styles and their behavioural issues were major challenges, as was the need to keep them constantly engaged and attentive.

A NZ primary school teacher with curricular teaching expertise, effective child management strategies and a well-planned framework may not necessarily experience similar challenges. An effective peer support system however, may place teachers in a better position to understand and respond to these challenges.

The dance programme took place in only four primary schools in Auckland. These schools were of Decile 10 ranking and were restricted to the North Shore region of Auckland, usually comprising of children from upper socio-economic background. Development, delivery and transferability of a dance embedded curriculum across lower deciles, varied socio-economic backgrounds and regions could be the focus for another study. Finally, the present study was an observation of the delivery of a short-term dance programme. The long-term impact and feasibility of a dance programme in NZ primary schools requires further research.

Recommendations

Lack of government funding is a major hindrance towards embedding dance and creative movement into primary school teaching (Snook 2014; O'Brien, P, personal communication, Oct 10, 2019). Similar to the DLWC, fresh video resources would need to be filmed, bearing in mind the current academic focus of NZ primary educators. Reprinting and redistribution of the DLWC may also be considered, as currently this resource is not easily accessible for most primary educators (O'Brien, P, personal communication, Oct 10, 2019).

For a dance-embedded curriculum to be successful across NZ primary schools, teachers require constant support and professional development, without which they may fall back into their old teaching styles (Snook 2012a; Buck 2003). While Snook recommends employing a dance artist in schools to aid the integration of dance into curricular teaching, this may not necessarily provide generalist teachers with either the skills or confidence to embed creative movement into their teaching (Snook and Buck 2014). Potentially, this could lead to a programme where dance artists take most of the responsibility for dance-embedded learning, as opposed to a model where teachers take ownership.

The current study demonstrates that hiring a dance educator to collaborate with primary teachers can be an effective form of PLD. We recommend the brief hiring of a dance educator to collaborate with teachers, create a curriculum-embedded dance programme, provide training and later offer ongoing consultation when required. This has the potential to germinate a sustainable teaching model, where trained teachers share their experiences with their respective colleagues by co-teaching or by inviting other teachers to observe their class. In the current study relief teachers were appointed to cover the absence of DG teachers, providing them with exposure to the dance programme as well.

Teachers are likely to mirror their training and personal experiences in their teaching styles (Snook and Buck 2014). Hence, teacher training courses play a crucial role in shaping effective teaching practice. Exposure to dance education should be cultivated in teachers' pre-service training and early careers. Embedding dance education as an integral part of teacher training courses could be proposed as an effective way to ensure that student teachers perceive dance as an essential part of their practice, rather than an optional art form. Although teacher training courses may provide exposure to dance education and application, they are not uniform throughout NZ. Teacher training

courses may allocate designated hours to dance education, practice and assessment. After the course, student teachers then integrate their learnt experiences, develop their own teaching style and inject creativity into teaching practice.

University students majoring in dance at undergraduate or postgraduate levels, could be encouraged to apply their studies through placements at primary schools as part of their course requirements. Students with an interest or experience in dance education may also be given the opportunity. They may be asked to collaborate with a class teacher, co-create and co-teach a dance curriculum aligned with their term focus. A previous research incorporating a similar model demonstrated the benefits such a collaboration offered to the involved teachers and students (E. McPherson 2014).

Further research needs to be conducted in order to understand the feasibility of a dance programme across a range of school deciles throughout New Zealand. It would also be worth investigating how a diverse sample of DG teachers implement the dance sessions into their teaching practice over a long term.

Concluding remarks

This research was conducted to test the delivery and feasibility of a curriculum-integrated dance programme across four Auckland primary schools. The dance programme was well-received and encouraged by the schools as it aligned well with their respective school charters and overall school philosophy. Four teachers at their respective primary schools, collaborated with a dance educator to create a dance programme that was learning-oriented, feasible, malleable and highly engaging for the children. They worked off each other's strengths using the teachers' expertise in subject-learning and the dance educator's expertise in creative movement and choreography. Teachers were proactive, reflective and innovative in transferring the dance activities into their teaching practice. Their dedication, sense of ownership and involvement facilitated the dance programme across all four schools.

Despite the limitations of such a small sample size, time constraints and school decile, this research provided an overview of the applicability and transferability of a curriculum-integrated dance programme in NZ primary schools. This dance programme provided a unique opportunity for teachers and students to understand the applicability of dance and creative movement in their subject learning. The collaborative, triangular

mentorship model used in this research is also a contribution to literature and practice both in NZ and overseas. The evaluation procedures of the dance programme are discussed in the next studies of this thesis.

Chapter 3 **: Impact of a curriculum-integrated dance program on literacy and numeracy: A mixed-methods study on primary school children**

Preface

Numerous studies have suggested the benefits of embedding movement into primary school teaching, particularly for improving their academic performance. As an embodied learning experience for children, dance may leave a deeper understanding of their learning and enable better retention. Previous intervention studies devised and evaluated an intervention specifically towards a single learning (such as electricity, geometry or English learning) and found significant effects. With international evidence suggesting that NZ children need to improve reading levels in comparison to other countries, it was pivotal to devise and investigate a learning intervention which may benefit them. As such, chapter three was designed to evaluate the curriculum-integrated dance programme (mentioned in chapter two) on children's literacy and numeracy. The novelty behind this study's evaluation lay in the triangulation of quantitative and qualitative measures: academic performance questionnaires for reading and mathematics, children's journal writing and children's focus group interview. Moreover, it is unknown whether a dance programme covering a range of learning areas and dance-based activities may significantly impact primary schoolchildren's literacy and numeracy. The findings from this study are likely to be of value to NZ primary educators, special educators and dance educators. This chapter is currently under peer review in the *Journal of Dance Education*.

Abstract

This study evaluated the changes in literacy and numeracy levels on schoolchildren across four New Zealand primary schools. A total of 187 schoolchildren aged 8-9 years were assigned to either a dance group (n = 101) or control group (n = 86). The dance group (DG) from each school participated in a six-week, curriculum-integrated dance program with their teacher during school time. Mathematics and reading aptitude were evaluated at baseline and post-intervention timepoints using standardized questionnaires. DG participants shared their perceptions of the dance program through journal reflections and focus group interviews. Intervention effects were assessed using generalised linear models, and children's perceptions of the program were thematically analysed. The intervention had positive effects on reading for children with special needs and those of Asian descent. Children's reflections suggest that the dance program may have deepened their understanding of mathematics and enhanced their English vocabulary and comprehension.

Background

Participation in dance has various physical, academic, neurocognitive, behavioural, social, and wellbeing benefits for children (Peterson 2011; Sivvas et al. 2015; Sousa 2013; Bachrach et al. 2016). Studies have shown that when embedded into teaching, dance can enhance the learning of curricular subjects such as mathematics, English (as language arts) and science (Simpson Steele et al. 2016; Christa Mulker Greenfader and Liane Brouillette 2017; Dow 2010). Moreover, it has been suggested that dance-embedded learning can sustain children's interest towards curricular learning, and they may develop skills to apply dance and creative movement beyond the duration of the teaching sessions (Simpson Steele et al. 2016). Social skills, which are essential to a child's holistic development, may also be enhanced (Moore and Linder 2012; Simpson Steele et al. 2016). For instance, Moore and Linder's (2012) study involved the integration of dance and creative movement into geometry lessons. Children demonstrated their learning through a dance performance in groups and it was observed that the children developed co-operative skills, peer support and critiqued their peers' performances (Moore and Linder 2012). Another study showed that embedding dance into specific topics, such as electricity generation, sustained children's interest during and beyond the lessons

(Simpson Steele et al. 2016).Despite these potential benefits, many primary schoolchildren do not experience dance-embedded learning. A primary reason is teachers' perception of their lack of training in dance education as a major hindrance (D. E. Russell-Bowie 2013).

A curriculum-integrated dance programme is a series of dance sessions, encompassing various curricular activities using the principles of dance education and creative movement (Sharma et al. 2020). Curriculum-integrated dance programmes may be an effective means of introducing dance and creative movement to primary schoolchildren while also serving as professional learning development (PLD) for teachers (Moore and Linder 2012; E. McPherson 2014; C. M. Greenfader and L. Brouillette 2017). A curriculum-embedded, non-hierarchical model involving the collaboration of dance educators has helped teachers gain confidence to independently embed dance and creative movement into their teaching practice (Moore and Linder 2012; E. McPherson 2014; C. M. Greenfader and L. Brouillette 2017). The Teaching Artist Programme (TAP) in California (USA) was one such programme which was designed to serve as PLD for teachers and evaluate English scores of young English learners (Greenfader and Brouillette 2013; C. M. Greenfader and L. Brouillette 2017; Greenfader et al. 2015). Evaluation results showed that children who participated in TAP significantly outperformed control group participants in English speaking and listening tests (Christa Mulker Greenfader and Liane Brouillette 2017; Greenfader et al. 2015). Teachers also observed that English learners were actively engaged in classroom activities and were more confident in their English-speaking abilities (Greenfader and Brouillette 2013). Similarly, the Basic Reading Through Dance Programme (BRD) evaluated a dance-embedded learning intervention across six primary schools in Chicago, with children hailing from African American families and lower socioeconomic backgrounds (McMahon et al. 2003). Pre-post test results revealed that children who participated in the programme outperformed their peers (control group) in consonant sound recognition, vowel recognition and phoneme segmentation as evaluated through the PhonoGraphix assessment test (McMahon et al. 2003).

Other USA arts-embedded leaning programmes such as The Visual and Performing Arts programme at San Diego schools (VAPA) and Opening Minds through the Arts (OMA) programme at Tucson Unified School District also showed the benefits of dance-based learning towards curricular subjects (Chand O'Neal 2014; Isenberg et al. 2009; OMA Design Team Members et al. 2012). These programmes have occurred in the

United States; with limited studies evaluating curriculum-integrated dance programmes for New Zealand primary schoolchildren.

A New Zealand -based evaluation conducted nearly 16 years ago, revealed that an arts-based PLD for primary school teachers positively impacted their practice and enhanced children's learning (Beals et al. 2003). However, this evaluation did not include children as participants and it is unknown whether arts-based learning, or more specifically dance-based learning, may benefit children's curricular learning. New Zealand dance education studies have explored the perceptions of primary teachers and have found that teachers feel inadequate and underconfident to embed dance and creative movement into their teaching practice (Ashley 2010; Snook 2012b; Buck 2003). Studies have also shed light on New Zealand primary schoolchildren's perceptions on health and fitness, but their voices and reflections on dance-based learning are unknown (Atkins 2015; Powell and Fitzpatrick 2015).

With this background, the aims of the present study were to (1) determine changes in literacy and numeracy levels from a curriculum-integrated dance program in New Zealand primary school children, (2) compare the effects of the program within gender, ethnicity and special needs groups, and (3) explore children's perceptions of embedding literacy and numeracy in a curriculum-integrated dance programme.

Methods

This study was conducted between October 2016 and December 2017. The Auckland University of Technology Ethics Committee (AUTEC) approved the research in September 2016 (application number 16/303). Owing to research logistics, a total of ten primary schools in the North Shore region of Auckland were contacted to request for participation. All schools belonged to decile 10 position. In New Zealand, a school decile refers to the socio-economic population of its students; a high decile may indicate that children hail from a higher socio-economic background in comparison to lower school deciles (New Zealand Ministry of Education, 2017).

Of the ten primary schools contacted, four primary schools and eight teachers (two teachers per school) agreed to participate in the study. As means of PLD, the teachers decided who would take part in the dance programme with their class children. Two classes from each school participated in the study: (1) DG class (dance group): children

participating in the dance programme; and (2) CG class (control group): children not participating in dance programme. A total of four DG and four CG classes participated in the study.

Study details were explained to the children, who were then given time to ask questions about the study. Written informed assent and consent were obtained from children, parents and teachers. Children with both parental consent and assent forms took part in the study.

A dance educator was hired to deliver the dance programme across all four schools. Prior to commencement of the dance programme in each school, detailed discussion concerning the delivery and logistics of the dance sessions took place between the dance educator, DG teacher and researcher. The dance sessions took place within the school time and were aligned with the teachers' schedule. The topics covered in the dance programme were in tandem to each teacher's school term focus. Regular debriefs and active communication between dance educator and teacher ensured the dance programme was tailored to the learning needs of the children. Each DG class participated in 18 dance sessions over a period of six weeks. DG teachers got the opportunity to gradually embed and transfer these dance activities into their teaching practice. Photos and videos were taken during the dance programme and have been used in this study with prior consent. Details pertaining to the delivery of the dance programme and its applicability to New Zealand primary schools have been discussed in the previous chapter of this thesis.

Children from various ethnic backgrounds and learning abilities participated in the dance programme. Participant demographics at baseline have been tabulated in Table 3-1. In the present study children belonging to Māori and Pasifika ethnic backgrounds were categorized into "Māori/ Pasifika" group; (e.g., India, China, Sri Lanka) were categorized as "Asians"; and children with European ethnicity (e.g., New Zealand, Australian, British) were categorized as "Europeans". Children from an ESOL background, with cognitive impairments (such as autism or ADHD) and/or speech difficulties (e.g., Tourette's) were considered as "special needs". This grouping was due to the low sample size of children from each category.

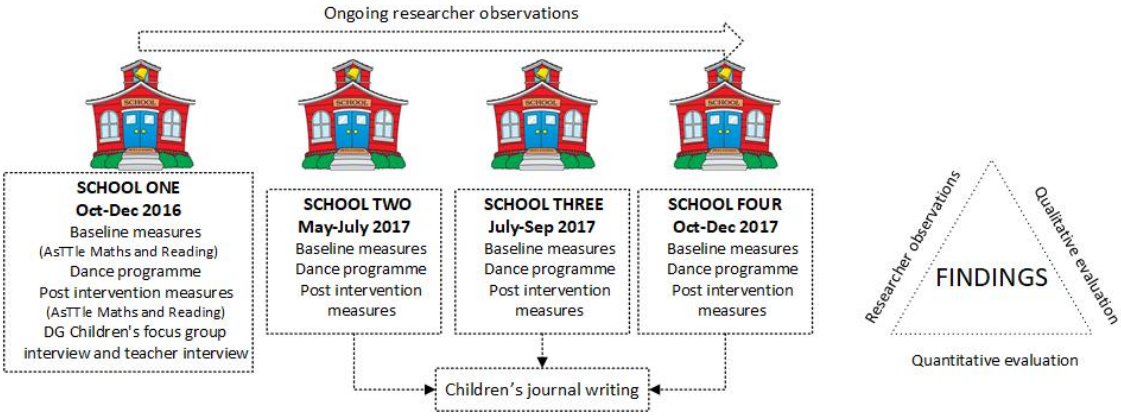


Figure 3-1. Pictorial representation of study design

Evaluation procedures

The novelty of this study lies in the utilisation of a mixed methods experimental design to assess children's academic performance, wherein data was collected before, during and after the dance program. Studies have evaluated changes in a dance-embedded learning program separately through quantitative (interpreting the before and after effect) and qualitative methods (interpreting the mechanism of the effect) (Hanna, 2008; Greenfader, et al. 2013, 2015, 2017).

Quantitative evaluation

Children from both DG and CG were evaluated on academic, behavioural, physical, and wellbeing outcomes at baseline and post-intervention timepoints. The current study focuses on the academic outcomes of the dance programme. Figure 3-1 represents the quantitative and qualitative evaluation procedures used in this study.

Children's academic performance was evaluated using the Assessment Tools for Teaching and Learning (AsTTle) questionnaire. The e-AsTTle online assessment tool was developed in New Zealand to assess students' achievement and progress in reading,

writing and mathematics in English and Te Reo Māori medium[3] (Hattie et al. 2003). A previous New Zealand study also used AsTTle to assess academic performance of primary schoolchildren (A. McPherson et al. 2018).

Mathematics and reading questions from the e-AsTTle were printed and handed out to the participating children. Different set of questions were given at baseline and post-intervention in order to avoid familiarity. Children were assessed in the morning at a time convenient to the class teacher. To avoid fatigue, mathematics and reading questionnaires were handed out on different days. Children were familiar with the e-AsTTle and the evaluation procedure was straightforward to administer. Although there was no time limit, children were asked to answer the questions promptly.

Qualitative evaluation

The current study involved three qualitative evaluation procedures: (1) DG children's journal writing; (2) DG children's focus group interviews and (3) DG teacher interviews. Children's journal reflections provided breadth; while children's focus group interviews and teacher interviews provided depth surrounding children's learning that occurred from the dance programme (Leigh 2012; Moore and Linder 2012; Simpson Steele et al. 2016).

Throughout the duration of the dance programme, DG children expressed reflections upon their learning through journal writing, with prompt questions from the DG teacher. For example, "what have you learnt from the dance sessions so far?" and "which other subjects can you learn from dance?". Journaling also included physical reflections (e.g., video of a child representing her favorite animal) and pictorial reflections (refer to Figure 8). These reflections were uploaded either through *Seesaw*[4] or Google

[3] Te Re Māori is one of the three official languages of New Zealand
[4] *Seesaw* is an online platform where children upload their reflections and share their learning with peers, teachers and parents.

Docs. Journal writing was included in the study after the data collection in School One. Children's journal reflections from Schools Two, Three and Four are part of the study.

Following the dance programme in each school, five children from each DG class were chosen to participate in a semi-structured focus group interview. A diverse cohort was chosen by the participating DG class and would usually include two girls, two boys and at least one child with special needs. For example, while one of the focus group interviewees from School Two had behavioural issues, another interviewee from School Four had Tourette's syndrome. These differences reflected the applicability of the dance programme for various children. During the focus group interview, children further expressed their perceptions of the dance programme through drawings and creative movements. The focus group interviews lasted 35-40 minutes and occurred at a time suiting the children's classroom schedule. As the content of the dance programme varied across the four schools, the focus group questions slightly varied across schools as well. However, the foci of the questions remained constant as the primary researcher had a general template of open-ended questions, which guided the interview.

DG teachers were individually interviewed to gather their perceptions around children's learning and to understand their experiences during the dance programme. These semi-structured interviews lasted between 40-50 minutes and questions varied slightly across all four teacher interviews. This study shall include teacher reflections on their children's learning. Other reflections, such as the impact of the dance programme on their PLD and the applicability to their teaching practice were discussed in the previous chapter.

Analysis

Quantitative analysis

Prior to conducting the study, power analysis was calculated using G*software. An ANCOVA model was conducted using three independent variables- age, gender, and baseline- amongst two groups – dance and control. Keeping a significance level (α) of 0.05, power of 0.8 (standard), effect size (f) of 0.25, a total sample size of 128 was indicated, with 64 participants in each group. With an anticipated participant drop-out rate of nearly 15%, the required sample size was 200 participants. As such, four primary schools were required to participate in the study, with an average of 25 children per class.

Baseline characteristics of the sample were calculated and presented as mean ± standard deviation for continuous variables, and n (%) for categorical variables. Independent-sample t-tests and chi-square tests were conducted to compare the characteristics of the DG and CG participants at baseline. To analyse mathematics and reading scores at post-intervention, generalised linear model with a normal distribution and identity link function was fixed to examine the effect of the intervention while adjusting for the corresponding baseline value and age. Estimated means and pairwise contrasts were then estimated for the treatment group (DG-CG), gender, ethnicity, and special need status, with multiple comparisons adjusted using the Bonferroni correction. An alpha of 0.05 was implemented, and all analyses were conducted in IBM SPSS Statistics v23 (IBM Cooperation, USA).

Qualitative analysis

Children's focus group interviews and teacher interviews were digitally audio-recorded and transcribed. Children's journal writing from Schools Two, Three and Four were collated into a common document. Data from children's focus group interviews and journal writings were meticulously read, coded into themes and later refined into sub-themes (Braun and Clarke 2006). A total of six themes were identified, out of which two will be discussed in the current study.

This study falls under the Concurrent mixed methods research design (QUAN+ qual) wherein the quantitative data influenced the discussion of qualitative findings (Morse 1991). This pragmatic approach of triangulation was envisaged to corroborate with the quantitative findings, providing a more well-rounded understanding on the impact of the program depth and breadth to the overall findings (Onwuegbuzie and Leech 2005). While the quantitative findings are posited to show significant differences in literacy and numeracy, the qualitative findings explore the mechanisms involved in this change.

Results

Quantitative results

T-test results revealed there were no differences in the mathematics or reading scores at baseline. However, there were significant differences; children from the CG had a higher

age (p=0.044). Chi-square test revealed a higher proportion of European participants and a lower proportion of Māori/Pasifika and Asian participants in the CG. There were no differences in the other two independent variables—gender and special needs. Preliminary results are tabulated in Table 3-1.

Table 3-1. Participant characteristics and AsTTLe scores at baseline

	DG (n=101)	**CG (n =86)**	**p**
Age	8.63 ± 0.44	8.77 ± 0.5	**0.044***
Gender			
Male	n=47 (47%)	n=42 (49%)	0.75
Female	n=54 (54%)	n=44 (51%)	
Ethnicity			
European	n=44 (44%)	n=55 (64%)	
Asian	n=38 (38%)	n=28 (33%)	**0.001***
Māori/Pasifika/others	n=19 (19%)	n=3 (4%)	
Special needs			
Special Needs	n=18 (18%)	n=12 (14%)	0.473
Non-special needs	n=83 (82%)	n=74 (86%)	
Mathematics scores	78% ± 20%	80% ± 18%	0.509
Reading scores	74% ± 20%	77% ± 21%	0.339

Data presented as mean ± SD or n (%). P value from independent samples t-test or chi-square test where appropriate; *indicate $p < 0.05$

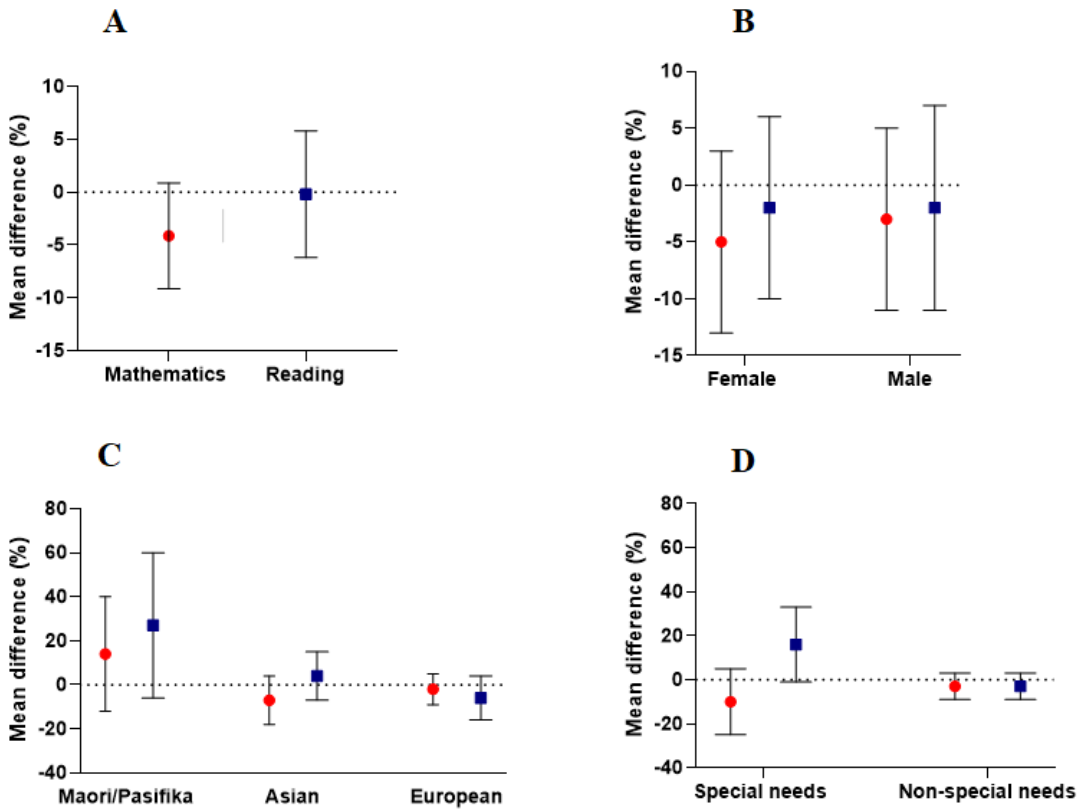
Table 3-2. Intervention effects on AsTTle scores after adjustment for baseline values and age

	B	95% CI Lower	95% CI Upper	Padj[a]		B	95% CI Lower	95% CI Upper	Padj[a]
MATHEMATICS					**READING**				
Bivariate model					**Bivariate model**				
CG	Ref				CG	Ref			
DG	-4.1	-8.8	0.5	0.081	DG	-0.2	-5.7	5.3	0.9
Multivariate models					**Multivariate models**				
Ethnicity* Treatment				0.1	Ethnicity* Treatment				**0.013***
Gender* Treatment				0.8	Gender* Treatment				0.485
Special needs* Treatment				0.2	Special needs* Treatment				**0.013***

Results obtained from generalised linear mixed models using a normal distribution and an identity link function. Bivariate model evaluated the main intervention effect after adjustment for age and baseline values. Multivariate models included interactions with ethnicity, gender, and special needs (separately) after adjustment for age and baseline values.

*P < 0.05

[a]Adjusted using sequential Bonferroni correction.



Intervention effects for AsTTle scores: (A) Overall effects for each subscale (B) effects by gender; (C) effects stratified by ethnicity; (D) effects by special needs group. Results obtained from generalised linear models using a normal distribution and identity link function.
All effects means were adjusted for age and baseline and are displayed with 95% CI.
*P < 0.05timepoint

Reading scores Mathematics scores

Figure 3-2. Mean difference (DG-CG) in AsTTle scores obtained from GLM

All GLM used in statistical analysis were adjusted for age and kept at a confidence interval of 95%. No significant intervention effects were detected for mathematics scores, although there was an inverse effect that approached significance (p=0.081), as represented in Figure 3-3. There were no significant intervention effects for gender, ethnicity or special needs, as represented in Figure 4-E. The mean difference (DG-CG) in mathematics scores was 14% greater among children of Māori/Pasifika ethnicity, but was 7% lower among children of Asian ethnicity and 2% lower among children of European ethnicity. However, this interaction effect was not significant (p=0.110).

There were no significant mean differences between DG and CG for reading scores (p=0.943). However, there was a significant interaction effect between the

intervention and ethnicity (p=0.013). The mean difference (DG-CG) in reading scores was 27% greater among children of Māori/Pasifika ethnicity and 4% greater among children of Asian ethnicity; mean difference was 4% lower among children of Pakeha ethnicity. A significant interaction effect was also observed between the intervention and special needs group (p=0.013). The mean difference (DG-CG) in reading scores was 16% higher among children with special needs; mean difference was 3% lower among children without special needs. There were no interaction effects between DG and gender in the reading scores (p=0.485), although the DG-CG mean difference was -2% for females and 2% for males.

Qualitative findings

With the dance program encompassing the learning areas outlined in the New Zealand curriculum, children's reflections resonated with these learning areas as well (New Zealand Ministry of Education 2007). This is represented in Figure 3-3. Approximately six (out of eight) learning areas- English, the arts, health and physical education, mathematics and statistics, sciences, social sciences- were observed from children's reflections. For the purpose of this study, themes pertaining to English, mathematics and statistics shall be discussed since they complement the quantitative findings pertaining to literacy and numeracy.

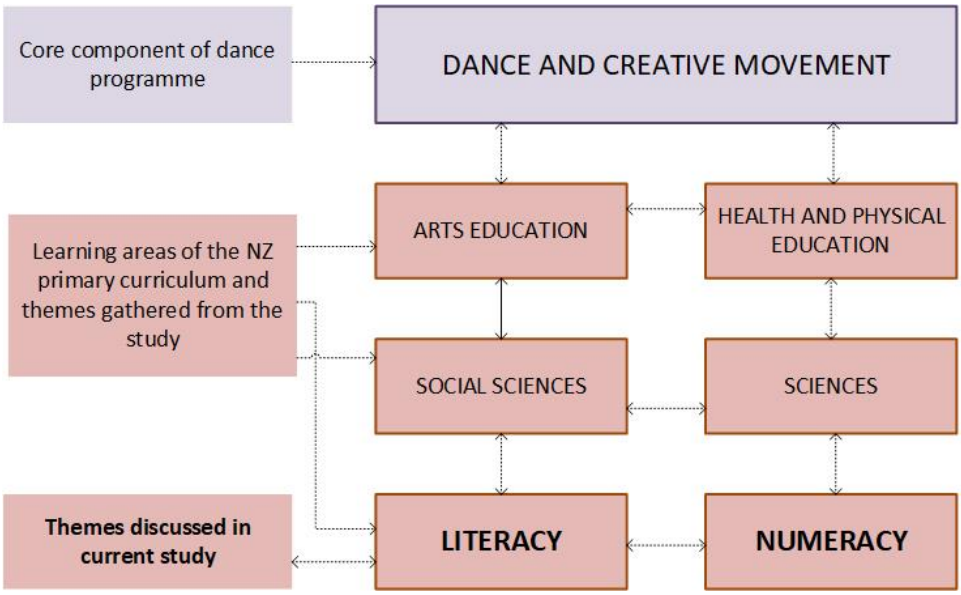


Figure 3-3. Themes from children's reflections

Prior to the start of the dance program, children had assumed that the dance program entailed genre-specific dance learning. "I just thought that we would be learning

jazz and stuff. Did not know that it would be learning" (Child A, FG, School One). However, the dance program seemed to have changed their perceptions about dance and its connection with learning. "I felt like I was in the classroom… it was like I was learning" (Child B, FG, School One). Although dance constitutes an essential component of NZ arts education, with little exposure to dance education (Author), many primary children perceive dance mainly from an aesthetic and performative viewpoint. It is likely that after participating in the "dance sessions" children recognised that their classroom learning was being applied in the dance programme.

Themes on numeracy

Mathematics formed an integral part of the dance programme across all four schools, as it constituted part of the term focus for all DG teachers. There was an overlap of dance activities, with one form of learning leading to the next. For example, in School Two, the Bar Graph activity was based on the measurements of children's hip-hop slide. Children were first divided into pairs and asked to measure their partner's jump, hop and slide. They measured their partner's hip-hop slide and their individual slides were later plotted as a class bar graph. The entire class represented the graph of a single child and this experiential learning seemed to be an enjoyable experience (refer to Figure 3-4). "The graph helped me know that we can make bar graphs out of everything!" (Child C, FG, School Two).

> *I learnt how to do a hip hop slide… my measurement of my slide was 173 cm… I enjoyed doing a human bar graph because I liked it when we all got into order. My number was 120 and the numbers went all the way up to 160. (Child D, Journal, School Two)*

Another activity related to mathematical learning was *Cannon and Unison.* This was the representation of a place value, ranging from units to thousands through a specific movement and was conducted in School Four. "…some big numbers I get mixed up with. It helped because I could actually see the number" (Child A, Journal, School Three). Children also appeared to have understood the importance of using their body as an instrument of learning.

> *Interviewer: Which activity do you think helped you learn your subjects better?*

Child: The Time Tables one because you get to use your body to be a Time Table (Child A, FG, School Four)

Figure 3-4. Lateral view of Bar Graph representation

Themes on numeracy

Name solos—representation of names through various pathways— was a commonly used activity in all schools. This activity served as a means of experiential learning of handwriting and involved solo demonstration of children's names to their peers (refer to Figure 3-5). "Dance is really fun and interesting for me especially when we tried to do the first letter of our name. I found three different ways to do it" (Child B, Journal, School Three). These dance activities improved children's vocabulary surrounding dance such as tempo and space and was particularly useful for the ESOL children, where dance program may have served as a conduit of learning. These children may have found creative movement and embedded kinesthetic learning a conduit for comprehending the activities as described in the following conversation with an ESOL child.

Interviewer: "Which activity do you think helped you learn your subjects better?

Child: I think… everything? I love playing Name Game and Dance Detective because in Dance Detective we can copy the movements of the person and the Detective has to think and the brain can work so that's good. In Name Game, we can learn people's names and we can learn the dance and have fun. (Child E, FG School Two)

Figure 3-5. Name solos activity

Although English is the language of instruction across many NZ primary schools[5], Māori vocabulary is embedded to a certain extent as one means of respecting and embracing Māori culture. Another means of preserving Māori culture is by passing on stories of Māori legends to children (through English narrative). In the current study,

[5] There are a few primary schools in NZ taught entirely in Māori, but few in comparison to English.

legends such as *Maui and the Sun, Seven Sisters of Matariki* and *The Battle of the Mountains* were taught by engaging children in dance and creative movement. Kinesthetically representing these legends appeared to have provided a holistic and deeper learning experience for the children. Children were able to comprehend the message of the stories and "make extensions of how they (the stories) could've ended" (Teacher, I3). Given that creative writing forms a part of literacy in many primary schools, this finding suggests that dance may enable creative thinking and reflection among children. Since literacy involves a combination of reading, comprehending and repacking ideas it is likely that dance acted as a medium of reliving the characters.

> *In dance class retelling The Seven Sisters of Matariki helped me because when I wrote my Matariki myth it gave an idea of characters and setting.* (Child C, Journal, School Three)

There were, however, some children who did not perceive dance as a legitimate form of learning. Four children expressed their preference for classroom-based learning during focus group interviews. "Because through dance you cannot learn much... at school you learn science and maths…" (Child D, FG, School Two). It is possible that these children were more inclined towards visual, auditory, reading/writing forms of learning than kinesthetic learning (Fleming and Mills 1992). It is also possible that these perceptions originated from a deep-seated understanding that learning certain subjects (such as mathematics) occur only in the classroom.

In summary, the qualitative findings from this study suggest that there may have been a deeper impact of the dance program on children's literacy and numeracy abilities. These findings suggest that dance can be an effective mode of learning, irrespective of gender, special learning needs or ethnicity.

Discussion

The current study evaluated changes in literary and numeracy from a curriculum-integrated dance program among four primary schools in Auckland, New Zealand. The novelty of this study lies in the utilisation of a mixed methods approach, which was posited to provide comprehensive understanding of changes in literacy and numeracy from a dance program. The three main findings from this study were: (1) The dance program did not have a significant impact overall on the mathematics or reading scores

of the DG participants as measured through the AsTTle questionnaires; (2) Interaction effects were seen between reading scores and two of the independent variables—ethnicity and special needs; and (3) Children's reflections suggest dance had a deeper impact on their knowledge on literacy and numeracy.

At post-intervention, the mean difference (DG-CG) was 4.1% lower in mathematics and 0.21% lower in reading scores. However, these differences were statistically insignificant with a large margin of errors. Previous studies from the US primary school context mirror these results (Greenfader et al. 2015; Werner 2001). Although the TAP showed significant improvement in English test scores among young English learners, there was not much improvement among native speakers (Greenfader et al. 2015). The dance program from the current study showed no significant improvement in mathematics test scores of DG participants and adds to the few studies evaluating dance-embedded learning on mathematics scores (Werner 2001). Since dance has the potential to cater to various learners, it is likely that the curriculum-integrated dance program impacted other curricular subjects; however, this assumption could not be quantifiably assessed in the current study.

There appeared to be a significant interaction effect between the reading scores and ethnicity. Upon further investigation, it was found that these effects were mainly found among Asian and Māori/ Pasifika sub-group. While there appeared to be a 4% difference among Asian ethnic group there was a 27% difference in Māori/ Pasifika sub-group. These findings corraborate with literature suggesting that movement-based learning may be particulalry advantageous to certain population sub-groups (Catterall et al. 2012). However, the interaction effect among the Māori/ Pasifika sub-group would need to be interpreted with caution given that there were significant demographic dfferences for this sub-group at baseline (Table 1). An international report collating and comparing data across 29 countries, found New Zealand primary children to have the second widest reading gap after Malta (UNICEF Office of Research 2018). With Māori and Pasifika students constituting the second largest ethnic group (Children's Commissioner 2020) and showing lower academic achievement in comparison to the national average (May et al. 2019), the findings from this study suggest that research is warranted in order to gather further emeperical evidence on the possiblity of dance as a tool for increasing academic achievemnt among the Māori/ Pasifika ethinc group. As such, this maybe another research trajectory from the curent study (Mackley-Crump 2011).

The dance program may have benefitted the reading scores of children with special needs, as there appeared to be a 16% difference at post-intervention. This finding makes novel contribution to the area of Dance Education, since it contributes to our understanding on the effects of a dance-based learning intervention on children with special needs in a primary school. As separate studies, dance has been beneficial for primary school children as form of psychotherapy and form of learning (Greenfader and Brouillette 2013, 2015; McMahon et al 2003; Erfer and Ziv 2006). The current study corroborates with research on both therapeutic and pedagogical effects of dance and suggests that in the primary school context, dance may cater to children's varying needs (Greenfader and Brouillette 2013, 2015; McMahon et al 2003; Erfer and Ziv 2006) For English learners, dance may have acted as an effective tool of communication benefitting their learning outcomes both quantitatively and qualitatively (Greenfader and Brouillette 2013, 2015; McMahon et al 2003). This finding is highly applicable for ESOL teachers and New Zealand primary educators with non-native English speakers in their classes (Pinter 1999). In the international context, this finding adds to numerous studies suggesting dance is a language entailing non-verbal communication in children (Richard 2013; Adams 2016; Williams 1992).

Although the quantitative data from the current study suggests that the dance program may have significantly effected only the reading scores of children belonging to Asian descent, qualitative data suggests that most of the children benefitted from the dance program. Through focus group interviews and journal writing, children's reflections on various activities of the program- such as bar graphs, *Canon and Unison* and handwriting- could be garnered. These reflections suggest that the dance activities helped children absorb, comprehend, reflect and demonstrate their creative movement; a finding reflective of previous studies (Leigh 2012; Moore and Linder 2012; Simpson Steele, Fulton, and Fanning 2016). It may also be observed that children are innate kinesthetic learners and use their bodies as *instruments* or *vehicles* for learning (Hanna 2015; Dow 2010). Moreover, one child even felt that dance was a form of communication and may have influenced her learning. "I think that is one of the silent languages and in Unison you need do some team works and do at on right beat" (Child D, FG, School Four). Children's reflections pertaining to math-based activities represent leveraged learning and seemed to have formed a deeper effect on children's mathematical abilities (Deans and Cohrssen 2015, Moore and Linder 2012, Werner 2001).

Did the Cannon & Unison Place Value Activity help with your Maths learning?

Yes because it is where each number is a different movement and it is easier to remember when you are doing maths (Child E, Journal, School Four).

Besides creative movement and kinesthetic learning, other elements of dance which included co-operation, flexibility, negotiation and trust could also be observed in the study (refer Figure 9). The children seemed to have connected the dance activities to curricular learning, reflected from the experience and applied creative movement to their curricular learning. The research further demonstrates that a curriculum-embedded dance programme can be enjoyable and valuable for New Zealand primary schoolchildren, irrespective of gender, special need or ethnicity. It also suggests that dance and creative movement caters to the various learning needs of the children and may act as a bridge for children with limited verbal communication abilities.

The findings from this study also suggest that dance may be a potential learning tool for different kinds of learners in the classroom- Visual, Auditory, Read/Write or Kinesthetic learner (Fleming and Mills 1992). For example, while Canon and Unison may have helped children visualise a certain number after kinaesthetically representing it, *Maui and the Sun* may have increased their helped with their vocabulary and comprehension. These activities were covered in the dance programme after they had been briefly discussed in the classroom by the teacher. For example, teacher from School Three had read the story of *Maui and the Sun* to the children before it was covered in the dance programme. It is likely that dance cemented their understanding on the story and enabled them to unpack this creatively through their journal writing. As such, the authors of this study acknowledge that dance-embedded learning may be effective with prior discussion and enquiry on the concerned topic. It may be feasible for primary educators and schools to consider embedding dance alongside their existing curriculum, since creating and implementing a new dance-integrated curriculum is subject to several challenges. These challenges are explained along with suggestions of sustainable recommendations in previous chapter.

Limitations of the study

Drawing from the findings of the current study, it is acknowledged that evaluating a curriculum-integrated dance program specifically on literacy and numeracy outcome measures is subject to many limitations. Firstly, the AsTTle questionnaires specifically assessed changes in literacy and numeracy through the AsTTle reading and mathematics questionnaires respectively. Changes in the other learning areas of the curriculum-integrated dance programme, such as social sciences, sciences or arts education could not be quantifiably assessed.

Socio-economic status was not an independent variable in the study and may have influenced quantitative assessment of literacy and numeracy outcome measures. The current study was conducted among primary schools with children from higher socio-economic backgrounds, pertaining to one region from Auckland, New Zealand. Participants from varying socio-economic backgrounds were not part of the study and the influence of varying school deciles could not be explored.

Finally, the learning levels of the CG and DG classes across all four schools were not similar. DG teachers agreed to participate in the dance program with their class children, as they were keen on improving the class performance on literacy and numeracy and bringing it to the level of the CG class (of the same cohort). This might be another reason for no significant differences in the outcome measures, particularly in mathematics scores.

Implications for future research

The current study was conducted as a quasi-experimental research among four high decile primary schools in Auckland. Future studies could consider evaluating a common dance programme among varying school deciles, as a quasi-experimental study. The topics covered in the dance programme should be in alignment with the academic outcome measures, such that specific topic-based learning outcomes can be effectively evaluated. In addition, the long-term impact of the programme on children and teachers could potentially be explored. Research from the New Zealand context would need to evaluate dance-embedded learning, particularly among various ethnic groups and special needs. This might be of relevance to Māori/Pasifika and Asian ethnic groups.

The current study could not evaluate the long-term effects of a curriculum-integrated dance programme across primary schools. Learning outcomes of children could include a combination of children's test grades, ongoing journal reflections and

teacher assessment. In the current study, the DG teachers had their own form of assessment, which became a part of the children's term report. For example, Teacher Two sketched out a rubric specifically for dance sessions, similar to previous studies (Moore and Linder 2012).

> *I've actually done sort of a rubric. I'm writing criteria for what they participated with enthusiasm-some of them developing confidence with their learning too. It gave me the opportunity to do a little bit of assessment- can they develop ideas? Can they participate? (Teacher, I2)*

In the US context, learning through other art forms—drama, music and visual arts—constitutes an integral part of many primary schools (Smith 2009). Moreover, the benefits have been perceived by teachers and children alike. Hence, future studies in New Zealand could investigate the outcomes of various arts-based learning programmes among primary children. As a comparative study across schools, it would be worthwhile to investigate which learning programme—dance, drama, music or visual arts—might have significant impact on the academic performance of primary children.

There may be primary schools in New Zealand with a dance-embedded learning programme in place, yet unknown to New Zealand researchers in dance education. For instance, the research team came across a primary school situated in West Auckland where dance-embedded learning was an integral part of the school curriculum. However, there have been few empirical studies to evaluate the academic performance of the children from such schools. Thus, future research could include a comparative study between dance-embedded primary schools and other primary schools to evaluate differences in academic performance.

Conclusion

The current study was conducted to evaluate the literacy and numeracy outcomes from a curriculum-integrated dance program using a mixed methods approach. The study suggested that adding three hours of dance-embedded learning per week could have quantitative and qualitative benefits for primary school children. The findings of this study suggest that dance has the potential to meet the various learning needs of children-visual, artistic, reading/ writing or kinesthetic- and may contribute to the holistic development of the child. Further research is warranted to assess the short-term and long-

term impact of embedding dance into primary school teaching, particularly in the New Zealand context. The findings of this study are of value to primary school educators, dance educators and school policy makers from the New Zealand and an international context.

Chapter 4 **: Dance-embedded learning may enhance children's wellbeing: A mixed methods evaluation across four New Zealand primary schools**

Preface

The preceding chapter covered the literacy and numeracy outcomes of the curriculum-integrated dance programme. With children repeatedly referring to the programme as "fun" and previous school-based research suggesting that dance programmes can influence children's happiness and learning, chapter four evaluates the wellbeing outcomes of the programme. Similar to the previous study, the current study utilised a mixed methods approach and garnered data from a wellbeing questionnaire, children's focus group interviews and journal writing. This study is novel study since it (1) evaluates wellbeing using a mixed methods perspective (2) establishes literature on dance-embedded learning on school wellbeing (3) adds to the holistic benefits of dance in primary school children. It is envisaged that the findings from this chapter adds to our understanding on the applicability and benefits of embedding dance into primary school teaching.

Abstract

The aim of this study was to evaluate the effects of a curriculum-integrated dance programme on children's wellbeing. A total of 187 schoolchildren aged 7-9 years from four New Zealand primary schools were assigned to a dance group (n = 101) or control group (n = 86). DG participants completed a six-week, curriculum-integrated dance programme and shared their perceptions of the dance programme through journal reflections and focus group interviews. Wellbeing was evaluated at baseline and post-intervention timepoints through the Assessing Wellbeing in Education (AWE) questionnaire. Intervention effects were assessed using generalised linear models, and children's perceptions of the programme were thematically analysed. Compared with CG participants, DG participants reported significantly greater improvements in overall wellbeing (adjusting for age and special needs) and in health and lifestyle subdomain of wellbeing. Themes from children's reflections surrounding emotional wellbeing, social wellbeing and physical fitness overlapped with curricular learning and creative movement.

Background

Previous research suggests that dance may have numerous benefits for school children, particularly in the primary school context. Dance can be integrated into primary schools in various forms: as an art form to foster creativity, exercise to promote physical activity, psychotherapy to support children with special needs or as a pedagogical tool in curricular learning (C. M. Greenfader and L. Brouillette 2017; Sivvas et al. 2015; Zitomer 2016; P. H. Kulinna 2018; Kassing and Jay 2002b). Given its versatile application, dance may also be an effective strategy to promote wellbeing in primary schools, as it has been reported to foster social interaction and peer engagement among children (Toppen 2019).

There is abundant literature suggesting the benefits of dance on children's wellbeing (Zitomer 2016; Olga et al. 2018; Zitomer and Reid 2011). An evaluation of Creative Dance showed improvements in General Mood and School and Learning sub-domains of the Health-Related Quality of Life (HRQoL) questionnaire (Olga et al. 2018). A study evaluating an eight-week dance intervention which included a combination of Creative Dance and BrainDance, found no improvement in primary children' wellbeing as measured by the Health-Related Quality of Life (HRQoL) questionnaire (Olga et al. 2018; Gilbert 2006). However, the evaluation did show improvements in General Mood and School and Learning sub-domains of the HRQoL questionnaire. The researcher also

observed an increase in children's self-esteem and peer social interaction. A previous evaluation on a Creative Dance intervention also showed no significant differences in children's wellbeing, although children seemed to have developed a positive attitude towards dance in school (Quin et al. 2007). However, these findings from Quin's study need to be considered with caution as there is a lack of information on the psychological assessment, methodology and analysis of data.

Dance seems to have increased the wellbeing of children with special needs, as perceived from the primary school context (Zitomer 2016). It was observed that dance classes enabled special needs children to move out of their comfort zone, and one child reflected that he preferred to be amongst his peers rather than with his teacher aide. This suggests that dance may develop a sense of peer acceptance and leverage social interaction among special needs children. A previous study from the same author found that primary school children - with and without physical disabilities - seemed to have perceived dance as a form of enjoyment (Zitomer and Reid 2011). Children also reflected on the application of dance to their curricular learning and seemed to have developed an understanding around dance education. These findings report the perceived benefits of wellbeing from a dance programme among few participants in a single primary school, and children's reflections from a larger sample size is unknown. As such, a mixed methods evaluation could be an effective approach to understand the impact of dance on children's wellbeing from the primary school context. Triangulation of wellbeing data from children's written reflections, oral reflections and questionnaire data may provide a holistic understanding of the association between dance and children's wellbeing. The similar mixed methods approach was used in the previous study (Chapter 4).

In New Zealand, dance is one of the art forms taught in primary schools along with drama, music and visual arts (p.20) (NZ Ministry of Education 2007a) and a few primary schools embed dance and creative movement into their school curriculum. However, there is lack of evidence supporting the impact of dance-embedded learning on primary school children, specifically towards their wellbeing (refer Figure 4-1). It is unknown if NZ primary children perceive a change in wellbeing as a result of a curriculum-integrated dance programme. This raises two crucial questions: 1) Can a curriculum-integrated dance programme significantly improve the wellbeing of NZ primary school children 2) What are the perceptions of NZ primary school children who participate in a curriculum-integrated dance programme?

Rationale and significance of the study

The current study was formulated to address the above questions by evaluating a curriculum-integrated dance programme across four NZ primary schools. A curriculum-integrated dance programme is a series of dance sessions, encompassing various curricular activities using the principles of dance education and creative movement (Sharma et al. 2020). The current study evaluated the effects a curriculum-integrated dance programme on primary school children's wellbeing by triangulating findings from children's focus group interviews, journal reflections and self-reported questionnaires.

Although a previous evaluation on dance education has been conducted in NZ, the effects of a curriculum-integrated dance programme specifically towards children's wellbeing has not been conducted before (Beals et al. 2003). This study discusses the written and oral reflections from a large group of children across four primary schools, whereas previous studies involved data from a relatively smaller sample size (Zitomer 2016; Zitomer and Reid 2011). It is envisaged that the findings from this study contribute towards the literature surrounding dance and wellbeing in primary school children from the NZ and overseas context.

Methods

This study evaluated a curriculum-integrated dance programme across four primary schools in Auckland, New Zealand. The data collection for this project took place between October 2016 to December 2017 and the participants were evaluated on various measures, including wellbeing outcomes at baseline and post-intervention timepoints. The Auckland University of Technology Ethics Committee (AUTEC) approved the research in September 2016 (application number 16/303).

Prior to the commencement of data collection, ten primary schools in the North Shore region of Auckland were contacted to request for participation. Out of the ten primary schools contacted, four primary schools and eight teachers (two teachers per school) agreed to participate in the study. The teachers decided who would take part in the dance programme with their class children, as means of their professional learning development. Thus, there were two classes from each school which participated in the study 1) DG class (dance group): children participating in the dance programme; 2) CG class (control group): children not participating in dance programme. A total of four CG classes and four DG classes participated in the study. Study details were explained to the

children and they were given time to ask questions. Written informed assent and consent were obtained from children, parents and teachers. Children with both parental consent and assent forms took part in the study. The photos (which will be referred to in this study) have been used with prior consent.

Mixed methods design

The novelty of this study lies in the utilisation of a mixed methods experimental design to assess wellbeing, wherein data was collected before, during and after the dance programme. Although a previous study in NZ has assessed wellbeing through mixed methods procedures, the study did not evaluate a school-based intervention and was conducted among adolescent children (Bharara et al. 2019). In the current study, Convergent Parallel Design of Mixed Methods typology was utilised, wherein the quantitative and qualitative research strands were collected and analysed separately, but later integrated into a common discussion (Creswell 2011). This study may also fall under Emergent Mixed Methods, since children's journal reflections were added to the study during the data collection at School Two (Creswell 2011).

The curriculum-integrated dance programme

A dance educator was hired to deliver the dance programme across all four schools. Each DG class participated in 18 dance sessions over a period of six weeks with their teacher and the teacher decided the focus of the dance programme in his/her school. Besides covering curricular learning, the activities in the curriculum-integrated dance programme pertained to children's creative movement, critical appreciation, recreation, teamwork and collaboration.

Children from various ethnic backgrounds and learning abilities participated in the dance programme. Participant demographics at baseline have been tabulated in Table 4-1. In the present study children belonging to Polynesian ethnicities, such as Māori and Pacific Island ethnic backgrounds, were categorised into the "Māori/ Pasifika" group; children from all Asian countries (e.g., India, China, Sri Lanka) were categorised as "Asian"; children with European ethnicity (e.g., New Zealand, Australian, British) were categorised as "European". Children from ESOL background, cognitive impairments, speech difficulties, were categorised as "special needs". In previous studies, children with cognitive impairments and physical disabilities have been considered as special needs children (Zitomer 2016; Zitomer and Reid 2011). However, given the low sample size of children from these categories, children attending ESOL classes were also considered as

"special needs". The English standards of these ESOL children were not in par with their other classmates and a few children required extra time to interpret the instructions during the dance sessions.

Quantitative evaluation

Children from both DG and CG were evaluated on academic, behavioural, physical, and wellbeing outcomes at baseline and post-intervention timepoints. Our previous study discussed the academic outcomes of the dance programme (Chapter 4) and the current study focuses on the wellbeing outcomes of the dance programme. Children's wellbeing was evaluated using the Assessing Wellbeing in Education (AWE) questionnaire (Jarden et al. 2015). AWE is an online psychometric test is widely used in Australia and New Zealand. It is available in three different versions: (1) Adult version for staff and parents, (2) Junior version for 8-12 year olds and (3) Senior version for 12-18 year olds. The questions and domains of wellbeing differs in each version.

The Junior version of the questionnaire was unavailable during the commencement of this study (Sep 2016) and an adapted Senior version of the AWE questionnaire was used. The questions were modified to suit primary school children after consulting a NZ primary educator who was experienced in teaching primary children of 7-9 years. The questionnaire used in this study had a total of 16 questions; 3 questions on global wellbeing, 8 questions on school wellbeing, 1 question on resilience and 4 questions on health and lifestyle. Hard copies of the questionnaire were used, and participants were assessed in the morning at a time convenient to the class teacher. Although there was no time limit, children were asked to answer the questions promptly. Some ESOL children were assisted by a language interpreter to translate the questions into their native language.

Qualitative evaluation

The current study involved two qualitative evaluation procedures for the DG participants: (1) children's journal writing and (2) children's focus group interviews. While children's journaled reflections provided breadth towards children's perceptions, focus group interviews provided depth (Leigh 2012; Moore and Linder 2012; Simpson Steele et al. 2016). Children's reflections were gathered during the dance programme at their schools and these reflections were uploaded either through Seesaw or Google Docs. These reflections were prompted as questions by the DG teacher. Some questions pertained to their wellbeing, for example "how were the first three dance sessions? What did you enjoy

the most?" and some pertained to creative movement "what other activities would you like to add to Hello?" The journaling also included physical reflections, such as videos of children representing their favourite animal). Journal writing was included in the study after the data collection in School One. Children's journal reflections from Schools Two, Three and Four are part of the study.

After the dance programme in each school, five children from each DG class were chosen to participate in a semi-structured Focus Group Interview. A diverse cohort were part of these Focus Group Interviews and were chosen by the participating DG class. This would usually include two girls, two boys and at least one child with special needs. For example, while one of the focus group interviewees from School Two had behavioural issues, another interviewee from School Four had Tourette's syndrome. These differences reflected the applicability of the dance programme for various children. During the focus group interview, children also expressed their perceptions of the dance programme through drawings and creative movements. The focus group interviews lasted between 35-40 min and occurred at a time suiting the children's classroom schedule. As the content of the dance programme varied across schools, the questions slightly varied across the four schools as well. However, the foci of the questions remained constant as the primary researcher had a general template of open-ended questions, which guided the interview. DG teachers were individually interviewed to gather their experiences of the dance programme and their perceived benefits towards children.

Analysis

Quantitative analysis

Prior to conducting the study, power analysis was calculated using G*software. An ANCOVA model was conducted using three independent variables- age, gender, and baseline- amongst two groups – dance and control. Keeping a significance level (α) of 0.05, power of 0.8 (standard), effect size (f) of 0.25, a total sample size of 128 was indicated, with 64 participants in each group. With an anticipated participant drop-out rate of nearly 15%, the required sample size was 200 participants. As such, four primary schools were required to participate in the study, with an average of 25 children per class.

Independent-sample t-tests and chi-square tests were conducted to compare participant characteristics at baseline. Generalised linear models (GLM) were then used to compare the differences in wellbeing scores at post-intervention between CG and DG participants

while adjusting for age and baseline values. Interactions between the intervention, sub-scales of the AWE questionnaire and all other independent variables were also explored. An alpha of 0.05 was implemented for all analyses.

Qualitative analysis

Children's focus group interviews and teacher interviews were digitally audio-recorded and transcribed. Children's journal writing from Schools Two, Three and Four were collated into a common document. Data from children's focus group interviews and journal writings were meticulously read, coded into themes and later refined into sub-themes (Braun and Clarke 2006). A total of eight themes were identified; three of these themes resonated with the quantitative measures which were used to evaluate the curriculum-integrated dance programme, i.e academic performance, wellbeing and physical activity. Themes related to dance education, creative movement, research logistics, teacher PLD and researcher observations were also gathered. For the purpose of this paper, the themes pertaining to children's wellbeing and physical activity shall be discussed in parallel to themes pertaining to dance education and creative movement.

Results

Quantitative findings

T-test results revealed significant differences in AWE scores at baseline; the overall AWE score was significantly higher among the CG than the DG children ($p < 0.05$) and so were the sub-scales on school wellbeing ($p < 0.01$) and health and lifestyle ($p < 0.01$). There were also significant differences in age and ethnicity between the two groups: CG had a higher age ($p < 0.05$) and Chi-square test results revealed a higher proportion of European participants and a lower proportion of Māori/Pasifika and Asian participants in the CG ($p < 0.01$). There were no differences in the other two independent variables-gender and special needs. Preliminary results are tabulated in Table 4-1 .

Table 4-1. Participant characteristics and AWE scores at baseline

	DG (n=101)	**CG (n =86)**	***p***
Age	8.63 ± 0.44	8.77 ± 0.5	**0.044***
Gender			
Male	n= 47 (47%)	n= 42 (49%)	0.75
Female	n= 54 (54%)	n= 44 (51%)	
Ethnicity			
European	n= 44 (44%)	n= 55 (64%)	**0.001***
Asian	n= 38 (38%)	n= 28 (33%)	
Māori/Pasifika	n= 19 (19%)	n= 3 (4%)	
Special needs			
Special needs	n= 18 (18%)	n= 12 (14%)	0.473
Non-special needs	n= 83 (82%)	n= 74 (86%)	
Wellbeing scores			
Baseline AWE	75% ± 16%	81% ± 11%	**0.004***
Baseline Global wellbeing	79% ± 17%	81% ± 16%	0.528
Baseline School wellbeing	73% ± 17%	80% ± 13%	**0.003***
Baseline Resilience	72% ± 26%	73% ± 27%	0.889
Baseline Health and Lifestyle	78% ± 22%	84% ± 15%	**0.0025***

Data presented as mean ± SD or n (%). P value from independent samples t-test or chi-square test where appropriate; *indicate $p < 0.05$

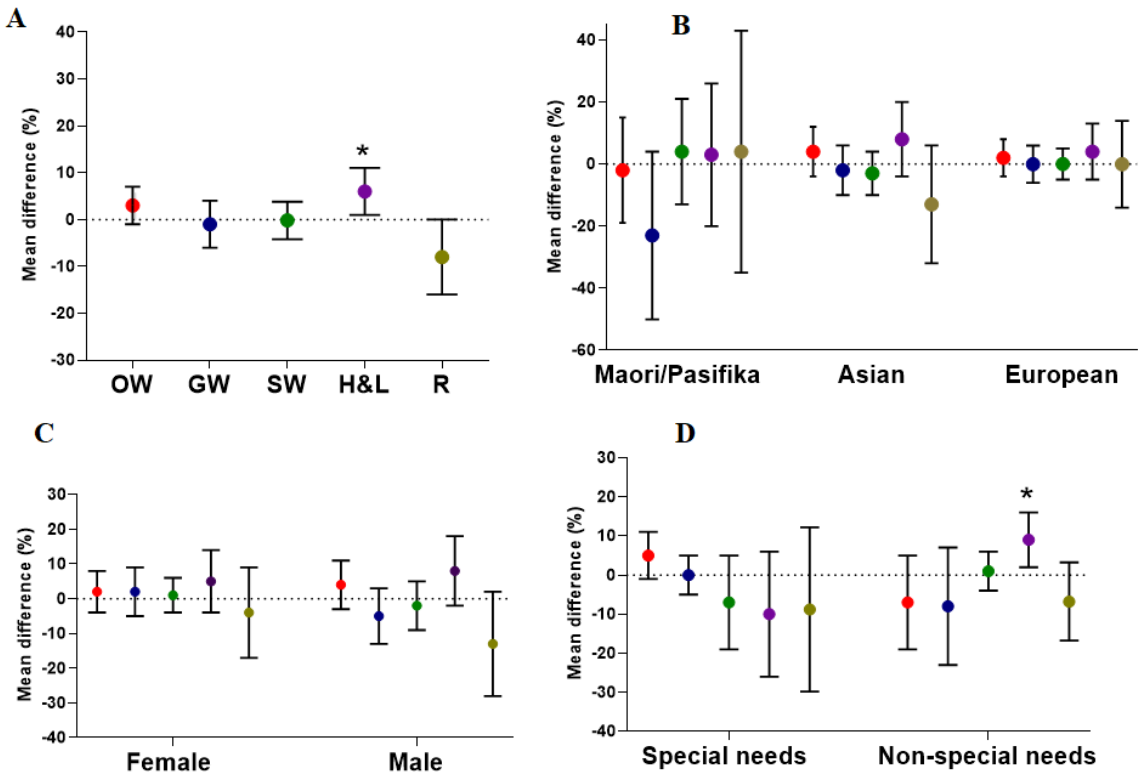
Table 4-2. Intervention effects for AWE scores after adjustment for baseline values and age

	B	95% CI		Padj[a]		B	95% CI		Padj[a]
		Lower	Upper				Lower	Upper	
WELLBEING (overall)					**SCHOOL WELLBEING**				
Bivariate model					**Bivariate model**				
CG	Ref				CG	Ref			
DG	3.03	0.903	6.963	0.131	DG	-0.182	-3.640	4.004	0.926
Multivariate models					**Multivariate models**				
Ethnicity* Treatment				0.707	Ethnicity* Treatment				0.709
Gender* Treatment				0.705	Gender* Treatment				0.670
Special needs* Treatment				**0.033***	Special needs* Treatment				0.117
GLOBAL WELLBEING					**RESILIENCE**				
Bivariate model					**Bivariate model**				
CG	Ref				CG	Ref			
DG	-1.185	-3.449	5.818	0.616	DG	-7.768	-15.537	0.001	**0.05***
Multivariate models					**Multivariate models**				
Ethnicity* Treatment				0.086	Ethnicity* Treatment				0.218
Gender* Treatment				0.149	Gender* Treatment				0.241
Special needs* Treatment				0.218	Special needs* Treatment				0.853
HEALTH AND LIFESTYLE									
Bivariate model									
CG	Ref								
DG	6.300	1.092	11.509	**0.018***					
Multivariate models									
Ethnicity* Treatment				0.234					
Gender* Treatment				**0.046***					
Special needs* Treatment				**0.008***					

Results obtained from generalised linear mixed models using a normal distribution and an identity link function. Bivariate model evaluated the main intervention effect after adjustment for age and baseline values. Multivariate models included interactions with ethnicity, gender, and special needs (separately) after adjustment for age and baseline values.

*P < 0.05

[a]Adjusted using sequential Bonferroni correction.



Intervention effects for Wellbeing scores: (A) Overall effects for each subscale (B) effects stratified by ethnicity; (C) effects by gender; (D) effects by special needs group. Results obtained from generalised linear models using a normal distribution and identity link function. All effects means were adjusted for age and baseline and are displayed with 95% CI.
OW = Overall wellbeing, GB= Global wellbeing, SW= School wellbeing, H&L = Health and Lifestyle, R= Resilience.
*P < 0.05

Overall wellbeing Global wellbeing School wellbeing Health and Lifestyle Resilience

Figure 4-1. Mean differences (DG-CG) in various domains of wellbeing

Although there were no effects on the change in overall wellbeing score initially, when adjusted separately for special needs, a significant effect was detected (p = 0.033). Children without special needs in the DG had an improved sense of overall wellbeing in comparison to their CG counterparts. This difference in overall wellbeing mean score between the DG and CG was approximately 6%. This has been graphically represented in Figure 4-2. There were no significant interaction effects in gender (p = 0.705) or ethnicity (p = 0.707).

There were no significant between-group differences in global wellbeing or school wellbeing sub-scale improvements as measured by the AWE questionnaire. Effects on the resilience sub-scale approached significance, with CG children reporting a

greater improvement in resilience than DG participants (p = 0.05). DG children reported a significant improvement in the health and lifestyle sub-scale of the AWE questionnaire in comparison to CG children. There was approximately a 6% mean difference in the effects on health and lifestyle score between the two groups. There was also an interaction effect after adjusting for gender (p = 0.046) and special needs (p =0.008).

Qualitative findings

A total of five sub-themes related to wellbeing were gathered from children's focus interviews and journal writing. These themes were centred around themes related to curricular learning, dance education and creative movement and is represented in Figure 4-3.These central themes have been discussed in our previous study (Chapter 4) and the peripheral themes shall be discussed in this study.

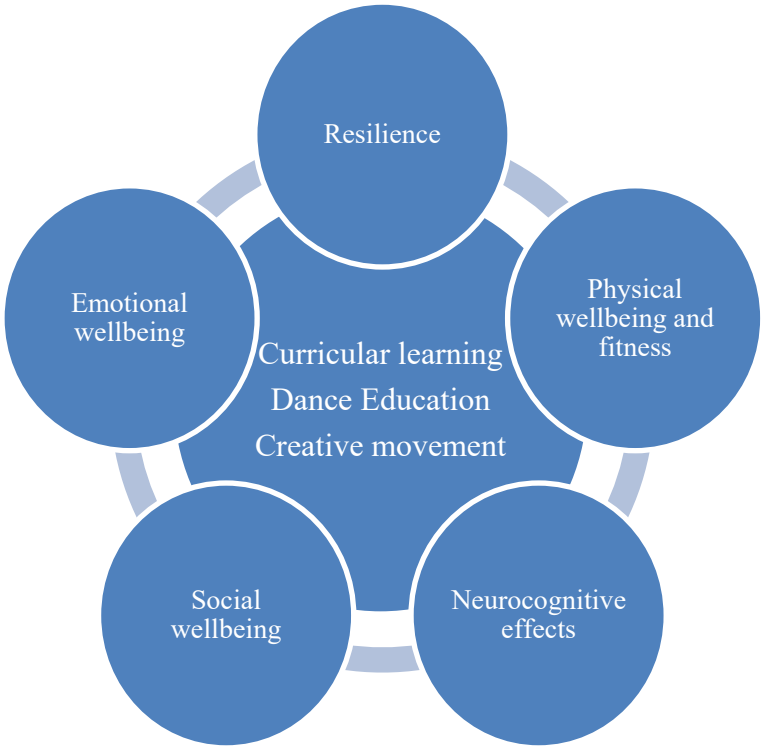


Figure 4-2. Central and peripheral themes related to children's wellbeing gathered from the study

Emotional wellbeing

It was quite evident that children thoroughly enjoyed the dance sessions, as the words *happy*, *enjoy* and *fun* appeared frequently throughout the qualitative data. The sub-theme emotional wellbeing overlapped with other sub-themes too.

Researcher: What was it that you liked the most out of the dance sessions?

Child A (instantly): The whole thing

Child B and Child C: Yeah! (School One, FG)

The above snippet was the opening conversation from the focus group interview conducted at School One. The spontaneous response from Child A in this interview is similar to another child's response: *The first thing that comes to my mind when I hear dance is "Yeah!" and then I'm thinking of the Life Cycles of the Frog* (Child A, School Two, FG). It is clear from this quote that the children looked forward to the dance sessions and viewed them as a form of curricular learning. Figure 4-4 represents the *Life Cycle* activity in action.

Figure 4-3. children actively participating in the Life Cycle activity with dance educator and class teacher

Besides *Life Cycle*, the other two frequently mentioned activities from the dance were *Name Game* and *Dance Detective.* These activities provided the children an opportunity to create their independent movements in an environment devoid of judgement or criticism.

In dance I have enjoyed the Name Game because we had to come up with a movement of our own we had to choose one of our personal action and dance teacher said that we could not copy anyone (Child B, Journal, School Three)

Having autonomy over one's creative movement not only added to their positive experience of the programme, but also exposed them to dance education concepts such as tempo, beat and rhythm.

In dance I have enjoyed the music because when it went slow then we danced slow and when its fast we danced fast and I like how we could create our own moves and when we created our moves we made it go with the rhythm (Child C, Journal, School Three).

Children perceived happiness was another interesting finding, which was commonly found in the data across all four schools. This happiness may have impacted their learning in the classroom as well. *Everybody should come back to the classroom with smiles on their faces, because I always do!* (Child B, Journal, School Two). Another example is an excerpt from a focus group interview:

Researcher: Did you feel happy before or after the dance sessions?

Child A: After

Child B: both

Child C: I felt happier after the dance sessions and also while we were doing it.

Child D: probably while we were doing and after we were doing dance. (School Three interview)

A salient observation from the dance programme was children's enthusiasm and flexibility irrespective of the venue of the dance session – classroom or hall. For example, during one dance session inside the classroom, a child from School Two made the researcher's camera tripod as his *burrow* for the *Life Cycle*. The child radiated happiness as seen in Figure 4-5.

Figure 4-4. “This is going to be my burrow!”

Social wellbeing

Peer interaction, teamwork and negotiation were key elements of the dance programme and were frequently observed in children’s reflections. In dance I have enjoyed having time with the dance teachers and having time together with friends and dancing makes me feel very happy (Child D, Journal, School Three). Festivals Across The World -an activity where children represented various festivals in groups of five – involved planning and negotiation, besides creative movement. These groups were made by the class teacher and enhanced collaboration outside of their friend circle. It felt ummmm… it felt like I was making new friends (Child B, FG, School One). Figure 4-6 below represents four girls spontaneously coming together to represent the tadpole phase from Frog Life Cycle.

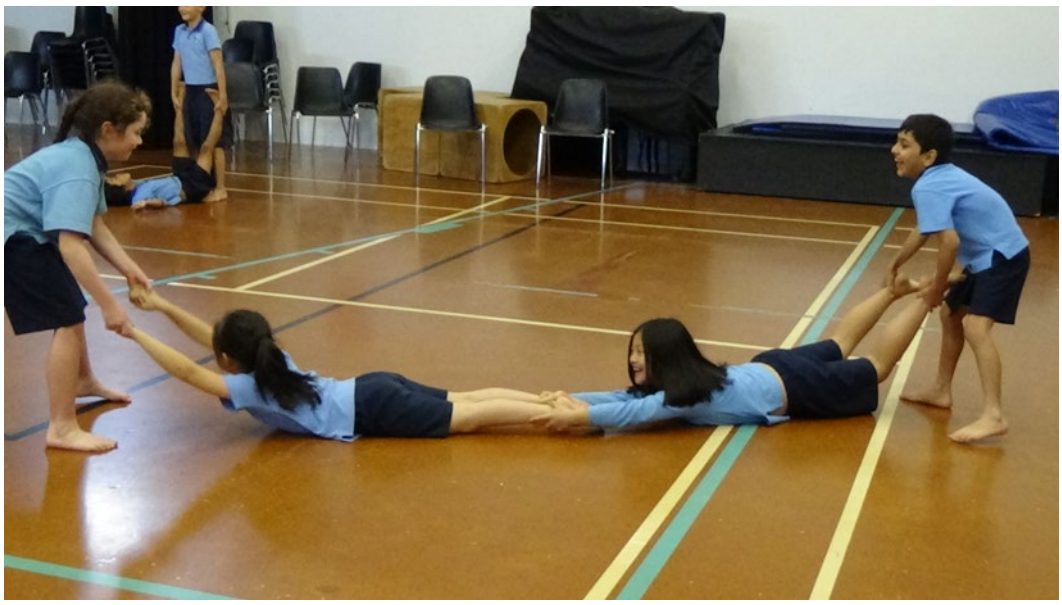


Figure 4-5. Happy faces during the *Life Cycle* activity

Hello – an activity specifically designed to enhance social skills and mutual understanding in children – garnered significant popularity due to its dynamic structure. *You actually got to learn and support each other and help each other…*(Child A, FG, School Four). The snippet below is another example of children's reflections on *Hello*.

> *Researcher: Which kind of activity do you like best- ones where you run across the hall, where you sit and learn or ones where you did you with your friends.*
>
> *Child A: I like "hello" as well because it's all about helping each other and no one is all mean and not going around and not helping each other… I just feel like everyone is really caring in that game*
>
> *Child B: I think that since we all help each other none is left out because everyone was enjoying the game and they didn't want to end it.*
>
> *Child C: I liked the one with friends because you get to communicate with one another…*
>
> *Researcher: But you weren't communicating, were you?*
>
> *Child C: Communicate with moves…(School Three interview)*

Besides improving their social skills, *Hello* enhanced their non-verbal communication. This was particularly useful for children with speech disabilities.

Balance of weight, trust and coordination were also observed in this activity and can be seen in Figure 4-7.

Figure 4-6. Boys balancing their weight as part of *Hello* activity

Physical wellbeing and fitness

Physical activity was seamlessly embedded in the dance programme, varying in intensity and frequency according to the activity.

> *Researcher: How was it like coming back from the dance session? Did you feel more energetic? One of your classmates said that he felt like he was doing exercise..*
>
> *Child A: It was more energetic*
>
> *Child B: I felt a lot tired*
>
> *Child C: I felt happier*
>
> *Child D: I felt really tired*
>
> *Child E: I felt like I had done something good (School One, FG)*

There were mixed responses to children's energy levels after the dance sessions. As an essential component of wellbeing, the reflections on physical wellbeing overlapped with emotional wellbeing. *Dance is kinda like sport but more fun and it is good because if you don't like jogging you can just dance!* (Child A, School Two, Journal writing). There was also an overlap between physical wellbeing and kineasthetic learning. *The*

dance sessions is a funner way than having to waste our seats and do Maths.. dance has like more fitness and it's more fun than what we have usually … (Child B, School three, FG).

Resilience

Out of all the activities covered in the dance programme, the hip-hop slide appeared to have been the most challenging one for the children. Figure 4-8 shows the hip-hop slide in action.

> *I learnt to do the slide it was quite fun. My measurement was 1.37 cm. I enjoyed making the graph… I found the slide a bit difficult it was complicated but I learnt how to do it (Child D, School Two, FG)*

Figure 4-7. Children learning the hip-hop slide from the dance educator

Although challenging, this activity motivated the children to *try harder* (Child E, School Two, FG) and may have contributed to developing resilience and reducing fear of performing for peers. *I feel more confident performing in front of people* (Child D, School Three, FG).

> Dance is really fun and interesting for me especially when we tried to make our first letter of our name. That was a bit hard, but I found three ways to do it! (Child E, School Two, Journal)

Children's persistent interest towards the dance sessions enabled them to think creatively to seek solutions to challenging problems. Figure 4-9 represents a child happily representing the letter J as part of the *Name Solo* activity. This was the boy's first exposure to creative movement and embodied learning.

Figure 4-8. Embodied representation of "J"

Neurocognitive effects

I like Dance Detective because it helps make your brain muscles stronger (Child E, School Two, FG). An unanticipated theme which arose from the qualitative data was children's perceived neurocognitive benefits and the transferable effect after the dance sessions.

Researcher: After going back to class after a dance session, were you able to concentrate better?

Child A: Yes, because when you go from dance you had a bit of fitness and when you come back to your place you get to concentrate a lot. That makes you more active

Child B: Yes because after dance your brain is like awoken you can like focus on your learning more than before

Child C: Yes because the fitness got your brain working and then when you went back to classroom you concentrated better I think…(School Four, FG)

Children reflected on the relationship between the neurocognitive benefits of the dance programme and on classroom behaviour. This overlaps with the (previously discussed) emotional wellbeing theme, where a child expressed that she transferred her happiness from the dance session to her classroom learning as well.

Discussion

The current study evaluated the effects of a curriculum-integrated dance programme on children's wellbeing in the primary school setting of New Zealand. This study establishes literature surrounding the effects of movement-based learning on children's wellbeing, by triangulating data from a self-reported wellbeing questionnaire, children's focus interviews and journal reflections. The main results from the study were: (1) DG children had an improved sense of wellbeing in comparison to the CG participants after adjusting separately for special needs; (2) DG children reported a significant improvement in their health and lifestyle in comparison to the CG participants; 3) DG children's reflections suggested that the dance programme had benefits for children's emotional and social wellbeing; (4) DG children perceived dance as a learning tool which was both physically and mentally engaging.

Although at baseline, the CG showed a significantly higher overall wellbeing score, at post-intervention the DG showed a significantly improved wellbeing score. Pairwise comparisons in mean scores revealed that the non-special needs children from the DG had a 4% higher improvement in wellbeing score in comparison to their CG counterparts. Without adjusting for special needs, there were no significant improvement

in the overall wellbeing score. Approximately 18% of the children from the DG belonged to special needs category, which may have impacted the overall wellbeing score.

At baseline, the CG had significantly higher mean scores in two of the AWE sub-scales, i.e. school wellbeing and health and lifestyle. However, at post-intervention, a significant improvement in health and lifestyle was observed in the DG, in comparison to the CG participants. Without adjusting for independent variables – gender, special needs or ethnicity- there was a 6% higher improvement in the health and lifestyle score among DG in comparison to CG. These significant differences in mean scores could also be seen after adjusting separately for gender and special needs. DG participants reported no significant improvements in school wellbeing post-intervention, although CG seemed to have a higher school wellbeing score at baseline. There was a 0.18% mean difference between the DG and CG at post-intervention as seen from the GLM, which was marginal in comparison to the significant mean difference at baseline. This may show that the margin of mean differences in school wellbeing scores between the DG and DG reduced at post intervention.

Since movement and physical activity constituted an essential component of the dance programme, it is likely that the DG participants were more satisfied with their health and exercise in comparison to their CG participants. This finding mirrors the reflections from the DG children surrounding physical activity and fitness and also adds to existing literature surrounding the association between regular physical activity and wellbeing (Biddle and Asare 2011).

> *Researcher: After being part of these dance sessions, what do you think dance means to you right now?*
>
> *Child A: It means like your body gets active. And it helps you move your body a lot.*
>
> *Child B: You can get strong and can have good fitness*
>
> *Child C: You can get creative with it. It helps you learn how to move*
>
> *Child D: It gives your brain a good move (School Four, FG)*

The above excerpt from a focus group interview encapsulates some of the themes which were found in this study - creative movement, neurocognitive benefits, physical activity and fitness. These themes were multidimensional and are subject to several interpretations.

Firstly, many of the reflections on the dance sessions included either a component of emotional wellbeing or curricular learning. As such, movement – based learning proved to be an effective form of learning, as it was *fun* and made them *happy*.

Secondly, children's affinity towards interacting with peers and learning in a conjoint space adds to the literature on dance education. The activities from the dance sessions and children's reflections affirm that children's social wellbeing and interaction increased when pulled out of their comfort zone. Children's negotiation skills also increased, affirming the social benefits of dance in the primary school setting (Simpson Steele et al. 2016; Moore and Linder 2012).

> *"…with dance you get to play with all the people, but during lunch you only play with those who want to play with you…. It's like people who don't agree with anyone, they do agree nicely…." (Child E, School Four, FG).*

Finally, the dance – embedded learning was physically and mentally engaging for all children. The AWE evaluation on wellbeing did not find have an interaction effect on the independent variables – gender or ethnicity. This mirrors children's reflections where all ethnic groups of children affirmed the fun and socially engaging aspect of the dance programme. Boys and girls alike actively participated in the programme demonstrating creativity, flexibility and negotiation in the dance activities.

Although the AWE scores did not have a significant difference among children with special needs, their reflections show that the dance programme may have influenced their wellbeing. For example, during the Focus group interview at School Four, a boy with Tourette syndrome said: *It literally lit up your brain. We need more fitness after morning tea!* Another boy from School Three with ESOL learning support wrote in his journal reflection: *I learnt how to do knee slide and dance was so much fun.* This affirms previous literature on the positive experiences of dance among primary school children with and without disabilities (Zitomer 2016).

Children's perceptions surrounding resilience was another interesting finding from this study. Since perceived resilience was closely tied with their confidence and interest towards the dance programme, there appeared to be an indirect association between dance and children's resilience. Although previous research has associated the effects of dance and drama on resilience among adolescents, the perceived sense of

resilience from dance-embedded learning had not been evidenced before (Grunstein and Nutbeam 2007).

In summary, the findings from this study holds a unique place in the literature surrounding dance education, as the wellbeing outcomes from a curriculum-integrated dance programme has never been assessed in a primary education setting. The qualitative findings add to the literature surrounding children's perceived benefits on their wellbeing and learning. The previous chapters (Chapter 3 and Chapter 4) have emphasised the need to embed dance- embedded learning into primary children's teaching and this study adds to the literature.

Limitations and implications for future research

The current study was subject to several limitations, mainly pertaining to the wellbeing assessment and to the intensity of the dance programme. Since the AWE questionnaire was modified for children of 7-9 years of age, its reliability and validity remain unknown. The number of questions in each sub-scale varied, with only one question measuring resilience. Also, the impact of dance on primary children's resilience is unexplored and this may be an implication for future research. Future studies could use the child version of the AWE questionnaire or consider using the Kidscreen questionnaire (Olga et al. 2018).

The dance programme lasted only six weeks in each school and the long-term effects could not be assessed. Given the small sample size of the study, interaction effects of the dance programme on children with various ethnicities could not be assessed. Future longitudinal studies, involving a large sample size could evaluate the long-term benefits of a dance programme and assess the interaction effects on various ethnicities. Although AWE scores represented no significant interactions between the dance programme and children with special needs, children's reflections revealed that children with special needs were benefitted from the dance programme. This resonates with previous studies, wherein children with special needs expressed social interaction, creativity and peer adjustment as found through qualitative data (Zitomer 2016; Zitomer and Reid 2011). Children with special needs and ESOL children were not assessed separately in this study. Although some ESOL children received assistance for interpreting the questions from the AWE questionnaire, most of the children belonging to the special needs category of this

study answered the questions by themselves. There were chances of misinterpretation and future researchers assessing wellbeing, may need to make provision for the varying reading abilities of children.

Socio-economic status was not an independent variable in the current study, as it was conducted among primary schools with children from higher socio-economic backgrounds. This may have influenced the wellbeing outcomes in the study and future studies would need to consider assessing children of varying socioeconomic backgrounds from the NZ context. Neurocognition was not quantifiably assessed in the current study, although children from the DG reflected on the cognitive effects of the dance programme. As such, future research may include neurocognition to assess the effects of dance-embedded learning among children.

Conclusion

The current study evaluated the wellbeing outcomes from a curriculum-integrated dance programme using a mixed methods approach. The quantitative results from the study proved that dance may enhance primary children's wellbeing and their satisfaction towards health. The qualitative results further affirmed that dance-based learning techniques could be a fun and engaging method for teaching in primary schools, as mentioned in literature. This study details children's perspectives towards the educational, physical and neurocognitive benefits associated with dance-based learning. Furthermore, it adds to the need to integrate dance-embedded learning in the primary school curriculum. The findings of this study are of value to primary school educators, dance educators and school policy makers from within New Zealand and internationally.

Chapter 5 : Does dance-embedded learning influence classroom behaviour in primary school children?

Preface

Chapter Four suggested that the dance-programme from this research may have influenced children's wellbeing. While it was evident that the children felt engaged and happy during the programme, it was unknown whether the dance sessions influenced their behaviour after the programme. Research suggests that dance can influence children's social bonding, decrease negative behaviour and improve children's concentration. However, it is unknown whether a dance-embedded leaning programme can significantly impact children's behaviour within the classroom setting. As such, Chapter Five was conceived to investigate whether teachers observed any significant difference in their children's behaviour after the programme. The findings from this chapter are novel as (1) it provides empirical evidence on the effect of dance-embedded learning on children's behaviour and (2) contributes to evidence-based research on applicability of dance on children with special needs.

Please note that assessment of classroom behaviour was added to this research project after completion of data collection in School One. Thus, the current study involves the evaluation across only three schools.

Abstract

The aim of this study was to evaluate changes in classroom behaviour following a curriculum-integrated dance programme. A total of 153 primary children aged 7- 9 years from three New Zealand schools were assigned to either a dance group (n = 77) or control group (n = 67). The dance group participated in a six-week curriculum-integrated dance programme with their class teacher. Classroom behaviour was evaluated by class teachers at baseline and post-intervention time-points using the Strengths and Difficulties Questionnaire. Intervention effects were assessed using generalised linear models after adjustment for baseline values and age. Although there was no significant intervention effect on total difficulties, the programme resulted in significant reduction in hyperactivity and increase in prosocial behaviour. These findings may be applicable to primary educators, dance movement therapists, and school policy-makers.

Background

Managing a large group of students in a classroom can be challenging for primary educators working in the general education setting (Merrett and Wheldall 1993). This challenge is further accentuated when educators need to cater to children's varying physical, educational, cognitive and behavioural difficulties in the classroom (Skoning 2008). While primary educators use a multitude of teaching techniques to keep all children focused and engaged (Parsonson 2012), the utilization of movement-based techniques can be particularly effective for a class consisting of children with and without behavioural difficulties (Bremer et al. 2016; Daly-Smith et al. 2018; Skoning 2008).

In New Zealand, a report investigating the prevalence of behavioural difficulties in children found that boys had a higher percentage of difficulties than girls; while Māori and Pasifika children were more likely to experience behavioural difficulties compared to their non-Māori and non-Pasifika counterparts (NZ Ministry of Health 2018). These data were obtained using a parent-report Strengths and Difficulties Questionnaire (SDQ) (Goodman 1997). However, teachers' perceptions of children's behaviour at school and the effectiveness of school-based interventions on behaviour are currently limited (NZ Ministry of Health 2018).

Arts-embedded learning techniques may benefit primary children, particularly children with behavioural issues (Li et al. 2015). When teaching techniques such as photo-elicitation, drama or student artwork are applied in the primary school teaching, there may

be improvements in student-teacher relationship and leverage in curricular learning (Li et al., 2015). Such engaged forms of learning may act as a space for catharsis, particularly for children experiencing anxiety (Koshland and Wittaker 2004). As a form of therapy, Dance Movement Therapy (DMT) may be beneficial for children with hyperactivity or autism, or children that have trouble focusing during curricular learning (Alotaibi et al. 2017; Bremer et al. 2016; Koshland and Wittaker 2004; Levin 2016). DMT based interventions are likely to enhance self-control, emotional regulation and problem-solving among primary children (Chiang 2017; Gilbert 2006; Koshland and Wittaker 2004; Moula et al. 2020). Children have also shown significantly higher focus on teacher instructions, increased peer bonding and a greater sense of wellbeing (Alotaibi et al. 2017; Withers et al. 2019). Although there is abundant research suggesting the benefits of DMT among children with special needs, its associated effects on curricular learning is under-researched in the primary school context (Deans and Cohrssen 2015; Koshland and Wittaker 2004; Simpson Steele et al. 2016; Withers et al. 2019).

Besides psychotherapeutic benefits, there may be academic benefits of dance as well (McMahon et al. 2003; Nikitina 2003; Soto 2001). When applied as a teaching tool in primary schools, dance can serve as a conduit of learning among children (Deans and Cohrssen 2015; Dow 2010; Withers et al. 2019; Moore and Linder 2012; Richard 2013). A curriculum-integrated dance programme is a series of dance sessions, encompassing various curricular activities using the principles of dance education and creative movement (Sharma et al. 2020). Such a programme, involving a more engaged form of learning, has the potential to improve prosocial behaviour and reduce negative behaviour among primary children (Chiang 2017; Kreutzmann et al. 2017). However, this claim cannot be ascertained given the lack of empirical evidence on the effects of a curriculum-integrated dance programme on children's behaviour (Bateman 2018; Chiang 2017). Moreover, it is unknown whether these changes in children's behaviour may vary according to ethnicity or special needs.

Recognizing the gaps in literature surrounding dance-embedded learning and children's behaviour, the current study was formulated to: (1) examine if a curriculum-integrated dance programme affects children's classroom behaviour in the primary school context, and (2) determine if behavioural changes vary significantly between gender, special needs and ethnic groups.

Methods

This study evaluated a curriculum-integrated dance programme across three primary schools in Auckland, New Zealand. The project took place between September 2016 and December 2017. Data were collected one week prior to the intervention starting (baseline), and at the conclusion of the six-week intervention (follow up). The Auckland University of Technology Ethics Committee (AUTEC) approved the research in September 2016 (application number 16/303).

Participants

Ten primary schools in the North Shore region of Auckland were invited to participate, of which three schools agreed. Within each school, one class was assigned to the dance group (DG), which received the intervention, and one class was assigned to the control group (CG), which did not receive the intervention. As such, a total of 153 primary children aged 7- 9 years were divided into three CG classes (n = 67) and three DG classes (n = 77). Study details were explained to the children and they were given time to ask questions. Written informed assent and consent were obtained from children, parents and teachers prior to participation.

Children from various ethnic backgrounds and learning abilities participated in the study. Children of Polynesian ethnicities, such as Māori and Pacific Island, were categorized a "Māori/ Pasifika"; children from all Asian countries (e.g., India, China, Sri Lanka) were categorized as "Asian"; and children of European ethnicity (e.g., New Zealand, Australian, British) were categorized as "European". Children attending English language classes, and those with cognitive impairments or speech difficulties were categorized as "special needs". Due to the very low sample size, children attending special English classes and children with cognitive disabilities were all considered "special needs".

Dance programme

Details of the dance programme delivery and its applicability to New Zealand primary schools can be found elsewhere (Sharma et al. 2020). Briefly, a dance educator was hired to deliver the dance programme across all three schools. Each DG class and their teacher participated in 18 dance sessions over a period of six weeks. The class teacher decided the focus of the dance programme in his/her school. Besides covering curricular learning, the activities in the curriculum-integrated dance programme encompassed creative

movement, critical appreciation, recreation, teamwork and collaboration. Each of the dance sessions involved peer interaction and was acknowledged by the children to be a "fun" and "happy place to be".

Measures

Children from both the DG and CG were evaluated on academic, behavioural, physical and wellbeing outcomes at baseline and post-intervention time-points. The current study focuses on the behavioural outcomes of the dance programme. Children's behaviour was evaluated using the SDQ, which is an assessment tool used to identify and screen children for behavioural issues (Goodman 1997). In the current study, the SDQ teacher version was used to assess changes in negative and positive behaviour across six primary classes (van den Heuvel et al. 2017).

The teacher version of the SDQ comprises a total of 25 questions, with four subscales on negative behaviour: emotional problems, conduct problems, hyperactivity, peer problems; and one subscale on positive behaviour: prosocial behaviour. There are five questions for each subscale, which are scored on a three-point scale with 0 = "not true", 1 = "somewhat true" and 2 = "certainly true". Certain questions were reverse coded according to the SDQ scoring protocol (Goodman 1997). Total Difficulties Score (TDS) was calculated by adding the scores from the negative behaviour sub-scales. In the current study, an adjusted percentage score was calculated for each subscale by dividing the total subscale score with the maximum possible subscale score (10). Similarly, the percentage of total difficulties was calculated by dividing TDS with the maximum possible TDS score (40). Hard copies of the questionnaire were used, and teachers completed the questionnaires at a time suiting their school schedule.

Statistical analyses

Prior to conducting the study, power analysis was calculated using G*software. An ANCOVA model was conducted using three independent variables- age, gender, and baseline- amongst two groups – dance and control. Keeping a significance level (α) of 0.05, power of 0.8 (standard), effect size (f) of 0.25, a total sample size of 128 was indicated, with 64 participants in each group. With an anticipated participant drop-out rate of nearly 15%, the required sample size was 200 participants. As such, four primary schools were required to participate in the study, with an average of 25 children per class.

Baseline characteristics of the sample were calculated and presented as mean ± standard deviation for continuous variables, and n (%) for categorical variables. Independent-sample t-tests and chi-square tests were conducted to compare the characteristics of the DG and CG participants at baseline. To analyze SDQ scores at post-intervention, generalised linear models with a normal distribution and identity link function were fit to examine the effect of the intervention while adjusting for the corresponding baseline value and age. Estimated means and pairwise contrasts were then estimated for the treatment group (DG-CG), gender, ethnicity and special need status; with multiple comparisons adjusted using the Bonferroni correction. Separate models were run for the TDS and for each sub-scale. An alpha of 0.05 was implemented, and all analyses were conducted using IBM SPSS Statistics v23 (IBM Cooperation, USA).

Results

T-test results revealed significant differences in age and ethnicity between the two groups: CG had a higher age ($p < 0.05$) and Chi-square test results revealed a higher proportion of European participants and a lower proportion of Māori/Pasifika and Asian participants in the CG ($p<0.01$). There were no differences in the other two independent variables—gender and special needs. Participant demographics along with baseline outcome measures are tabulated in Table 5-1.

Table 5-1: Participant Characteristics and SDQ Scores at Baseline

	DG (n=77)	**CG (n =67)**	***p***
Age	8.7 ± 0.35	8.9 ± 0.34	**0.044***
Gender			
Male	37 (48.1%)	33 (49.3%)	0.886
Female	40 (51.9%)	34 (50.7%)	
Ethnicity			
European	31 (40.3%)	45 (67.2%)	
Asian	35 (45.5%)	21 (31.3%)	**0.001****
Māori/Pasifika/Others	11 (14.3%)	1 (1.5%)	
Special Needs			
Special needs	10 (13%)	7 (10.4%)	0.638
Non-special needs	67 (87%)	60 (89.6%)	
SDQ scores			
Baseline total difficulties	3% ± 4%	4% ± 5%	0.105
Baseline conduct problems	4% ± 10%	7% ± 14%	0.14
Baseline hyperactivity	12% ± 20%	18% ± 25%	0.05

Baseline emotional problems	2% ± 6%	3% ± 8%	0.154
Baseline peer problems	8% ± 14%	7% ± 12%	0.537
Baseline prosocial	88% ± 20%	86% ± 19%	0.579

Data presented as mean ± SD or n (%). P value from independent samples t-test or chi-square test were appropriate. * represents $p<0.05$; ** represents $p<0.001$

Table 5-2 represents the intervention effects in the TDS and across all sub-scales of the SDQ. There were no significant effects for TDS, conduct problems, emotional problems or peer problems. Effects were not significantly influenced by ethnicity, gender or special needs (i.e., there were no interaction effects).

There were significant intervention effects for prosocial behaviour and hyperactivity (Figure 5-1). Hyperactivity was 4% lower in the DG than CG after adjustment for baseline and age ($p=0.03$). There were no significant interaction effects between hyperactivity and ethnicity, gender or special needs. There was a significant intervention effect in the prosocial scale of the SDQ questionnaire ($p<0$), which can also be seen in Figure 5-1. For the DG, this difference was 8% higher in comparison to the CG after adjustment for baseline and age. There were no interaction effects between prosocial needs and the independent variables.

There was also a significant interaction effect between ethnicity on the emotional problems subscale when adjusted for baseline and age ($p=0.016$). Follow up tests revealed European children had lower emotional difficulties post-intervention, but these differences did not remain significant after adjustment for multiple comparisons. These findings are represented in Figure 5-1, along with pairwise comparisons among gender and special needs groups.

Table 5-2: Intervention Effects for SDQ Scores After Adjustment for Baseline Values and Age

	B	95% CI		Padj[a]		B	95% CI		Padj[a]
		Lower	Upper				Lower	Upper	
TOTAL DIFFICULTIES SCORE					**HYPERACTIVITY**				
Bivariate model					**Bivariate model**				
CG	Ref				CG	Ref			
DG	-1.352	-2.956	0.251	0.098	DG	-3.689	-7.074	0.305	**0.033***
Multivariate models					**Multivariate models**				
Ethnicity* Treatment				0.466	Ethnicity* Treatment				0.429
Gender* Treatment				0.480	Gender* Treatment				0.254
Special needs* Treatment				0.318	Special needs* Treatment				0.628
CONDUCT PROBLEMS					**EMOTIONAL PROBLEMS**				
Bivariate model					**Bivariate model**				
CG	Ref				CG	Ref			
DG	0.110	-1.450	-1.671	0.890	DG	-0.201	-1.934	-1.533	0.821
Multivariate models					**Multivariate models**				
Ethnicity* Treatment				0.999	Ethnicity* Treatment				**0.016***
Gender* Treatment				0.756	Gender* Treatment				0.949
Special needs* Treatment				0.238	Special needs* Treatment				0.298
PEER PROBLEMS					**PROSOCIAL**				
Bivariate model					**Bivariate model**				
CG	Ref				CG	Ref			
DG	0.240	-3.314	3.793	0.895	DG	8.070	4.518	11.622	**<0.001**
Multivariate models					**Multivariate models**				
Ethnicity* Treatment				0.993	Ethnicity* Treatment				0.247
Gender* Treatment				0.797	Gender* Treatment				0.611
Special needs* Treatment				0.150	Special needs* Treatment				0.674

Results obtained from generalised linear mixed models using a normal distribution and an identity link function. Bivariate model evaluated the main intervention effect after adjustment for age and baseline values. Multivariate models included interactions with ethnicity, gender and special needs (separately) after adjustment for age and baseline values.

*p<0.05

[a]Adjusted using sequential Bonferroni correction

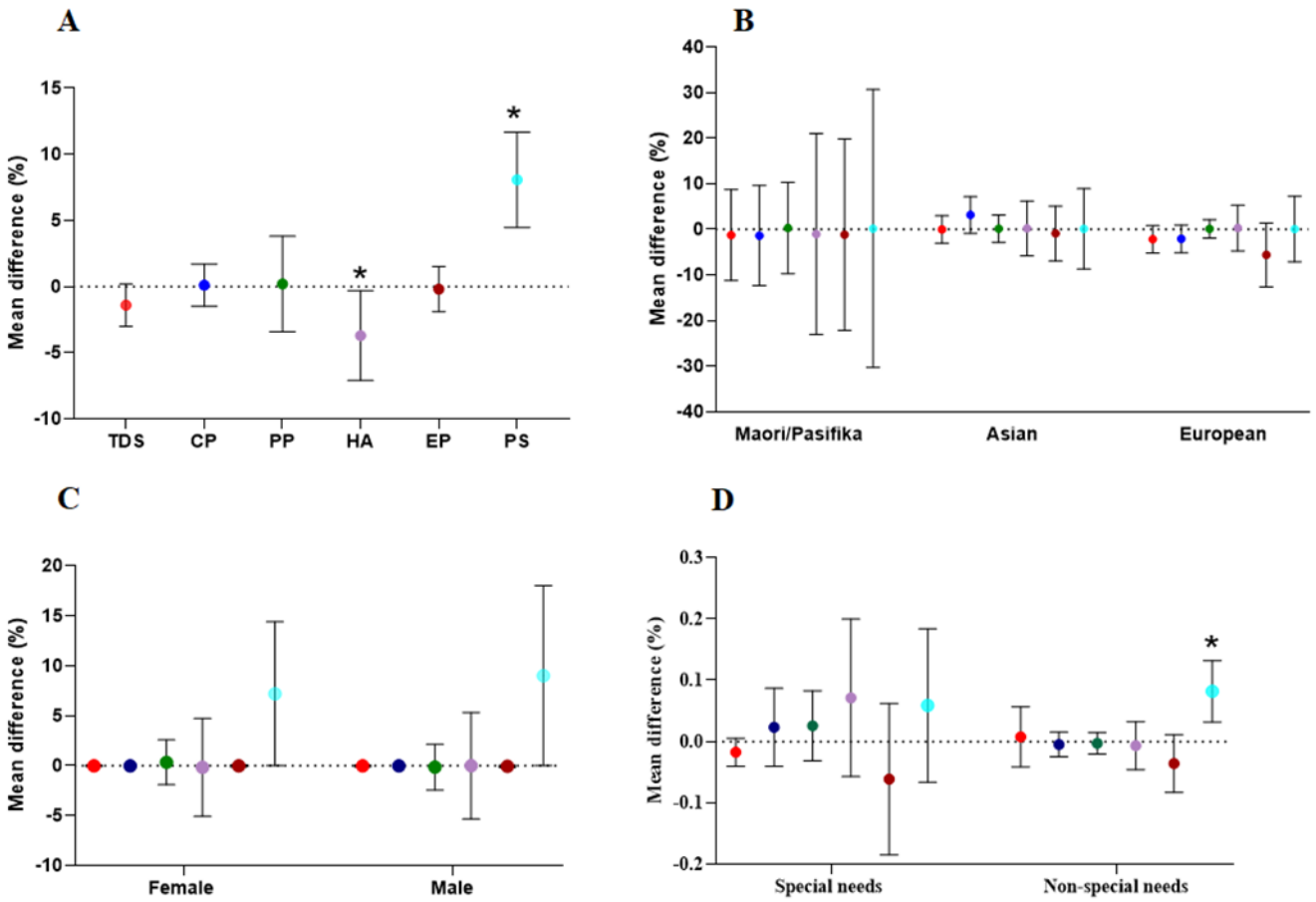


Figure 5-1: Mean Differences (DG-CG) in SDQ Scores

Discussion

The current study evaluated the effects of a curriculum-integrated dance programme on children's behaviour in the New Zealand primary school setting. The significant findings from this study were decreased hyperactivity and increased prosocial behaviour among DG children when compared to CG children. These findings represent a novel contribution to the unexplored area of dance-embedded learning and classroom behaviour. Although curricular learning and creative movement formed key aspects of the dance programme, other aspects such as teamwork and group performances may have contributed to these significant changes in behaviour.

The findings from the current study contradict the findings from a BrainDance study, wherein children's hyperactivity levels significantly increased post-intervention (Chiang 2017; Gilbert 2006), but aligns with another observational study, which suggested that dance may help children with ADHD (Levin 2016). In the current study,

it is unclear which aspect of the dance programme reduced hyperactivity. It may be a combination of physical activity and dance education wherein physical activity is an outlet of energy, creative movement and release of emotions, and dance education provides a platform of expression (Levin 2016). These mechanisms are yet to be further explored in the primary school context.

The positive benefits on prosocial behaviour observed in the present study align with previous evidence on the social benefits of dance among children (Chiang 2017; Koshland and Wittaker 2004; Masadis et al. 2019; Withers et al. 2019). Curricular learning was taught through creative movement, social interaction, teamwork and critical appreciation. It is likely that certain activities from the dance programme may have influenced the prosocial behaviour of the children. Activities such as Hello—an activity involving creative movement where children required the help of peers; Festivals Across The World—an activity representing various festivals in small groups; or Plant Life Cycle—representation of the stages of a plant with the help of a partner, all required negotiation, communication and trust.

The application of dance in the primary school context as a learning tool and a form of art or psychotherapy, may have significant benefits for children (C. M. Greenfader and L. Brouillette 2017; Kassing and Jay 2002b; Koshland and Wittaker 2004; Parab et al. 2019). In the New Zealand public school context, primary educators are expected to effectively teach and engage with all children, irrespective of disability (NZ Ministry Of Education 2007b). Given the versatile application of dance, primary educators may consider dance-based activities to enhance learning in children, while also decreasing incidents of classroom misbehaviour. When applied as a means of positive reinforcement in the classroom setting, dance may be more effective than punishment, particularly for children with behavioural difficulties (Moula et al. 2020).

Limitations and Implications for Future Research

The current study was subject to several limitations, mainly pertaining to the duration of the dance programme and the low sample size (particularly within ethnic groups). The dance programme lasted only six weeks in each school and the long-term effects on hyperactivity and prosocial behaviour could not be assessed. Future longitudinal studies should include a larger sample size and evaluate the long-term benefits of a dance programme.

Socio-economic status was not an independent variable in the current study, as it was conducted among primary schools with children from higher socio-economic backgrounds. Given the effects of dance as a therapy for children at-risk of dropping out from school, future studies could investigate the effects of dance on children from the lower socioeconomic strata (Koshland and Wittaker 2004). Future interventions could also involve a combination of DMT and dance-embedded learning to assess the behavioural changes among children at-risk.

In the current study, although there were significant differences in observed hyperactivity, the mechanism through which this occurred is unclear. It cannot be determined whether these differences were caused due to creative learning (involving creative movement and group performances) or due to kinesthetic learning (involving fitness and coordination). An observational study on Capoeira found therapeutic benefits on children with ADHD (Levin 2016). As such, future researchers may compare different dance-based interventions among children with varying physical disabilities, cognitive disabilities, ethnicity and socioeconomic status. A mixed methods study combining researcher observations, children interviews, children journal reflections and assessments may be utilized to explore these mechanisms in detail.

Conclusions

The findings from the current study suggest that dance-embedded learning may decrease hyperactivity and increase prosocial behaviour among primary children. As such, primary school educators, school principals and school policy-makers may wish to consider embedding dance and creative movement into their curriculum. Primary school educators who teach children with ADHD or behavioural issues may consider dance as an effective teaching tool—one that is inclusive and engaging for all children. The findings from this study may also be applicable to dance movement therapists, special educators and school psychologists. However, further research would need to be conducted to assess the long-term impact of dance-embedded learning on children's behaviour, particularly among children with varying special needs at school. Dance-embedded learning among children with co-morbid learning disabilities, such as ADHD and dyslexia, may be further explored.

Chapter 6 **: Effects of a curriculum-integrated dance programme on children's physical activity**

Preface

Movement and physical activity were integral to the dance programme in this research project. Although the level of physical activity varied in intensity and frequency, children were engaged physically and mentally throughout the programme. Research has suggested that movement-based learning and dance can increase children's levels of physical activity. However, it is unknown whether a dance-based learning programme can increase children's levels of physical activity. While chapter four's findings did suggest that the dance programme may have had health benefits on children, it is unclear whether their levels of physical activity was effected. As such, the current chapter endeavours to investigate whether the curriculum-integrated dance programme had an impact on children's physical activity levels as measured through accelerometers. This chapter is currently under review in the *Journal of Physical Activity and Health*.

Abstract

Background: Curriculum-integrated dance programmes are a promising but relatively under-researched strategy for increasing children's physical activity. The aim of this study was to determine the impact of a curriculum-integrated dance programme on children's levels of physical activity.

Methods: A total of 134 primary children aged 7–9 years from four New Zealand schools were assigned to either a dance group (n = 78) or control group (n = 56). The dance group participated in a six-week curriculum-integrated dance programme during school time. Although the dance programme focussed on curricular learning, fitness and coordination were embedded in the dance sessions. Intensity of physical activity varied according to the focus of each dance session. Physical activity was measured at baseline and post-intervention using a waist mounted ActiGraph GT3X+ accelerometer for eight consecutive days.

Results: There were no significant intervention effects on step counts or physical activity levels between the dance and control groups at post-intervention timepoint.

Conclusion: Dance-embedded learning did not increase overall levels of physical activity in this study. Future studies may consider assessing longer-term effects of a dance-based intervention, or programmes that place more focus on physical activity promotion.

Background

Empirical evidence suggests that children's regular participation in school-based physical activity (PA) may improve their academic performance, neurocognition, classroom focus and wellbeing (Biddle and Asare 2011; Norris et al. 2015). Research also suggests that physically active lessons, which constitute one form of movement-based learning, may foster children's understanding towards subjects such as mathematics, social sciences or language arts (Norris et al. 2015). Such lessons may leave a more deeper effect on children's minds and enable retention, due to the interplay between experiential learning and visual learning (Moore and Linder 2012). Furthermore, with the increase in childhood obesity worldwide, embedding PA and movement into school teaching may be one effective mechanism of reducing obesity rates, while also promoting children's learning. Moreover, empirical evidence suggests that movement-based learning may significantly increase PA levels of children, and may have a knock-on effect on increasing their fitness levels and wellbeing (Norris et al. 2015).

Dance is another form of movement, which encompasses creative, physical and mental health benefits for primary schoolchildren (Anjos and Ferraro 2018; Moore and Linder 2012; Richard 2013). Furthermore, when embedded into primary school teaching, dance and creative movement- a component of dance involving the encouragement of independent movement and expression- may provide a deeper learning experience for children (Richard 2013). This interplay between body and mind which is manifested through dance and creative movement, may provide a more embodied learning experience for children (Richard 2013). As such, dance may be considered the connecting link between physical education and art education which constitute two among eight[6] learning areas mentioned in the NZ primary school curriculum (NZ Ministry Of Education 2007b).

[6] English, the arts, health and physical education, learning languages, mathematics and statistics, sciences, social sciences, and technology are the eight learning areas of the NZ school primary curriculum

Recognising the benefits of PA, aerobic programmes such as Jump Jam are part of many primary schools across NZ. However, as a form of mass physical education such programmes have little curricular cross-over and may have limited scope for creative movement (Kulinna et al. 2018). Owing to primary school logistics such as unavailability of school hall and timetable issues, it is unlikely whether Jump Jam sessions are a daily routine for the entire school. Dance-embedded learning at the individual class level may be a sustainable and effective teaching tool to keep children active and promote learning. Given that NZ primary educators feel inexperienced towards dance-embedded teaching, professional learning development (PLD) may be effective in helping teachers apply dance and creative movement into their teaching practice. In order to expose children and teachers to dance and creative movement, a curriculum-integrated dance programme was developed and this formed the intervention of the study.

A curriculum-integrated dance programme is a series of dance sessions that encompass various curricular activities using the principles of dance education and creative movement (Sharma et al. 2020). Although research suggests that dance may contribute to increased PA levels in children, the impact of a curriculum-integrated dance programme on children's PA levels is under-researched (Robertson-Wilson et al. 2016). Moreover, previous studies have been conducted outside school hours with minimal class teacher participation and curricular cross-over (Adkins et al. 2013; K. L. Cain et al. 2015; Jago et al. 2015; O'Neill et al. 2011). This study is novel from the NZ and overseas context to evaluate changes in PA levels from a six-week dance programme, which was developed around an existing primary school curriculum. With previous studies suggesting that PA levels may differ across certain sub-groups, the study also investigated differences in PA levels among gender, ethnicity and special needs.

Methods

This study was a cluster randomised controlled trial that evaluated the effects of a curriculum-integrated dance programme on physical activity among children from four primary schools in Auckland, New Zealand. The project took place between September 2016 and December 2017. Data were collected one week prior to the intervention (baseline) and at the conclusion of the six-week intervention (follow-up). The Auckland University of Technology Ethics Committee (AUTEC) approved the research in September 2016 (application number 16/303).

Participants

A total of four primary schools from Auckland, New Zealand participated in the study. Taking into consideration the travel time and availability of the dance educator, primary schools in the North Shore region of Auckland were asked to participate. Within each school, one class was assigned to the dance group (DG) which received the intervention and one class was assigned to the control group (CG) which did not receive the intervention. Hence, four DG classes and four CG classes participated in the study. Study details were explained to the children and they were given time to ask questions. Written informed assent and consent were obtained from children, parents and teachers prior to participation.

Children from various ethnic backgrounds and learning abilities participated in the study. Children of Polynesian ethnicities, such as Māori and Pacific Island, were categorised a "Māori/Pasifika"; children from all Asian countries (e.g., India, China, Sri Lanka) were categorised as "Asian"; and children of European ethnicity (e.g., New Zealand, Australian, British) were categorised as "European". Children attending English language classes and those with cognitive impairments or speech difficulties were categorised as "special needs".

The dance programme

The dance programme was delivered by a dance educator, with DG teachers and their children participating in the dance sessions. The module of the dance programme differed across all four schools and was tailored to meet the teachers' term focus: such as science, Māori culture or Environmental Science. Teachers played a key role in the development of the dance programme, with detailed discussion taking place between the DG teacher, dance educator and primary author. It was envisaged that the dance programme would serve as teachers' professional learning development and help instigate movement-based teaching into their teaching practice. During the absence of the dance educator, the primary author and participating teacher collaborated to run the dance sessions.

In each school, the dance programme was delivered three times per week over a period of six weeks. Thus, each school took part in 18 dance sessions. Each session varied between 30 minutes to 45 minutes and were conducted during school timings at a time suiting the teacher. Some sessions lasted little as 20 minutes, owing to confusion in timings or overlap with other school activities. Topics such as Canon and Unison (mathematics), plant life cycles (science), Maui and The Sun (Māori culture) were

covered in close alignment with the learning areas outlined in the NZ primary school curriculum. The sessions also involved creative movement, critical appreciation, recreation, teamwork and collaboration which closely aligned with the core competencies and values outlined in the NZ primary school curriculum.

The volume and intensity of physical activity differed across the dance sessions, given the varied lesson plan and availability of school hall. For example, the *Traveling Activity* - wherein children traversed across the school hall in various movements and permutations- involved moderate and vigorous intensities of PA; however, *Life Cycle*- which was conducted in the classroom- involved a low intensity of PA owing to space constraints. *Dance Detective* and *Hello* which involved a low intensity of PA were designed to keep children engaged and was applied as a means of positive reinforcement. Since all four participating teachers had little to no experience in dance-embedded teaching, the activities from the dance programme were designed to be simple, malleable and applied into their practice. Teachers were handed over an outline of the dance sessions, with photos and videos of the dance programmes in their respective schools. This was envisaged to serve as a source of reference for the teacher and for their school. Further details about the development and delivery of the dance programme and its applicability to New Zealand primary schools can be found elsewhere (Sharma et al. 2020).

Measures

Actigraph GT3X+ (Actigraph, Pensacola, FL) was used to assess light, moderate and vigorous physical activity, and step counts for both DG and CG participants. These devices are small (46mm x 33mm x 15mm) light weight (19g), and have been used extensively in studies with children given their high validity (Donnelly et al. 2009; Kelli L. Cain et al. 2013). Each device was initialised to log raw data at 30 Hz for one week before the intervention (baseline timepoint) and one week after intervention (follow up timepoint) using the Actilife software (v6, Actigraph, Pensacola, FL). The devices were worn on a waist belt positioned over the participant's right hip. Children were asked to wear the belt during waking hours and to remove the belt during showering and swimming (or other water-related activities). Children completed a compliance log, where they recorded the times the accelerometer was worn and removed. In the current study, the compliance log mainly acted as a reminder for the children to wear the belt during their wake times. After a week, the devices and compliance logs were collected

from the school. The data from the compliance log could not be applied in the study, since there was missing data at post-intervention timepoints.

At Schools One and Two, children were attached with the devices keeping one day overlap of the dance session both at baseline and post-intervention timepoints. Bearing in mind intervention fidelity, the primary author tried to keep a note of absentees from each dance sessions. However, these procedure could not be replicated for Schools Three and Four owing to research logistics such as varied intervention timings at each school, teacher unavailability and other research responsibilities (such as planning and delivering the dance sessions in the absence of the dance educator).

Children, teachers and school principals were handed over a report on the various intensities of PA at baseline and post-intervention timepoints. Children's report contained breakdown of their individual data, while teacher reports contained average PA of their class. Principal reports entailed information on the PA levels of both DG and CG class.

Statistical analysis

Power analysis

Prior to conducting the study, power analysis was calculated using G*software. An ANCOVA model was conducted using three independent variables- age, gender, and baseline- amongst two groups – dance and control. Keeping a significance level (α) of 0.05, power of 0.8 (standard), effect size (f) of 0.25, a total sample size of 128 was indicated, with 64 participants in each group. With an anticipated participant drop-out rate of nearly 15%, the required sample size was 200 participants. As such, four primary schools were contacted to participate, given the average class strength is 25 students.

Baseline characteristics of the sample were calculated and presented as mean ± standard deviation for continuous variables, and n (%) for categorical variables. Independent-sample t-tests and chi-square tests were conducted to compare the characteristics of the DG and CG participants at baseline. For each of the physical activity outcome variables (step count, sedentary, light intensity, moderate intensity, vigorous intensity) a generalised linear model with a normal distribution and identity link function was fit to examine the effect of the intervention while adjusting for the corresponding baseline value and age. The interaction between the treatment group and other fixed effects was also examined. Estimated means and pairwise contrasts between each level of the categorical independent variables (treatment group, ethnicity, gender, special

needs) were computed, with multiple comparisons adjusted using the Bonferroni correction. An alpha of 0.05 was implemented, and all analyses were conducted using IBM SPSS Statistics v23 (IBM Cooperation, USA).

Intervention effects

For each of the physical activity outcome variables a generalised linear model with a normal distribution and identity link function was fit to examine the effect of the intervention while adjusting for the corresponding baseline value and age. The interaction between the treatment group and other fixed effects was also examined. Estimated means and pairwise contrasts between each level of the categorical independent variables (treatment group, ethnicity, gender, special needs) were computed, with multiple comparisons adjusted using the Bonferroni correction. An alpha of 0.05 was implemented, and all analyses were conducted using IBM SPSS Statistics v23 (IBM Cooperation, USA).

Results

Using Actilife, the data were downloaded and aggregated to 30 second epoch values before step counts; and sedentary, light, moderate and vigorous intensity physical activity was estimated by applying the Evenson cut points (Evenson et al. 2008). Children had to have at least 8 hours of accelerometer wear time on at least three days (for both baseline and post-intervention timepoints) to be included in the analysis. Of the 187 children that took part in this study, 134 met the inclusion criteria.

Table 6-1 shows the participant demographics at baseline. There was a small but significant difference in vigorous physical activity at baseline: DG children had 2 min/day more vigorous physical activity than the CG children ($p = 0.039$). There were also significant differences in age and ethnicity between the two groups: CG was slightly older ($p = 0.013$) and had a higher proportion of European participants but a lower proportion of Māori/Pasifika and Asian participants ($p = 0.002$). The DG had approximately 0.5 less valid days of accelerometer wear time compared with the CG ($p = 0.033$). There were no differences in the proportion of children with special needs or of each gender.

Table 6-1: Participant characteristics and physical activity levels at baseline

	DG (n = 78)	CG (n = 56)	*p*
Age	8.64 ± 0.41	8.84 ± 0.45	**0.013***
Gender			
Male	35 (45%)	27 (48%)	0.702
Female	43 (55%)	29 (52%)	
Ethnicity			
European	34 (44%)	40 (71%)	
Asian	33 (42%)	15 (27%)	**0.002***
Māori/Pasifika/Others	11 (14%)	1 (2%)	
Special Needs			
Special needs	9 (12%)	4 (7%)	0.396
Non- special needs	69 (88%)	52 (93%)	
Physical activity			
Baseline wear time (min/day)	727 ± 80	739 ± 71	0.109
Baseline valid number of days	6.6 ± 1	7.1 ± 1	**0.033***
Baseline steps (steps/day)	9670 ± 2242	9561 ± 2000	0.771
Baseline sedentary PA (min/day)	323 ± 70	338 ± 68	0.204
Baseline light PA (min/day)	355 ± 50	347 ± 56	0.338
Baseline moderate PA (min/day)	39 ± 16	41 ± 16	0.32
Baseline vigorous PA (min/day)	10 ± 7	8 ± 1	**0.039***
Baseline MVPA (min/day)	49 ± 21	54 ± 21	0.137

Data presented as mean ± SD or n (%). P value from independent samples t-test or chi-square test where appropriate. * represents $p < 0.05$

Table 6-2 shows the main intervention effects for each physical activity outcome variable. These are the estimated differences post-intervention, after adjusting for the corresponding baseline value and age. For each outcome variable, the difference between the DG and CG was small; no significant effects on physical activity or step counts were observed. The between-group difference equated to 1.5 min/day of moderate-vigorous physical activity, 1.5 min/day of moderate physical activity, 0.2 min/day of sedentary, 6.7 min/day of light physical activity, and 0.5 min/day of vigorous physical activity. The only significant treatment interaction effects were observed for ethnicity when examining moderate-vigorous physical activity ($p = 0.03$) and vigorous physical activity ($p < 0.01$);

however, the pairwise contrasts revealed no differences after adjustment for multiple comparisons. Given the low sample number of Māori/Pasifika in the CG (n = 1) these estimates must be interpreted with caution. Figure 6-1 presents the estimated difference in means between the DG and CG overall; and for each level of the ethnicity, gender and special needs fixed effects.

Table 6-2: Intervention effects on physical activity levels after adjustment for baseline values and age

Activity	*B*	95% CI		p value	[a] r^2_{adj}	[b] $\eta_p 2$
		lower	upper			
Sedentary	6.56	-16.13	29.25	0.568	0.58	0.002
Light	3.82	-24.56	16.92	0.717	0.56	0.002
Moderate	-0.12	-5.37	4.97	0.964	0.41	0.001
Vigorous	-1.06	-5.01	2.90	0.598	0.18	0.005
MVPA	-0.75	-8.81	7.31	0.854	0.36	<0.001

MVPA = Moderate-to-vigorous physical activity
Results obtained from generalised linear mixed models using a normal distribution and an identity link function. Bivariate model evaluated the main intervention effect after adjustment for age and baseline values. Multivariate models included interactions with ethnicity, gender, and special needs (separately) after adjustment for age and baseline values.
*P < 0.05
[a]Adjusted using sequential Bonferroni correction.

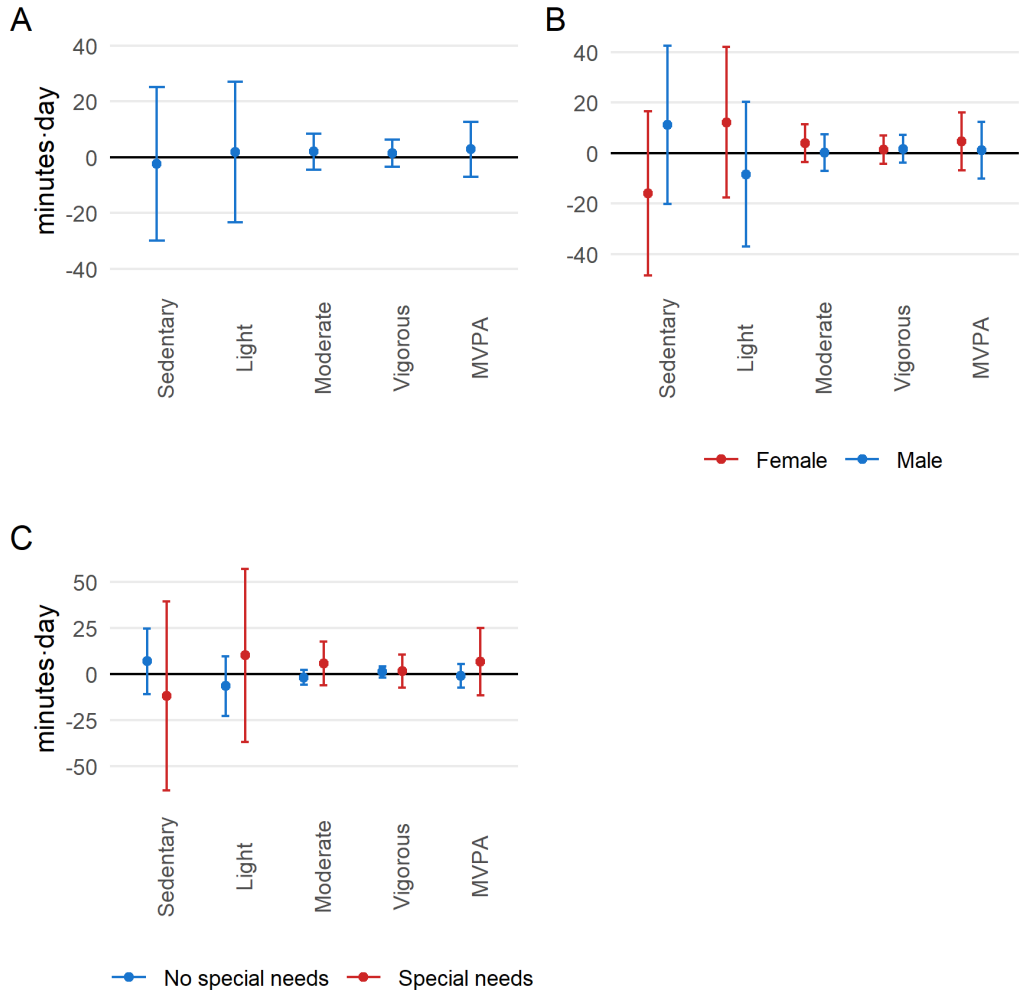


Figure 6-1: Mean difference (DG-CG) in physical activity levels

MVPA Sedentary PA Light PA Moderate PA Vigorous PA

Intervention effects for PA: (A) Overall effects for each PA level; (B) effects stratified by gender; (C) effects by ethnicity; (D) effects by special needs group. Results obtained from generalised linear models using a normal distribution and identity link function. All effects means were adjusted for age and baseline and are displayed with 95% CI.

PA = physical activity; MVPA= moderate-to-vigorous physical activity

Discussion

The current study evaluated the effects of a curriculum-integrated dance programme on children's physical activity in the New Zealand primary school setting. The findings from this study revealed no significant treatment effects on physical activity as a result of a curriculum-integrated dance programme. There were no significant differences in the

various levels of physical activity or step counts between the DG and CG. Changes in the various levels between physical activity and moderate-vigorous physical activity, sedentary, light, moderate or vigorous—were not influenced by gender, ethnicity or special needs.

The intervention from the current study involved a combination of physical activity, curricular learning and dance. Given the novelty of the dance programme, it is difficult to compare the findings with previous research which have evaluated changes in physical activity levels either through movement-based learning (Donnelly et al. 2009), or dance as separate studies (O'Neill et al. 2011). Although a physical activity-based learning programme in a previous study did find a 12% increase in daily physical activity levels in the treatment group (Donnelly et al. 2009), there was little crossover with dance or a creative movement component. Also, the study spanned three years- a factor likely to have contributed to the significant result (Donnelly et al. 2009). Another study did find an association between physical education lessons and children's physical activity, wherein boys showed significantly higher rates of MVPA. However, the physical education lessons appeared to focus more on fitness and neither involved a curricular cross-over nor a dance component (Howells et al. 2018).

There may have been several factors which influenced the findings of the current study. Literature has suggested that when teachers are well-informed of their children's PA levels, they are likely to increase movement-based activities in their teaching, thereby decreasing sedentary PA in their children (Hodgin et al. 2020). In the current study, teachers were provided a class report (with baseline and post-intervention PA data) *after* the completion of the dance programme. Had the teachers been given a report of baseline PA data, teachers may have placed more emphasis on movement in their classroom teaching and may have led to significant differences in PA levels at post-intervention. With an absence in follow-up data, it is unknown whether PA levels changed after the programme in each school.

The core component of the dance programme was curricular learning through creative movement and dance. Since the programme had to cater to the needs of the participating teachers and children, the curricular focus and intensity of physical activity during the dance sessions differed.

Moreover, the dance programme lasted only six weeks in each school with a focus on enhancing curricular learning through exposing children and teachers to creative

movement. Although fitness and coordination were key components of the programme, the intensity of these components may not have been sufficient to produce significant effects. This also meant that the programme did not have a specific focus on health-based education, which may have contributed to the lack of physical activity behaviour change were observed.

Limitations and implications for future research

There were several limitations of this study. Given the randomisation of participants occurred at the class level (and not the school level) the possibility of contamination effects across classes within the same school cannot be ruled out. Furthermore, since the dance programme module differed across schools, a standardised volume and intensity of physical activity could not be maintained for each intervention class. Future research could consider developing a long-term intervention where all participants receive a similar physical activity stimulus.

Lack of follow-up beyond the duration of the intervention formed another limitation of the study. Since it was posited that dance would constitute part of the teachers' practice, it was unknown whether children's PA levels changed over time. Future studies may consider evaluating children after six months and one year. Teacher perspectives may be gathered after six months (or a year) to understand the logistics and feasibility of embedding movement as part of their teaching practice.

The accelerometers were removed at certain times during the day (e.g., water-based activities), and several children forgot to wear the devices again after removal. This non-wear time across the sample may have impacted the overall findings of the study. As such, future researchers may consider utilising waterproof devices such as the Axivity AX3. These devices can be attached directly to the skin, and can provide 24 hours wear time compliance (Duncan et al. 2018).

Although fitness, balance and coordination were essential components of the dance programme, these could not be quantitatively assessed and future studies may want to take this into consideration (Anjos and Ferraro 2018). With a growing body of literature suggesting the role of arts in public health, future studies may consider evaluating and devising dance- based interventions around health education (Bungay and Vella-Burrows 2013). Topics related to exercise, nutrition and obesity may be covered in these interventions and may be evaluated using mixed methods procedures.

Conclusions

Although there were no significant findings, the methodology utilised in the current study is unique and may provide impetus for further research on PA-based learning programmes in schools. Future researchers may need to devise more robust and sustainable learning interventions, which are physically engaging, creative and promote children's holistic development. This study may contribute to literature on dance education, physical education and school-based interventions.

This research evaluated a curriculum-integrated dance programme across four primary schools in Auckland, New Zealand. The body of work from this thesis is posited to (1) provide insight on the feasibility and applicability of embedding dance into an existing curriculum from the New Zealand context, to (2) deepen our understanding on the effects of dance-embedded learning on primary school children and teachers (3) as a randomised controlled trial (RCT), contribute to research evaluating school-based interventions on academic, physical, behavioural and wellbeing measures.

The key findings from this thesis is represented in Table 7-1.

Research Summary

The crux of this research laid in the curriculum-integrated dance programme which took place across four primary schools in Auckland (NZ) and is explained in chapter two of this thesis. Four primary school teachers and their respective class children (101 primary school children) took part in this six-week dance programme at their schools during school timings. The dance programme catered to the needs of the children and curricular term focus of each teacher. While other dance-based interventions targeted a particular subject theme (e.g. mathematics) or a particular behavioural outcome (e.g. decreased aggressive behaviour) the current study's intervention is novel to have covered a wide range of curricular subjects by embedding activities pertaining to dance education, creative movement, social learning and fitness. The key findings from this study were teachers' reflections on the transferability of dance-embedded learning to their teaching practice and the programme's impact on their professional learning development. Applicability of the dance programme to other NZ schools is discussed along with sustainable recommendations which may support the integration of dance into primary school teaching and learning.

Chapters three, four, five and six covered the evaluation outcomes of the dance programme. Chapters three and four were findings from a mixed methods evaluation; chapters five and six were findings from quantitative evaluation procedures.

Table 7-1 overview of chapters two-six

Chapter	Type of study	Participants	Key measures		Key findings	
			Quantitative	Qualitative	Quantitative	Qualitative
2	Qualitative	101 DG children 4 DG teachers		Researcher observations and teacher interviews		Dance programme served as means of teachers' PLD and enabled them to reflect on embedding embedded dance and creative movement into future teaching practice.
3	Mixed methods	101 DG children 86 CG children	AsTTle reading and mathematics questionnaires (child-reported)	Children's journal writing, focus group interview and researcher observations	Increased reading scores among children with special needs, Māori/Pacific Island and Asian	Themes pertaining to curricular learning overlapped with creative movement, dance education and kinaesthetic learning.
4	Mixed methods	101 DG children 86 CG children	AWE questionnaire (child-reported)	Children's journal writing, focus group interview and researcher observations	Increased overall wellbeing; health and lifestyle	Themes pertaining to emotional wellbeing, resilience, physical wellbeing and fitness, social wellbeing resonated with AWE sub-domains.
5	Quantitative	77 DG children 67 CG children	SDQ (teacher-reported)		Decreased hyperactivity and increased prosocial behaviour	
6	Quantitative	78 DG children 56 CG children	ActiGraph GT3X+ accelerometers		No significant findings	

Chapter three discussed the impact of the dance programme on children's academic performance, utilising a mixed methods approach. The key findings from this study were the significant effects of the dance programme on reading outcomes among certain sub-groups of DG children: children with special needs and children hailing from Māori/Pacific Island and Asian ethnic groups. Furthermore, DG children reflected on the dance activities and its impact on their curricular learning. Children's themes pertaining to creative movement, kinaesthetic learning and dance education were in tandem to each other, suggesting the dance programme served as a diverse experience for the children.

Chapter four was conceived after recognising the abundant literature on dance and children's overall wellbeing. However, the current study differed from previous literature in utilising a novel approach to triangulate findings from a wellbeing questionnaire along with written and oral reflections. The key findings from this study were DG children's significant improvement in reported overall wellbeing, and in the health and lifestyle domain of the wellbeing questionnaire in comparison to the CG. Moreover, themes from children's reflections surrounding emotional wellbeing, social wellbeing and physical fitness overlapped with curricular learning and creative movement. This study overlaps from chapter three's findings, suggesting the dance sessions were a source of happiness, recreation, and a modality of learning for the DG children.

Chapter five evaluated changes in classroom behaviour. Drawing from literature suggesting the benefits of dance movement therapy on children's behaviour, this study was conducted to assess changes in behaviour following a dance-embedded learning programme. The key findings from this study were the significant reductions in hyperactivity and increased prosocial behaviour in children as reported by three DG teachers. The collective findings from chapters four and five suggest that the dance programme had quantitative and qualitative effects on children's social behaviour.

Given limited evidence on the impact of dance interventions on children's physical activity (PA) levels, chapter six investigated whether a curriculum-integrated dance programme could increase PA levels of children significantly. There were no significant differences in the PA levels between the DG and CG at post-intervention timepoint. However, chapter four found significant differences in DG children's health and fitness as gathered from quantitative and qualitative findings. Although the dance programme may not have impacted children's PA levels, the potential impact on children's physical health and fitness should not be ruled out.

Significance of findings

This body of work makes several novel contributions to the field of dance education from the NZ and overseas context. These contributions are represented in Figure 7-1 and discussed in detail.

Impact on primary educators

Primary educators in the NZ and overseas lack exposure towards dance-embedded teaching and feel the need for an expert to deliver the dance sessions (Ashley 2010; Buck 2003; Snook 2012b). In order to address this problem, the curriculum-integrated dance programme from this research was designed to act as Professional Learning Development (PLD) for the participating teachers (Sharma et al. 2020). This collaborative artist-teacher model drew inspiration from previous research in the overseas context (Greenfader and Brouillette 2017; Mulker et al. 2015; Mulker and Liane 2013).

As anticipated, the dance programme acted as a means of PLD for all participating teachers. The collaborative model of the dance programme provided teachers exposure to the planning, delivery and logistics of embedding dance into their teaching practice. Three teachers even started applying the activities from the dance sessions into their classroom teaching- either as a form of physical activity or as a creative art form. With prior planning, teachers acknowledged that dance can be embedded into their primary school teaching and learning. Besides gaining practical experience on dance-embedded learning, teachers were also provided reference material: an outline of all 18 dance sessions in their school, supported with photos and videos. Acting as a source of reference, it is likely that these reference materials aided teachers beyond the duration of the dance programme.

> *When I look at all of the sessions it's like "Wow! Did we really do that much?" We did so much in six weeks (flipping through the dance sessions outline) … These are great, thank you! Going to have a look at them (Teacher Three interview, 5th July 2017)*

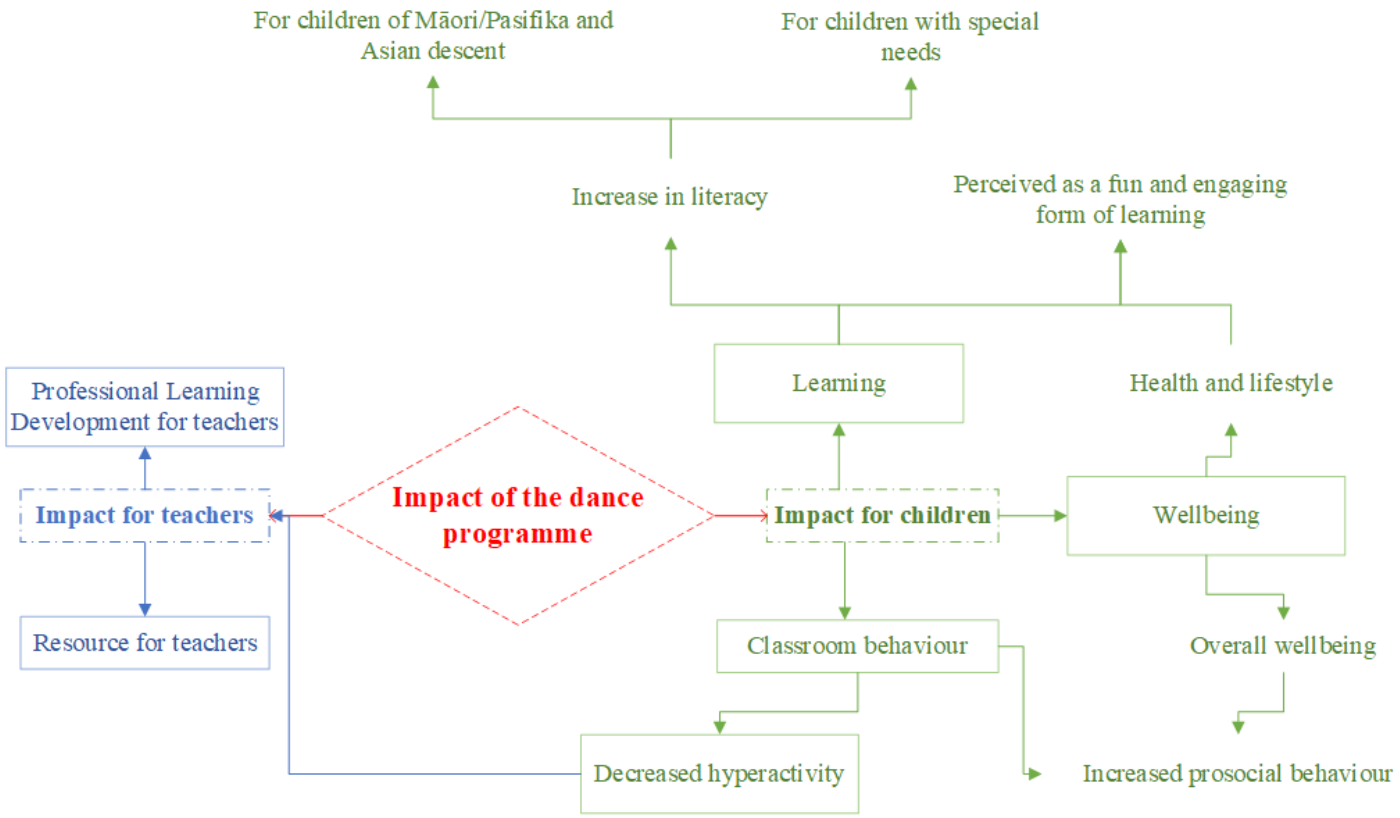


Figure 7-1: Representation of thesis findings

In NZ, several other resources such as *Dancing the Long White Cloud* (DLWC), *Kiwi Kids Dance*, *Discovering Dance-Teachers' Notes* and the *Dance Wall Charts* were handed over to primary educators to assist the integration of dance in their schools. (Ashley and Anderson 2002; Ministry of Education 2002; Ministry of Education 2005; New Zealand Ministry of Education 2006). However, these resources were released more than 15 years ago and currently not many schools are in possession of these physical resources. Reprinting of these resources stopped after a reduction in government funding (Sharma et al. 2020)

In summary, the collaborative nature of the dance programme served as a means of PLD for the teachers and provided them an opportunity to apply the activities into their teaching practice. The activities covered in the dance programme (Table 2-1) may be applied by teachers interested in embedding dance and creative movement into their teaching practice. An outline of the dance programme covered in School Three with learning reflections can be seen in Appendix 15; this may be of interest to researchers and educators from the international context as well as within New Zealand.

Impact on primary children

Enhanced curricular learning through exposure to dance and creative movement

Findings from Chapter Three add to the literature on the effects of dance and creative movement on primary school children's learning (Greenfader and Brouillette 2017, Simpson Steele, Fulton, and Fanning 2016; Dow 2010). Triangulation of focus group interview results, teacher interviews and children's journal writing suggested that most of the children displayed learning outcomes from the dance programme. These reflections on learning outcomes overlapped with themes related to creative movement, dance education and kinaesthetic learning, since they were covered in the dance programme. These findings suggest that when the principles of dance are applied as an active and embodied form of learning, children are likely to experience an enriched and deeper form of learning.

The activities covered in the dance programme helped towards building children's awareness on certain concepts surrounding dance education such as tempo, rhythm, use of space and levels. Through creative movement, children were encouraged to produce an original piece of movement, either individually or as a group. Team work, critical

appreciation, creativity and negotiation were also observed throughout the dance programme and add to existing literature on the social benefits of the dance in primary schools (Simpson Steele et al. 2016; Moore and Linder 2012). These findings have been covered in chapters Two and Three.

Although the dance programme did not significantly increase the reading and mathematics scores of the children as measured by the AsTTle questionnaire, it did significantly impact the reading scores of children with special needs, and children of Māori/Pacific Island and Asian descent. This is similar to the Teaching Artist Programme, wherein the dance-based learning intervention was specifically targeted towards improving English comprehension (Greenfader and Brouillette 2017). The novelty behind chapter three's findings is that the dance programme showed treatment effects on reading scores, despite including few activities targeting English reading and comprehension. The findings from Chapter Three suggest that dance may have acted as a medium of learning for these children (Richard 2013). It is also possible that the dance programme increased children's self-esteem and scholastic aptitude, given that participation in a similar school-based intervention targeted towards self-esteem and cultural learning has benefitted children of Māori descent (Rubie et al. 2004).

The increase in reading comprehension- both observed and assessed- is of particular value to certain sub-groups of NZ children. According to an international report comparing data across OECD countries, NZ had the second highest performance gap in reading and third highest inequality in primary school education (UNICEF Office of Research 2018). With primary schools including children of diverse ethnic and cultural backgrounds, dance-embedded learning may act as a form of communication for children with limited English-speaking abilities and children of recent immigrants. New Zealand reports on primary children's reading scores suggest that children of Māori and Pasifika descent perform lower in comparison to other ethnic groups- such as Asian and Pakeha. As such educational development of Māori/ Pasifika children is a national and school priority (Ell 2011; Ministry of Education 2016b) and dance-embedded learning may be one mechanism to help these children's academic performance (Rubie et al. 2004).

In countries such as USA, dance and creative movement are part of the primary school curriculum across many states. For example at the Tucson Unified School District, Opening Minds Through the Arts programme (OMA-TUSD) is an essential part of children's learning at school (Tucson Unified Schol District 2012). Research suggests

that OMA-TUSD schools increased literacy and numeracy levels in comparison to other schools with no art-integrated learning. The sustainability of this programme is largely due to the collaboration between teaching artists, integration specialists, classroom teachers and principals. In the case of New Zealand, a dance educator may be briefly hired a means of staff PLD, providing them the opportunity to reflect on ways embedding dance into teacher practice. Schools may consider applying a co-teaching approach, wherein ideas on art-integration are shared and applied into practice.

Increased sense of wellbeing

This research makes novel contributions in deepening our understanding on the effects of dance-embedded learning on children's wellbeing by triangulating findings from a wellbeing questionnaire, children's written perceptions and oral perceptions (Chapter Four). The findings from this study may suggest that dance-embedded learning may promote social wellbeing and may have a positive influence on their perceived health and lifestyle (Chiang, 2017; Kreutzmann, Zander, & Webster, 2017). These findings correspond to some of the desired outcomes for New Zealand's strategies of wellbeing at school (Education Review Office 2015, 2016). These include being socially and emotionally competent, physically active, having a sense of belonging and connectedness.

With cultural inclusivity constituting an essential aspect in primary schools, dance programmes at school may act as a common medium to promote school wellbeing and educate children on cultural respect. NZ reports suggest that the wellbeing strategies which are currently in place- both in schools and in the wider community- may not be effective for children belonging to Māori and Pasifika descent (Children's Commissioner 2020) (Education Review Office 2016). For these children, cultural dances such as *Sasa* or *Haka*[7] may promote a sense of belonging and with proper planning may cover other

[7] *Sasa* is a Samoan cultural dance, while *Haka* is a Māori cultural dance

learning areas of the curriculum as well. Schools may also consider embedding dance into their existing School Wide Positive Behaviour Support (SWPBS) framework (Savage et al. 2011). Empirical evidence suggests that school-based interventions are likely to have longer impact and are more sustainable when implemented at a school level (Donnelly et al. 2009). As such, dance may be applied-either as a physical activity or form of psychotherapy- to help all the children in a school, with or without special needs. Since the SWPBS framework, can be tailored according to the needs of the school, dance can be used to empower students, instil confidence, and educate them on integrity and cultural respect.

Improved prosocial behaviour and decreased hyperactivity

Although research has suggested that dance can improve children's social bonding, this study provides empirical evidence specifically on the treatment effect of a dance-embedded learning on prosocial behaviour (Chiang, 2017; Kreutzmann, Zander, & Webster, 2017). Additionally, this study establishes empirical evidence on the impact of a curriculum-integrated dance programme on reducing levels of hyperactivity (Chiang 2017; Levin 2016). Teachers may consider applying dance and creative movement as (a) a positive behavioural reinforcer for children with behavioural issues, (b) a conduit of introducing new children to their class (c) a class activity to increase social bonding and trust among children, (d) means to support children with cognitive and physical disabilities. Moreover, research has suggested that classrooms with increased social bonding and classroom focus permeates into children's academic performance as well (Barth et al. 2004; Flook et al. 2005).

The contributions of the overall body of work arising from this thesis is schematically represented in Figure 7-2. The findings from this research may provide impetus to further research in dance education from the NZ context by (1) helping devise effective and sustainable means of dance-based PLD for teachers and (2) by informing strategies for children's holistic development. From the overseas context, this thesis (1) provides novel contributions towards art-based and movement-based learning interventions at schools and (2) provides impetus for further empirical research on the effects of dance-embedded learning in the areas of special education, primary education and physical education (Catterall et al. 2012; Minton 2008; Richard 2013). A growing consensus of literature suggests that art-based strategies could run alongside health promotion strategies (Bungay and Vella-Burrows 2013). As a form of art and physical

activity, dance may be the connecting link between health, happiness and learning for primary schoolchildren. The recommendations from this thesis may be applicable to public policy makers, trying to develop robust and sustainable health practices for the wider community.

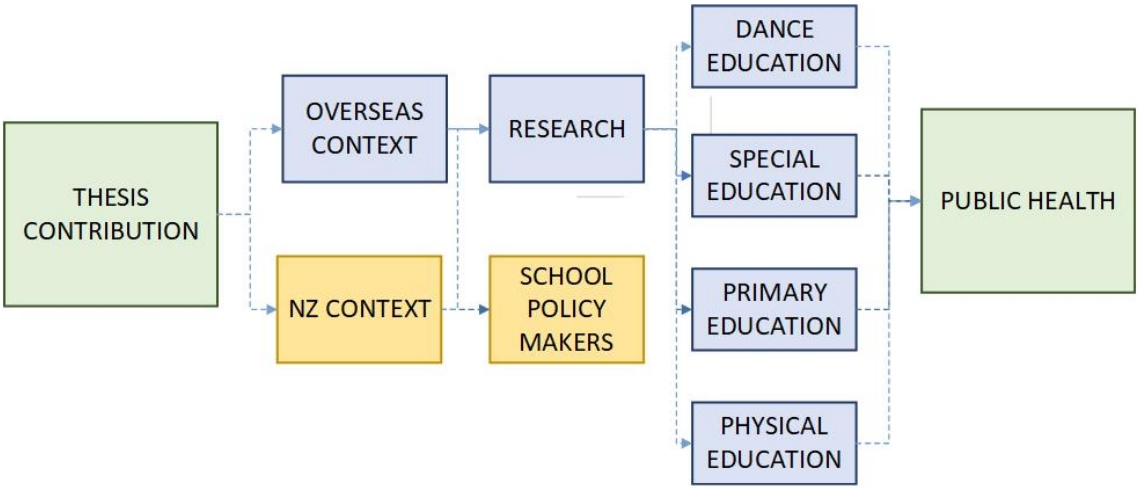


Figure 7-2. Thesis contribution to wider research areas

Research limitations and recommendations

The studies constituting this thesis were subject to several limitations and have informed directions for future recommendations and research. As with all research, time, budget, and resource constraints dictated study design and participant sample size. The most common research recommendations from chapters two to six would be (1) including a larger sample across varying socio-economic statuses, ethnicities and special needs (2) conducting longitudinal research across three or more timepoints, wherein retention effect are assessed (3) comparing various school-based interventions and asses the effects on outcome measures. Specific limitations and resultant future directions for each study are outlined forthwith.

Although the dance programme served as PLD for the teachers, it is unknown whether dance and creative movement became part of their teaching practice after the dance programme. As such, the absence of follow-up research is the main limitation of Study One and future longitudinal research may involve teacher interviews well beyond the intervention (e.g six months later). Schools may consider contracting a dance educator to organise workshops as part of their ongoing PLD. This may be an effective technique to ensure that teachers are comfortable and confident in embedding dance into their teaching practice. Such a form of PLD lies in close association with the Learning

Experiences Outside The Classroom (LEOTC) project run by the Ministry of Education (Ministry of Education 2016a). In this project, schools collaborate with community-based organisations to provide children a practical learning experience which covers several learning areas of the NZ primary school curriculum. Schools may consider collaborating with dance educators, such that teachers are provided with PLD and children experience an embodied form of learning. It may be observed that dance is least preferred as an LOETC provider, although dance-embedded learning can *support the achievement of broader curriculum outcomes (rather than specific learning areas)* (Te Kete Ipurangi*).* As such, funding towards dance either at the MOE level (as an LOETC project) or at the primary school level may be considered.

Another consideration could be including an outline of dance-based activities in the next version of the NZ arts curriculum. This could either be part of the main document or could be included in the appendix section. These activities would need to be easily applicable to NZ primary educators, who perceive a lack of expertise in dance education (Snook and Buck 2014). Finally, teacher training courses may consider allocating designated hours to dance education, practice, and assessment. This is likely to increase student teachers' confidence and exposure towards dance-embedded learning. While the current research involved the collaboration between a dance educator, primary educator and researcher, future research may consider evaluating dance-based projects involving student teachers, student artists and primary educators. Moreover, with limited funding towards dance, such collaborative projects led by student teachers/artists may provide ongoing PLD for primary educators and dance-embedded learning may gradually permeate into all schools.

A major drawback from Chapter Three was the quantitative assessment of the dance programme specifically on mathematics and reading abilities of children. The dance programme differed across all four schools, since it had to cater to the term focus of the participating teacher and serve as their PLD. However, the assessment measures remained constant and children could not be assessed on other subjects such as science, social science or art although they were also part of the dance programme. Future studies may include a rubric specifically to assess the learning outcomes from a dance-embedded learning programme across schools. Researchers may consider developing a questionnaire which is quantifiably measurable, transferable, and applicable across schools.

Chapter Four's limitations also lay in the quantitative evaluation procedures. The wellbeing questionnaire utilised in this study had not been previously used for any other study and these may pose concern on its reliability and validity. There was a disproportion in number of questions from each sub-scale, with only one question measuring resilience. This may have influenced the high error margin in the data analysis for resilience sub-scale. Future studies may consider utilising the Kidscreen questionnaire, which assesses children's wellbeing and the dance programme may include more activities focussing on children's resilience (Olga et al. 2018).

Many of the activities in the dance programme involved peer interaction and may have influenced the significant interaction effects in prosocial behaviour from Study Four. Although there were significant treatment effects in reduction of hyperactivity, it cannot be determined which aspect of the dance programme influenced this effect. It is unclear whether this effect was caused due to activities surrounding creative learning or due to activities surrounding kinesthetic learning which involved fitness and coordination. Given these findings may be of particular value to children with behavioural difficulties and ADHD in the primary school setting (Levin, 2016), further research can be specifically conducted to assess behavioural changes among children with these special needs. For children with co-morbid learning disabilities, such as ADHD with dyslexia, dance-embedded learning may act as an effective tool and as a behavioural modification technique. However, further research would need to warrant this. Effects of dance-embedded learning, specifically for children with varying cognitive and physical needs may also be considered.

Chapter Six's limitations lay in the assessment of PA levels from a dance programme focussing on learning and creative movement. Though physical activity and fitness were key elements of the programme, the intensity and frequency differed across the schools. As such, future researchers may consider maintaining a constant level of PA in a movement-based learning programme over a longitudinal study. Alongside accelerometers, children's self-reported questionnaires and in-depth interviews may provide comprehensive understanding on the impact of movement on children's learning. Another study may consider evaluating children's fitness levels, motor development and BMI from a dance-based intervention. As a longitudinal study, this may require with data being collected at six-month and a one-year follow-up. Another possibility would be to gather teachers' ideas on embedding movement and physical education into their

teaching. As a qualitative study, this will inform physical educators and school policy makers.

Conclusion

This thesis contextualised the development, delivery, evaluation and feasibility of a curriculum-integrated dance programme across four primary schools. This thesis suggests that dance in the NZ primary school context can tap into any learning area of the curriculum and can provide a holistic learning experience for children. Dance-embedded learning may be a promising mechanism to help children of Māori/ Pasifika descent in their learning outcomes and may promote their wellbeing. Moreover, dance-embedded learning is one possible tool to help migrant children and children with special needs integrate into primary schools. Finally, the findings from this thesis provide empirical data on the effects of a dance programme on academic, physical, behavioural and wellbeing outcomes.

This thesis reiterates the need to embed dance and creative movement into primary school teaching, given that an embodied form of learning caters to children of varying needs- physically, mentally, and emotionally. It was found that a dance programme conjointly developed by a primary educator and dance educator may encompass academic, wellbeing, behavioural and physical benefits for children. The novel findings from this thesis signify the need to integrate the principles of dance and creative movement into primary school teaching and into the need to emphasise on arts education in schools. This body of work also lies in close connection with the other applications of dance- as a form of psychotherapy, physical activity, and artistic expression- thus reinforcing the importance of children experiencing dance in way or another. With growing concerns on children's obesity rates and lack of exercise throughout the world, dance may be an effective tool to combat poor physical health and improve mental health. It is hoped that the information contained within this thesis will contribute to the next generation of school-based dance studies, and help inform the development of sustainable, physically active, creative, and engaging modules of learning.

References

Adams, J. H. (2016). Dance and Literacy Hand in Hand. *Journal of Dance Education, 16*(1), 31-34.

Adkins, M., Brown, G. A., Heelan, K., Ansorge, C., Shaw, B. S., & Shaw, I. (2013). Can dance exergaming contribute to improving physical activity levels in elementary school children? *African Journal for Physical, Health Education, Recreation & Dance, 19*(3), 576-585.

Alotaibi, A., Karkou, V., Linden, M. L. V. D., & Irvine, L. M. C. (2017). Movement therapy programme with children with mild learning difficulties in primary schools in Saudi Arabia. In V. Karko, S. Oliver, & S. Lycouris (Eds.), *The Oxford handbook of dance and wellbeing* (pp. 479-492). New York, USA: Oxford University Press.

Anjos, I. d. V. C. D., & Ferraro, A. A. (2018). The influence of educational dance on the motor development of children *Revista paulista de pediatria : orgao oficial da Sociedade de Pediatria de Sao Paulo, 36*(3), 337-344, doi:10.1590/1984-0462/;2018;36;3;00004.

Arnaud, C., Perlovsky, L., Bonniot-Cabanac, M. C., & Cabanac, M. (2013). Music and academic performance. *Behav Brain Res, 256*, 257-260, doi:10.1016/j.bbr.2013.08.023.

Ashley, L. (2010). *Teaching dance from contextual perspectives in the New Zealand curriculum : concerns, dilemmas and opportunities in theory and practice*. University of Auckland,

Ashley, L. (2014). *Essential guide to dance* (3rd ed.). London, United Kingdom: Hodder Education.

Ashley, L., & Anderson, E. (2002). Dancing the long white cloud. In D. Chadwick (Ed.). Wellington: Ministry of Education.

Atkins, D. R. (2015). *Body Pedagogies: How children come to understand their bodies and their selves during and following a health intervention in a New Zealand primary school*. Auckland University of Technology,

Bachrach, A., Jola, C., & Pallier, C. (2016). Neuronal bases of structural coherence in contemporary dance observation. *NeuroImage, 124, Part A*, 464-472, doi:http://dx.doi.org/10.1016/j.neuroimage.2015.08.072.

Barth, J. M., Dunlap, S. T., Dane, H., Lochman, J. E., & Wells, K. C. (2004). Classroom environment influences on aggression, peer relations, and academic focus. *Journal of School Psychology, 42*(2), 115-133, doi:https://doi.org/10.1016/j.jsp.2003.11.004.

Bartholomew, J. B., & Jowers, E. M. (2011). Physically active academic lessons in elementary children. *Preventive Medicine, 52*, S51-S54, doi:http://dx.doi.org/10.1016/j.ypmed.2011.01.017.

Bartholomew, J. B., Jowers, E. M., Roberts, G., Fall, A.-M., Errisuriz, V. L., & Vaughn, S. (2018). Active Learning Increases Children's Physical Activity across Demographic Subgroups. *Translational Journal of the American College of Sports Medicine, 3*(1), 1-9, doi:10.1249/tjx.0000000000000051.

Basnet, R. M., & Basnet, L. M. (2017). Association of Physical activity and academic performance in schoolchildren of Nepal. *Baltic Journal of Sport & Health Sciences*(3), 11-18.

Bateman, K. D. (2018). *Moving to learn: Improving attention in the classroom setting for elementary school children*. Boston University, Boston, USA.

Beals, F., Hipkins, R., Cameron, M., & Watson, S. (2003). An evaluation of professional development to support the arts in the New Zealand curriculum. Ministry of Education.

Beaulac, J., Olavarria, M., & Kristjansson, E. (2010). A community-based hip-hop dance program for youth in a disadvantaged community in Ottawa: implementation findings. *Health Promotion Practice, 11*(3 Suppl), 61S-69S, doi:10.1177/1524839909353738.

Bharara, G., Duncan, S., Jarden, A., & Hinckson, E. (2019). A prototype analysis of New Zealand adolescents' conceptualizations of wellbeing. *International Journal of Wellbeing, 9*(4), 1-25, doi:10.5502/ijw.v9i4.975.

Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: a review of reviews. *British Journal of Sports Medicine, 45*(11), 886-895, doi:10.1136/bjsports-2011-090185.

Bidwell, S. (2014). The Arts in Health: evidence from the international literature

Bläsing, B. (2017). Dance in the body, the mind, and the brain. In V. Karko, S. Oliver, & S. Lycouris (Eds.), *The Oxford handbook of dance and wellbeing* (pp. 45). New York, USA: Oxford University Press.

Boreham, C., & Riddoch, C. (2001). The physical activity, fitness and health of children. *Journal of Sports Sciences, 19*(12), 915-929, doi:10.1080/026404101317108426.

Bradley, K. K., & Szegda, M. (2012). The dance of Learning. In O. N. Saracho, & B. Spodek (Eds.), *Handbook of research on the education of young children*. London, United Kingdom: Routledge.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101, doi:10.1191/1478088706qp063oa.

Bremer, E., Crozier, M., & Lloyd, M. (2016). A systematic review of the behavioural outcomes following exercise interventions for children and youth with autism spectrum disorder. *Autism, 20*(8), 899-915, doi:10.1177/1362361315616002.

Brusseau, T. A., & Burns, R. D. (2018). Physical Activity, Health-Related Fitness, and Classroom Behavior in Children: A Discriminant Function Analysis. *Res Q Exerc Sport, 89*(4), 411-417, doi:10.1080/02701367.2018.1519521.

Brusseau, T. A., Hannon, J., & Burns, R. (2016). The Effect of a Comprehensive School Physical Activity Program on Physical Activity and Health-Related Fitness in Children From Low-Income Families. *Journal of physical activity & health, 13*(8), 888-894, doi:10.1123/jpah.2016-0028.

Buck, R. (2003). *Teachers and dance in the classroom : So, do I need my tutu?* , University of Otago, Dunedin.

Bungay, H., & Vella-Burrows, T. (2013). The effects of participating in creative activities on the health and well-being of children and young people: A rapid review of the literature. [Review]. *Perspectives in Public Health, 133*(1), 44-52, doi:10.1177/1757913912466946.

Burkhardt, J., & Brennan, C. (2012). The effects of recreational dance interventions on the health and well-being of children and young people: A systematic review. *Arts & Health, 4*(2), 148-161, doi:10.1080/17533015.2012.665810.

Cain, K. L., Gavand, K. A., Conway, T. L., Peck, E., Bracy, N. L., Bonilla, E., et al. (2015). Physical activity in youth dance classes. *Pediatrics, 135*(6), 1066-1073, doi:10.1542/peds.2014-2415.

Cain, K. L., Sallis, J. F., Conway, T. L., Van Dyck, D., & Calhoon, L. (2013). Using accelerometers in youth physical activity studies: a review of methods. *Journal of physical activity & health, 10*(3), 437-450, doi:10.1123/jpah.10.3.437.

Cameron, M., Crane, N., Ings, R., & Taylor, K. (2013). Promoting well-being through creativity: how arts and public health can learn from each other. *Perspectives in Public Health, 133*(1), 52-59, doi:10.1177/1757913912466951.

Catterall, J. S., Dumais, S. A., & Hampden-Thompson, G. (2012). The arts and achievement in at-risk youth: Findings from four longitudinal studies. (Vol. 55). Washington D C: National Endowment for the Arts.

Chand O'Neal, I. (2014). Selected Findings from the John F. Kennedy Center's Arts in Education Research Study: An Impact Evaluation of Arts-Integrated Instruction through the Changing Education through the Arts (CETA) Program. https://artsedge.kennedy-center.org/~/media/ArtsEdge/LessonPrintables/articles/arts-integration/KC-AE-Selected_Findings_CETA.pdf. Accessed 12/12/19.

Chiang, L. H. (2017). Enhance Learning through BrainDance Movements: An Empirical Study. *International Journal of Educational Methodology, 3*(1), 17-23, doi:10.12973/ijem.3.1.17.

Children's Commissioner (2020). The New Zealand Children's Commissioner's views on priorities for children. Wellington.

Clark, D. (2007). Classroom Management Challenges in the Dance Class. *Journal of Physical Education, Recreation & Dance, 78*(2), 19-24, doi:10.1080/07303084.2007.10597968.

Contant, R. (2015). Just Dance! Boosting engagement and maximizing learning in a PE classroom. *Physical & Health Education Journal, 81*(1), 30-32.

Costa-Giomi, E. (2004). Effects of Three Years of Piano Instruction on Children's Academic Achievement, School Performance and Self-Esteem. *Psychology of Music, 32*(2), 139-152, doi:10.1177/0305735604041491.

Creswell, J. W., and Vicki L. Plano Clark (2011). *Designing and conducting mixed methods research* (2nd ed.). Los Angeles: Sage.

Daly-Smith, A. J., Zwolinsky, S., McKenna, J., Tomporowski, P. D., Defeyter, M. A., & Manley, A. (2018). Systematic review of acute physically active learning and classroom movement breaks on children's physical activity, cognition, academic performance and classroom behaviour: understanding critical design features. *BMJ Open Sport & Exercise Medicine, 4*(1), e000341, doi:10.1136/bmjsem-2018-000341.

Deans, J., & Cohrssen, C. (2015). Young children dancing mathematical thinking. [Article]. *Australasian Journal of Early Childhood, 40*(3), 61-67.

Dobbins, M., De Corby, K., Robeson, P., Husson, H., & Tirilis, D. (2009). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6-18. *Cochrane Database Syst Rev*(1), Cd007651, doi:10.1002/14651858.Cd007651.

Donnelly, J. E., Greene, J. L., Gibson, C. A., Smith, B. K., Washburn, R. A., Sullivan, D. K., et al. (2009). Physical Activity Across the Curriculum (PAAC): a randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Preventive Medicine, 49*(4), 336-341, doi:10.1016/j.ypmed.2009.07.022.

Donnelly, J. E., Greene, J. L., Gibson, C. A., Sullivan, D. K., Hansen, D. M., Hillman, C. H., et al. (2013). Physical activity and academic achievement across the curriculum (A + PAAC): rationale and design of a 3-year, cluster-randomized trial. *BMC Public Health*, 1-8.

Donnelly, J. E., & Lambourne, K. (2011). Classroom-Based Physical Activity, Cognition And Academic Achievement. *Preventive Medicine, 52*, S36–S42, doi:http://dx.doi.org/10.1016/j.ypmed.2011.01.021.

Dow, C. B. (2010). Young Children and Movement: The Power of Creative Dance. *YC Young Children, 65*(2), 30-34.

Duncan, S., McPhee, J., Schluter, P., Zinn, C., Smith, R., & Schofield, G. (2019). *Efficacy of a Compulsory Homework Programme for Increasing Physical Activity and Healthy Eating in Children: The Healthy Homework Pilot Study*: BioMed Central Ltd.

Duncan, S., McPhee, J. C., Schluter, P. J., Zinn, C., Smith, R., & Schofield, G. (2011). Efficacy of a compulsory homework programme for increasing physical activity and healthy eating in children: the healthy homework pilot study. *The international journal of behavioral nutrition and physical activity, 8*, 127, doi:10.1186/1479-5868-8-127.

Duncan, S., Stewart, T., Mackay, L., Neville, J., Narayanan, A., Walker, C., et al. (2018). Wear-Time Compliance with a Dual-Accelerometer System for Capturing 24-h

Behavioural Profiles in Children and Adults. *Int J Environ Res Public Health, 15*(7), doi:10.3390/ijerph15071296.

Education Review Office (2015). *Wellbeing for Children's Success at Primary School*.

Education Review Office (2016). *Wellbeing for succes: a resource for schools*.

Education Review Office (2018). Introduction. In *A Decade of Assessment in New Zealand Primary Schools- Practice and trends* (pp. 3).

Ell, F. (2011). Teacher education in New Zealand. *Journal of Education for Teaching, 37*(4), 433-440, doi:10.1080/02607476.2011.611010.

Erfer, T., & Ziv, A. (2006). Moving toward cohesion: Group dance/movement therapy with children in psychiatry. *The Arts in Psychotherapy, 33*(3), 238-246, doi:http://dx.doi.org/10.1016/j.aip.2006.01.001.

Evenson, K. R., Catellier, D. J., Gill, K., Ondrak, K. S., & McMurray, R. G. (2008). Calibration of two objective measures of physical activity for children. *Journal of Sports Sciences, 26*(14), 1557-1565, doi:10.1080/02640410802334196.

Fleming, N. D., & Mills, C. (1992). Not Another Inventory, Rather a Catalyst for Reflection. *To Improve the Academy, 11*(1), 137-155, doi:10.1002/j.2334-4822.1992.tb00213.x.

Flook, L., Repetti, R. L., & Ullman, J. B. (2005). Classroom Social Experiences as Predictors of Academic Performance. *Developmental Psychology, 41*(2), 319-327.

Fong Yan, A., Cobley, S., Chan, C., Pappas, E., Nicholson, L. L., Ward, R. E., et al. (2017). The Effectiveness of Dance Interventions on Physical Health Outcomes Compared to Other Forms of Physical Activity: A Systematic Review and Meta-Analysis. [journal article]. *Sports Medicine*, doi:10.1007/s40279-017-0853-5.

Forman, S. G., Olin, S. S., Hoagwood, K. E., Crowe, M., & Saka, N. (2008). Evidence-Based Interventions in Schools: Developers' Views of Implementation Barriers and Facilitators. *School Mental Health, 1*(1), 26-36, doi:10.1007/s12310-008-9002-5.

Gall, S., Adams, L., Joubert, N., Ludyga, S., Müller, I., Nqweniso, S., et al. (2018). Effect of a 20-week physical activity intervention on selective attention and academic performance in children living in disadvantaged neighborhoods: A cluster randomized control trial. *PLoS One, 13*(11), e0206908, doi:10.1371/journal.pone.0206908.

Gardner, H., & Hatch, T. (1989). Educational Implications of the Theory of Multiple Intelligences. *Educational Researcher, 18*(8), 4-10, doi:10.3102/0013189X018008004.

Giguere, M. (2015). Dance education action research: a twin study. *Research in Dance Education, 16*(1), 16-32, doi:10.1080/14647893.2014.971231.

Gilbert, A. G. (2003). Toward Best Practices in Dance Education Through the Theory of Multiple Intelligences. *Journal of Dance Education, 3*(1), 28-33, doi:10.1080/15290824.2003.10387226.

Gilbert, A. G. (2006). *Brain-compatible dance education*. Reston, VA: National Dance Association.

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry, 38*(5), 581-586, doi:10.1111/j.1469-7610.1997.tb01545.x.

Gouws, C. (2015). Influence of an 8-week kinderkinetic movement programme on the scholastic performance of children aged 6-8 years. *African Journal for Physical, Health Education, Recreation & Dance, 21*(4:2), 1355-1362.

Greenfader, C. M., & Brouillette, L. (2013). BOOSTING LANGUAGE SKILLS OF ENGLISH LEARNERS THROUGH DRAMATIZATION AND MOVEMENT. *The Reading Teacher, 67*(3), 171-180.

Greenfader, C. M., & Brouillette, L. (2017). The Arts, the Common Core, and English Language Development in the Primary Grades. [Article]. *Teachers College Record, 119*(8), 1-38.

Greenfader, C. M., Brouillette, L., & Farkas, G. (2015). Effect of a Performing Arts Program on the Oral Language Skills of Young English Learners. *Reading Research Quarterly, 50*(2), 185-203.

Grunstein, R., & Nutbeam, D. (2007). The impact of participation in the Rock Eisteddfod Challenge on adolescent resiliency and health behaviours. *Health Education, 107*, 261-275, doi:10.1108/09654280710742564.

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. *The Lancet Child & Adolescent Health, 4*(1), 23-35, doi:10.1016/S2352-4642(19)30323-2.

Hampshire, K. R., & Matthijsse, M. (2010). Can arts projects improve young people's wellbeing? A social capital approach. *Soc Sci Med, 71*(4), 708-716, doi:10.1016/j.socscimed.2010.05.015.

Hanna, J. L. (2008). A Nonverbal Language for Imagining and Learning: Dance Education in K–12 Curriculum. *Educational Researcher, 37*(8), 491-506, doi:10.3102/0013189x08326032.

Hanna, J. L. (2015). *Dancing to learn : the brain's cognition, emotion, and movement*. Maryland: Rowman & Littlefield.

Hattie, J., Brown, G., Keegan, P., Irving, E., MacKay, A., Sutherland, T., et al. (2003). Evidence of asTTle Reading Assessment Results: Norms and Criteria. *asTTle Tech. Rep. 22,* : University of Auckland/Ministry of Education.

Hernandez, R., Bassett, S. M., Boughton, S. W., Schuette, S. A., Shiu, E. W., & Moskowitz, J. T. (2017). Psychological Well-Being and Physical Health:

Associations, Mechanisms, and Future Directions. *Emotion Review, 10*(1), 18-29, doi:10.1177/1754073917697824.

Hodgin, K. L., von Klinggraeff, L., Dauenhauer, B., McMullen, J. M., Kuhn, A. P., Stoepker, P., et al. (2020). Effects of Sharing Data With Teachers on Student Physical Activity and Sedentary Behavior in the Classroom. *Journal of physical activity & health*, 1-7, doi:10.1123/jpah.2018-0711.

Holochwost, S. J., Propper, C. B., Wolf, D. P., Willoughby, M. T., Fisher, K. R., Kolacz, J., et al. (2017). Music education, academic achievement, and executive functions. *Psychology of Aesthetics, Creativity, and the Arts, 11*(2), 147-166, doi:10.1037/aca0000112.

Hong, C. M. Dance in the school curriculum of Aotearoa New Zealand. In S. W. Stinson, S.-Y. Liu, & C. S. Nielsen (Eds.), *Dance, young people and change: Proceedings of the daCi and WDA Global Dance Summit. , Taipei National University of the Arts, Taiwan, July 14th – 20th 2012 2012*

Howells, K., Wellard, I., & Woolf-May, K. (2018). Young children's physical activity levels in primary (elementary) schools: what impact does physical education lessons have for young children? *Early Child Development and Care, 190*(5), 766-777, doi:10.1080/03004430.2018.1490899.

Huang, S. Y., Hogg, J., Zandieh, S., & Bostwick, S. B. (2012). A Ballroom Dance Classroom Program Promotes Moderate to Vigorous Physical Activity in Elementary School Children. *American Journal of Health Promotion, 26*(3), 160-165.

Isenberg, J., McCreadie, J., and, J. D., & Pearson, B. (2009). Changing Education Through the Arts: Final Evaluation Report 2005-2008 http://artsedge.kennedy-center.org/~/media/ArtsEdge/Images/Articles/Educators/how-tos/arts-integration/gmu_ceta_evaluation_v2.pdf. Accessed 12/12/19.

Jago, R., Edwards, M. J., Sebire, S. J., Tomkinson, K., Bird, E. L., Banfield, K., et al. (2015). Effect and cost of an after-school dance programme on the physical activity of 11-12 year old girls: The Bristol Girls Dance Project, a school-based cluster randomised controlled trial. *The international journal of behavioral nutrition and physical activity, 12*, 128, doi:10.1186/s12966-015-0289-y.

Jarden, A., Walker, S., & Quinlan, D. (2015). Assessing well-being in education (AWE) manual. (pp. 22).

Jones, A., Harlow, A., & Cowie, B. (2004). New Zealand Teachers' Experiences inImplementing the Technology Curriculum. *International Journal of Technology and Design Education, 14*, 101-119.

Kalendra, D. R., & Cook, A. (2017). Implementing organisational change using action research in two Australian organisations. [Journal Article]. *ALAR: Action Learning and Action Research Journal*(2), 71.

Käll, L. B., Malmgren, H., Olsson, E., Lindén, T., & Nilsson, M. (2015). Effects of a Curricular Physical Activity Intervention on Children's School Performance, Wellness, and Brain Development. *Journal of School Health, 85*(10), 704-713.

Karkou, V., & Oliver, S. (2017). Introduction to Part Three. In V. Karkou, S. Oliver, & S. Lycouris (Eds.), *The Oxford handbook of dance and wellbeing* (pp. 394-546): Oxford University Press.

Karpati, F. J., Giacosa, C., V, Foster. N. E., Penhune, V. B., & Hyde, K. L. (2015). Dance and the brain: a review. *Annals of the New York academy of sciences, 1337*(1), 7.

Kassing, G., & Jay, D. M. (2002a). *Dance teaching methods and curriculum design*. USA: Human Kinetics.

Kassing, G., & Jay, D. M. (2002b). Teaching strategies in the dance classroom. In *Dance teaching methods and curriculum design* (pp. 59-62). USA: Human Kinetics.

Kaufmann, K., & Dehline, J. (2014). *Dance Integration : 36 Dance Lesson Plans for Science and Mathematics*. Champaign, UNITED STATES: Human Kinetics.

Koff, S. R., & Warner, M. J. (2001). Curriculum integration: teaching in, through, and about dance in primary and secondary education. *Journal of Dance Education, 1*(4), 142-147.

Koshland, L., & Wittaker, J. W. B. (2004). PEACE Through Dance/Movement: Evaluating a Violence Prevention Program. *American Journal of Dance Therapy, 26*(2), 69-90.

Kreutzmann, M., Zander, L., & Webster, G. D. (2017). Dancing is belonging! How social networks mediate the effect of a dance intervention on students' sense of belonging to their classroom. *European Journal of Social Psychology*, doi:10.1002/ejsp.2319.

Kriemler, S., Meyer, U., Martin, E., van Sluijs, E. M., Andersen, L. B., & Martin, B. W. (2011). Effect of school-based interventions on physical activity and fitness in children and adolescents: a review of reviews and systematic update. *Br J Sports Med, 45*(11), 923-930, doi:10.1136/bjsports-2011-090186.

Kulinna, P. H., Stylianou, M., Dyson, B., Banville, D., Dryden, C., & Colby, R. (2018). The Effect of an Authentic Acute Physical Education Session of Dance on Elementary Students' Selective Attention. *BioMed Research International*, 1-8, doi:10.1155/2018/8790283.

LaMotte, M. (2018). The Integrated Approach Versus the Traditional Approach: Analyzing the Benefits of a Dance and Transportation Integrated Curriculum. *Journal of Dance Education, 18*(1), 23-32, doi:10.1080/15290824.2017.1336667.

Leandro, C. R., Monteiro, E., & Melo, F. (2018). Interdisciplinary working practices: can creative dance improve math? *Research in Dance Education, 19*(1), 74-90, doi:10.1080/14647893.2017.1354838.

Leigh, J. (2012). Somatic movement and education : a phenomenological study of young children's perceptions, expressions and reflections of embodiment through movement. University of Birmingham.

Levin, K. (2016). Aesthetics of Hyperactivity: A Study of the Role of Expressive Movement in ADHD and Capoeira. *American Journal of Dance Therapy, 38*(1), 41-62, doi:10.1007/s10465-016-9211-7.

Li, X., Kenzy, P., Underwood, L., & Severson, L. (2015). Dramatic impact of action research of arts-based teaching on at-risk students. *Educational Action Research, 23*(4), 567-580, doi:10.1080/09650792.2015.1042983.

Liem, G. A. D. (2019). Academic performance and assessment. *Educational Psychology, 39*(6), 705-708, doi:10.1080/01443410.2019.1625522.

Lloyd, K. (2017). Benefits of Art Education: A Review of the Literature. *Scholarship and Engagement in Education, 1*(1).

Mackley-Crump, J. (2011). Malaga—The Journey: The Performing Arts as Motivational Tool for Pasifika Students in Aotearoa New Zealand. *The Asia Pacific Journal of Anthropology, 12*(3), 255-273, doi:10.1080/14442213.2011.566573.

Makopoulou, K., Neville, R., & McLaughlin, K. (2020). Does a dance-based physical education (DBPE) intervention improve year 4 pupils' reading comprehension attainment? Results from a pilot study in England. *Research in Dance Education*, 1-18, doi:10.1080/14647893.2020.1754779.

Marsick, V. J., & Gephart, M. A. (2003). Action Research: Building the Capacity for Learning and Change. [Article]. *Human Resource Planning, 26*(2), 14-18.

Martin, M. (2014). Moving on the spectrum: Dance/movement therapy as a potential early intervention tool for children with Autism Spectrum Disorders. *The Arts in Psychotherapy, 41*(5), 545-553, doi:http://dx.doi.org/10.1016/j.aip.2014.10.003.

Masadis, G., Filippou, F., Derri, V., Mavridis, G., & Rokka, S. (2019). Traditional Dances as a Means of Teaching Social Skills to Elementary School Students. *International Journal of Instruction, 12*(1), 511-520.

McGall, S. E., McGuigan, M. R., & Nottle, C. (2011). Contribution of free play towards physical activity guidelines for New Zealand primary school children aged 7-9 years. *Br J Sports Med, 45*(2), 120-124, doi:10.1136/bjsm.2009.065318.

McIntyre, K. L. (2005). Cultural Dances and Stories from Around the World: A Discovery of World Cultures through Dance and Drama, Curriculum Designed for Grades K-5. *UC Irvine: Center for Learning in the Arts, Sciences and Sustainability*,

McMahon, S. D., Rose, D. S., & Parks, M. (2003). Basic Reading Through Dance Program: The Impact on First-Grade Students' Basic Reading Skills. *Evaluation Review, 27*(1), 104-125, doi:10.1177/0193841x02239021.

McPherson, A., Mackay, L., Kunkel, J., & Duncan, S. (2018). Physical activity, cognition and academic performance: an analysis of mediating and confounding relationships in primary school children. *BMC Public Health, 18*(1), 936, doi:10.1186/s12889-018-5863-1.

McPherson, E. (2014). A Collaboration in Dance Education Between Montclair State University and Bradford School (K–5). *Journal of Dance Education, 14*(2), 76-79, doi:10.1080/15290824.2014.848987.

Melchior, E. (2011). Culturally responsive dance pedagogy in the primary classroom. *Research in Dance Education, 12*(2), 119-135, doi:10.1080/14647893.2011.575223.

Mental Health Foundation of New Zealand (2001). *Guidelines for Mentally Healthy Schools*: Mental Health Foundation of New Zealand.

Merrett, F., & Wheldall, K. (1993). How Do Teachers Learn to Manage Classroom Behaviour? A study of teachers' opinions about their initial training with special reference to classroom behaviour management. *Educational Studies, 19*(1), 91-106, doi:10.1080/0305569930190106.

Ministry of Education (2016). *Bringing the Curriculum Alive*: New Zealand Government.

Ministry of Education (2016). Reading/Pānui: primary schooling.

Ministry of Education (2017). Teaching for positive behaviour: supporting engagment, participation and learning In T. Rohan (Ed.).

Ministry of Education (2019). PISA 2018: New Zealand summary report- systerm performance and equity Wellington.

Minton, S. C. (2008). *Using movement to teach academics; the mind and body as one entity* (Vol. 23, Reference and Research Book News, Vol. 2). Portland: Ringgold Inc.

Mitchell, D., Morton, M., & Hornby, G. (2010). Review of the Literature on Individual Education Plans. Ministry of Education.

Mohn, K. D. (2004). Rocking the Curriculum: Dance and Academics at an A+ School. *Journal of Dance Education, 4*(4), 121-123, doi:10.1080/15290824.2004.10387273.

Moore, C., & Linder, S. M. (2012). Using Dance to Deepen Student Understanding of Geometry. *Journal of Dance Education, 12*(3), 104-108, doi:10.1080/15290824.2012.701175.

Morse, J. M. (1991). Approaches to Qualitative-Quantitative Methodological Triangulation. *Nursing Research, 40*(2), 120–123.

Moula, Z., Aithal, S., Karkou, V., & Powell, J. (2020). A systematic review of child-focused outcomes and assessments of arts therapies delivered in primary mainstream schools. *Children and Youth Services Review, 112*, doi:10.1016/j.childyouth.2020.104928.

Mullane, S., & Dunphy, K. (2017). Dance movement therapy, student learning and wellbeing in speical education. In V. Karko, S. Oliver, & S. Lycouris (Eds.), *The Oxford handbook of dance and wellbeing* (pp. 493-515). New York, USA: Oxford University Press.

Mullender-Wijnsma, M. J., Hartman, E., Greeff, J. W. d., Bosker, R. J., Doolaard, S., & Visscher, C. (2015). Improving Academic Performance of School-Age Children by Physical Activity in the Classroom: 1-Year Program Evaluation. *Journal of School Health, 85*(6), 365-371, doi:10.1111/josh.12259.

Naylor, P. J., Nettlefold, L., Race, D., Hoy, C., Ashe, M. C., Wharf Higgins, J., et al. (2015). Implementation of school based physical activity interventions: a systematic review. *Prev Med, 72*, 95-115, doi:10.1016/j.ypmed.2014.12.034.

Netz, Y., Wu, M. J., Becker, B. J., & Tenenbaum, G. (2005). Physical activity and psychological well-being in advanced age: a meta-analysis of intervention studies. *Psychol Aging, 20*(2), 272-284, doi:10.1037/0882-7974.20.2.272.

New Zealand Council for Educational Research (2018). *Making a difference to student wellbeing - a data exploration*.

NZ children's commissioner (2019). *What makes a good life? Children and young people's views on wellbeing*

New Zealand Ministry of Education (2000a). The Arts in the New Zealand Curriculum. In W. L. Media (Ed.). Wellington

New Zealand Ministry of Education (2000b). Health and Physical Education in the New Zealand curriculum In W. L. Media (Ed.), (pp. 31). Wellington Learning Media Limited.

New Zealand Ministry of Education (2005). Kiwi Kids Dance. Wellington: Learning Media.

Nikitina, S. (2003). Movement class as an intergrative experience: academic, cognitive and social effects. *Journal of Aesthetic Education, 37*(1), 11, doi:10.1353/jae.2003.0008.

Norris, E., Shelton, N., Dunsmuir, S., Duke-Williams, O., & Stamatakis, E. (2015). Physically active lessons as physical activity and educational interventions: a systematic review of methods and results. *Prev Med, 72*, 116-125, doi:10.1016/j.ypmed.2014.12.027.

NZ Ministry of Education (2002). Dance Wall Charts Teacher Support Material. http://artsonline.tki.org.nz/Teaching-and-Learning/Secondary-teaching-resources/Dance/Reviewed-resources/Key-collection/Dance-Wall-Charts-Teacher-Support-Material.

NZ Ministry of Education (2007a). The New Zealand curriculum for English medium teaching and learning in years 1-13 *The Arts* (pp. 37). Wellington: Ministry Of Education.

NZ Ministry Of Education (2007b). The New Zealand curriculum for English medium teaching and learning in years 1-13 *The Arts* (pp. 20). Wellington: Ministry Of Education.

NZ Ministry Of Education (2007c). The New Zealand curriculum for English medium teaching and learning in years 1-13 *The Arts* (pp. 16). Wellington: Ministry Of Education.

NZ Ministry of Health (2018). Social, Emotional and Behavioural Difficulties in New Zealand Children: Technical Report. Wellington.

O'Neill, J. R., Pate, R. R., & Hooker, S. P. (2011). The contribution of dance to daily physical activity among adolescent girls. *The international journal of behavioral nutrition and physical activity, 8*, 87-87, doi:10.1186/1479-5868-8-87.

Olga, T., Georgios, L., Ioannis, G., Dimitrios, C., & Maria, K. (2018). The Positive Effects of a Combined Program of Creative Dance and BrainDance on Health-Related Ouality of Life as Perceived by Primary School Students. *Physical Culture & Sport. Studies & Research, 79*(1), 42-52.

Olive, L. S., Byrne, D., Cunningham, R. B., Telford, R. M., & Telford, R. D. (2019). Can physical education improve the mental health of children? The LOOK study cluster-randomized controlled trial. *Journal of Educational Psychology, 111*(7), 1331-1340, doi:10.1037/edu0000338.

OMA Design Team Members, Lewis, T., & Joy, W. (2012). *Opening Minds through the Arts: Where Integration Meets Innovation: A Model for Rethinking Education*: Amazon Digital Services.

Onwuegbuzie, A. J., & Leech, N. L. (2005). On Becoming a Pragmatic Researcher: The Importance of Combining Quantitative and Qualitative Research Methodologies. *International Journal of Social Research Methodology, 8*(5), 375-387, doi:10.1080/13645570500402447.

P. H. Kulinna , M. S., B. Dyson, D. Banville, C. Dryden, and R. Colby (2018). The Effect of an Authentic Acute Physical Education Session of Dance on Elementary Students' Selective Attention. *BioMed Research International*, doi:https://doi.org/10.1155/2018/8790283.

Parab, S., Bose, M., Shayer, S., Saini, R. K., Salvi, M., Ravi, P., et al. (2019). Effect of Bharatnatyam-based Dance Therapy in Children and Adolescents with Down Syndrome. *Clinical Kinesiology (Online Edition), 73*(3), 25-20.

Parsonson, B. S. (2012). Evidence-based Classroom Behaviour Management Strategies. *Kairaranga, 13*(1), 16- 23.

Perlovsky, L., Cabanac, A., Bonniot-Cabanac, M. C., & Cabanac, M. (2013). Mozart effect, cognitive dissonance, and the pleasure of music. *Behav Brain Res, 244*, 9-14, doi:10.1016/j.bbr.2013.01.036.

Peterson, J. R. (2011). *Dance medicine, head to toe: a dancer's guide to health*. Highstown, NJ: Princeton.

Powell, D., & Fitzpatrick, K. (2015). 'Getting fit basically just means, like, nonfat': children's lessons in fitness and fatness. *Sport, Education and Society, 20*(4), 463-484, doi:10.1080/13573322.2013.777661.

Quin, E., Frazer, L., & Redding, E. (2007). The Health Benefits of Creative Dance : improving children's physical and psychological wellbeing *Education and Health, 25*(2), 31-33.

Rapp-Paglicci, L., Stewart, C., & Rowe, W. (2011). Can a Self-Regulation Skills and Cultural Arts Program Promote Positive Outcomes in Mental Health Symptoms and Academic Achievement for At-Risk Youth? *Journal of Social Service Research, 37*(3), 309-319, doi:10.1080/01488376.2011.564067.

Renner, S. J. (2015). *Generalist teacher's self-efficacy beliefs for teaching dance*. University of Otago, Dunedin.

Resaland, G. K., Aadland, E., Moe, V. F., Aadland, K. N., Skrede, T., Stavnsbo, M., et al. (2016). Effects of physical activity on schoolchildren's academic performance: The Active Smarter Kids (ASK) cluster-randomized controlled trial. *Preventive Medicine, 91*, 322-328, doi:https://doi.org/10.1016/j.ypmed.2016.09.005.

Richard, M. (2013). Dance as a Language of Learning and a Source of Embodied Knowledge. *Physical & Health Education Journal, 79*(1), 6-10.

Robertson-Wilson, J., Reinders, N., & Bryden, P. J. (2016). Dance Interventions to Increase Physical Activity Among Youth: A Systematic Review. *Kinesiology Review, 5*(3), 170-188.

Romero, A. J. (2012). A Pilot Test of the Latin Active Hip Hop Intervention to Increase Physical Activity among Low-Income Mexican-American Adolescents. *American Journal of Health Promotion, 26*(4), 208-211, doi:10.4278/ajhp.090123-ARB-24.

Rubie, C. M., Townsend, M. A. R., & Moore, D. W. (2004). Motivational and academic effects of cultural experiences for indigenous minority students in New Zealand. *Educational Psychology, 24*(2), 143-160, doi:10.1080/0144341032000160119.

Russell-Bowie, D. (2004). *Arts education: are the problems the same across five countries?* Paper presented at the Arts education: are the problems the same across five countries?, Melbourne,

Russell-Bowie, D. E. (2013). What? Me? Teach dance? Background and confidence of primary preservice teachers in dance education across five countries. *Research in Dance Education, 14*(3), 216-232, doi:10.1080/14647893.2012.722614.

Said, P. M., & Abramides, D. V. M. (2020). Effect of music education on the promotion of school performance in children. *Codas, 32*(1), e20180144, doi:10.1590/2317-1782/20192018144.

San-Juan-Ferrer, B., & Hípola, P. (2019). Emotional intelligence and dance: a systematic review. *Research in Dance Education*, 1-25, doi:10.1080/14647893.2019.1708890.

San Diego Unified School District Visual and Performing Arts (VAPA). https://www.sandiegounified.org/visual-and-performing-arts-vapa. Accessed 29 April 2018.

Savage, C., Lewis, J., & Colless, N. (2011). Essentials for Implementation: Six years of School Wide Positive Behaviour Support in New Zealand. [Article]. *New Zealand Journal of Psychology, 40*(1), 29-37.

Schaub-Moore, C. (2017). Moving systems: A multidisciplinary approach to enhance learning and avoid dropping out In V. Karko, S. Oliver, & S. Lycouris (Eds.), *The Oxford handbook of dance and wellbeing* (pp. 447-458). New York, USA: Oxford University Press.

Sharma, G., Nikolai, J., Duncan, S., & Carter, J. (2020). Observing the Delivery of a Curriculum-Integrated Dance Programme Across Four New Zealand Primary Schools. *New Zealand Journal of Educational Studies, 55*(1), 29-47, doi:10.1007/s40841-019-00151-2.

Simpson Steele, J., Fulton, L., & Fanning, L. (2016). Dancing with STEAM: Creative Movement Generates Electricity for Young Learners. *Journal of Dance Education, 16*(3), 112-117.

Sivvas, G., Batsiou, S., Vasoglou, Z., & Filippou, D.-A. (2015). Dance contribution in health promotion. *Journal of Physical Education & Sport, 15*(3), 484-489.

Skoning, S. N. (2008). Movement and Dance in the Inclusive Classroom. *TEACHING Exceptional Children Plus, 4*(6), 11.

Smith, F. (2009). Tucson Schools Enhance Learning with the Arts. http://www.edutopia.org/arts-opening-minds-integration. Accessed 23rd May 2016.

Snook, B. (2012a). *Dance in New Zealand primary schools: Moving forward toward a realisation of UNESCO's aims for the arts.* Paper presented at the Proceedings of the daCi and WDA Global Dance Summit, Taipei National University of the Arts (TNUA), Taiwan,

Snook, B. (2012b). *Someone like us: Meanings and contexts informing the delivery of dance in New Zealand primary classrooms*. University of Auckland,

Snook, B., & Buck, R. (2014). Artists in Schools: "Kick Starting" or "Kicking Out" Dance from New Zealand Classrooms. *Journal of Dance Education, 14*(1), 18-26, doi:10.1080/15290824.2013.835052.

Soto, C. A. (2001). *Academic achievement, self-concept, and dance in 8 to 12 year olds*. M.A., California State University, Fullerton, Ann Arbor.

Sousa, D. (2013). How the Arts Develop the Young Brain. http://www.aasa.org/SchoolAdministratorArticle.aspx?id=7378.

Subasi, M., Aydin, S., & Seven, S. (2016). The effect of drama technique on students' academic performance and permanence *International Journal of Education, Science and Technology, 2*(1), 29-38.

Takahashi, H., Seki, M., Matsumura, T., An, M., Sasai, T., Ogawa, Y., et al. (2020). The Effectiveness of Dance/Movement Therapy in Children with Williams Syndrome: A Pilot Study. *American Journal of Dance Therapy*, doi:10.1007/s10465-020-09324-9.

Te Kete Ipurangi Learning Experiences Outside The Classroom. http://eotc.tki.org.nz/LEOTC-home.

Toppen, M. (2019). Using Dance to Promote SEL Skills. https://www.edutopia.org/article/using-dance-promote-sel-skills. Accessed 23 Jan 2020.

Tucson Unified Schol District (2012). OMA-TUSD – Opening Minds through the Arts in the Schools. http://tusd1.schooldesk.net/Portals/TUSD1/District/docs/OMA/CaseStatement.pdf?ver=2018-01-28-202008-000.

Ulas, A. H. (2008). Effects of creative, educational drama activities on developing oral skills in primary school children. *International Journal of Education, Science and Technology, 5*(7), 876-880.

UNICEF Office of Research (2017). Building the Future: Children and the Sustainable Development Goals in Rich Countries. In *Innocenti Report Card no. 14,* : NICEF Office of Research – Innocenti, Florence.

UNICEF Office of Research (2018). An Unfair Start: Inequality in Children's Education in Rich Countries. In *Innocenti Report Card 15*: UNICEF Office of Research - Innocenti, Florence.

van den Heuvel, M., Jansen, D., Stewart, R. E., Smits-Engelsman, B. C. M., Reijneveld, S. A., & Flapper, B. C. T. (2017). How reliable and valid is the teacher version of the Strengths and Difficulties Questionnaire in primary school children? *PLoS One, 12*(4), e0176605, doi:10.1371/journal.pone.0176605.

Vetter, M., O'Connor, H., O'Dwyer, N., & Orr, R. (2018). Learning "Math on the Move": Effectiveness of a Combined Numeracy and Physical Activity Program for Primary School Children. *Journal of physical activity & health, 15*(7), 492-498, doi:10.1123/jpah.2017-0234.

Walker, E., Tabone, C., & Weltsek, G. (2011). When Achievement Data Meet Drama and Arts Integration *Language Arts, 88*(5), 365-372.

Watson, A., Timperio, A., Brown, H., Best, K., & Hesketh, K. D. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: a systematic review and meta-analysis. *The international journal of behavioral nutrition and physical activity, 14*(1), 114, doi:10.1186/s12966-017-0569-9.

Watson, A., Timperio, A., Brown, H., Hinkley, T., & Hesketh, K. D. (2019). Associations between organised sport participation and classroom behaviour outcomes among primary school-aged children. *PLoS One, 14*(1), e0209354, doi:10.1371/journal.pone.0209354.

Wengrower, H. (2017). Dance movement therapy, student learning and wellbeing in speical education. In V. Karko, S. Oliver, & S. Lycouris (Eds.), *The Oxford handbook of dance and wellbeing* (pp. 517-533). New York, USA: Oxford University Press.

Werner, L. R. (2001). *Using dance to teach math: The effects of a co-teaching arts integration model on teacher practice and student learning*. Ph.D., University of Minnesota, Ann Arbor.

Withers, J. W., Muzzolon, S. B., & Zonta, M. B. (2019). Influence of adapted hip-hop dancing on quality of life and social participation among children/adolescents

with cerebral palsy. *Arq Neuropsiquiatr, 77*(10), 712-722, doi:10.1590/0004-282X20190124.

Zarobe, L., & Bungay, H. (2017). The role of arts activities in developing resilience and mental wellbeing in children and young people a rapid review of the literature. *Perspectives in Public Health, 137*(6), 337-347, doi:10.1177/1757913917712283.

Zitomer, M. R. (2016). 'Dance Makes Me Happy': experiences of children with disabilities in elementary school dance education. *Research in Dance Education, 17*(3), 218-234, doi:10.1080/14647893.2016.1223028.

Zitomer, M. R., & Reid, G. (2011). To be or not to be – able to dance: integrated dance and children's perceptions of dance ability and disability. *Research in Dance Education, 12*(2), 137-156, doi:10.1080/14647893.2011.575224.

Ethics

Appendix 1. AUTEC approval

AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

6 October 2016

Scott Duncan
Faculty of Health and Environmental Sciences

Dear Scott

Re Ethics Application: **16/303 Evaluation of an integrated dance programme in the NZ primary school curriculum**

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 6 October 2019.

As part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through http://www.aut.ac.nz/researchethics. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 6 October 2019;
- A brief report on the status of the project using form EA3, which is available online through http://www.aut.ac.nz/researchethics. This report is to be submitted either when the approval expires on 6 October 2019 or on completion of the project.

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: Geeta Sharma , geeta.sharma@aut.ac.nz; Jennifer Nikolai; Nigel Harris

Appendix 2. DG children's assent form

AUT
TE WĀNANGA ARONUI O TĀMAKI MAKAU RAU

Children's assent Form

(Dance group)

Dear ,

If you want to be part of my study, please tick the following and write your name along the dotted line.

- o I have read and understood the information sheet telling me what will happen in this study and why it is important.
- o I have been able to ask questions and to have them answered.
- o I understand that notes will be taken during the dance sessions and that I can have a look at the notes if I wish
- o I understand that I will be asked to wear a belt and fill in two questionnaires both before and after the 6-week dance programme
- o I understand that the dance sessions will be video recorded for research purposes and my school will keep a copy of the dance sessions.
- o I understand that I will have pictures clicked along with my friends during the dance sessions and a few may be used for research presentations.
- o I understand that I can stop being part of this study whenever I want and that it is perfectly ok for me to do this.
- o I understand that I have the choice of my pictures not to be used for research articles or conferences
- o If I stop being part of the study, I understand that then I will be offered the choice between having any information that that other people can know is about me removed or letting the researcher keep using it. I also understand that sometimes, if the results of the research have been written, some information about me may not be able to be removed.
- o I agree to take part in this research.

If you want to take part in the research but do **NOT** want your pictures to be used in research articles and conferences, please tell your teacher or Geeta.

My name is ..... and I would like to be part of this research

Date:

Please return the form with your parents signed form to your class teacher. Thank you!

Appendix 3. DG parent's consent form

Parent/Guardian consent Form

(Dance group)

Project title: Evaluation of an integrated dance programme in the NZ primary school curriculum

Project Supervisor: Assoc Prof Scott Duncan

Researcher: Geeta Sharma

To the parents of

If you agree that your child is part of the evaluation, tick the boxes below and please sign

- o I have read and understood the information provided about this research project
- o I have had an opportunity to ask questions and to have them answered.
- o I understand that my child will be evaluated on physical, well-being, behavioural and academic measures both before and after the dance programme.
- o I understand that the dance sessions will be filmed and photos will be clicked from school's IPad.
- o I understand that the school will keep a copy of the dance sessions, and the researcher will destroy her copy after analysis.
- o I understand that the researcher may use relevant pictures of the dance sessions during academic presentations and conferences. My child may/may not be in the picture.
- o I understand that my child may/may not be part in the focus group interview.
- o I understand that taking part in this study is my child's choice and that I may withdraw my child from the study at any time without being disadvantaged in any way.
- o I understand that if I withdraw my child 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.
- o I consent for my child to take part in this research.
- o I wish to receive a summary of the research findings (please tick one): Yes○ No○
- o I consent for my child's photos of the dance sessions to be used in research articles and conference presentations (please tick one): Yes○ No○

Child's name/s :.....

.....

Parent/Guardian's signature: .....

Parent/Guardian's name: .....

Date:

Please return this form with assent form to your child's class teacher, thank you!

Approved by the Auckland University of Technology Ethics Committee on Oct 6th 2016

AUTEC Reference number 16/303

Appendix 4. DG children's information sheet

Children's information sheet

(Dance group)

Kia Ora

I'm Geeta!

Like you, I am also a student and I go to AUT University. As part of my research, I am studying about dance in schoolchildren. Your class teacher might have mentioned that your class will be part of a fun dance programme for this term. I will be part of these dance sessions too. I will be filming the dance sessions and taking pictures of you and your friends. I will also be writing notes about all your achievements and cool moves in a diary. You can have a look at these videos, pictures or notes anytime you want!

I would like to know what you felt about the dance sessions and will be asking you to write a diary. I would like to read what you write and use it for my research.

I would like to study how good this dance programme is by asking you to fill out two forms (called questionnaires) that have questions in them. These questionnaires are for kids of your age. If you find any question hard to understand please ask. I will be there when you are answering these questionnaires.

I will also be asking you to wear a cool belt that will measure how much you move for 1 week, at two different times. I will let you know how and when to wear this belt.

You can talk to me and we can get to know each other. You can ask me about my study whenever you want to. If you are not sure or worried about being part of my study, come and talk to me about it or ask your class teacher or your parents about this.

This is my photo

And this is the photo of your dance teacher!

We will both be happy to talk to you and answer your questions! We look forward to meeting you!

Please keep this form for your reference

Appendix 5. DG parent information sheet

Parent/Guardian information sheet

(Dance group)

Project title: Evaluation of an integrated dance programme in the NZ primary school curriculum

Project Supervisor: Assoc Prof Scott Duncan

Researcher: Geeta Sharma

An Invitation to the parents of

Kia Ora!

I'm Geeta Sharma from AUT and I would like to invite your child to take part in my research. This research is part of my PhD qualification, where I am gathering information from four schools in Auckland.

Your child's class teacher has agreed to be part of a six-week dance programme that involves both subject learning and dance. These sessions, as an in-class dance programme, will be for all children in your child's class. This will be run by a dance educator and will be simple, fun and not genre-specific. Subject learning will be a major part of the dance sessions. The previous two schools that took part in the research learnt topics related to Science, Geometry, Maori culture and English through these dance sessions!

As part of my research, we will be evaluating the benefits of this dance programme and would like to ask your child to fill out two questionnaires. One questionnaire is related to their academic performance and another related to their general well-being. The questions are framed for children and may take 20-25 minutes to fill out. These questionnaires will be given twice with a six-week gap in between and within class timings

Your child's class teacher shall be asking all of her class children to maintain a journal as a record of their learning outcomes from the dance sessions. She has agreed to share this with the researcher either through Google Docs or *See Saw*. The researcher would like to use this to understand your child's perspective of the dance sessions. In order to understand how the children felt about the dance programme, I would like to interact with them through a focus group interview. About 5 children from your child's class shall take part in this interview and your child may/may not be included. For research purposes, this interview shall be audio recorded and children will be informed of the same.

I would also like to measure your child's physical activity levels. For this, I will ask your child to wear an elastic belt that contains a device called an accelerometer. This will be for a week before and a week after the six-week gap. We have used accelerometers in many other studies with children and they are completely safe. We will be providing your child a sheet (called a compliance log) to record the timings that it was not worn. Safety instructions and precautions will be on the back of the compliance log.

Your child's class teacher will be evaluating all participants' classroom behaviour (through a questionnaire) both before and after the dance programme.

What is the purpose of this research? What will happen in this research?

This research intends to study the effects of dance education for both teachers and their students. We expect to see significant improvements in academic performance, well-being, classroom behaviour and physical activity in the children that take part in the dance programme. All measures will be compared with another class of the same school called Control Group (those who are not part of the dance programme). The evaluation will also make a meaningful contribution to our understanding of how dance education may benefit children's learning. The findings will be written in a PhD thesis (towards my PhD qualification) and peer-reviewed publications. The findings shall also be presented in conferences.

How was my child identified and why is my child being invited to participate in this research?

Your child's class teacher has shown great interest in being part of these dance sessions since dance education enhances children's learning. Hence, your child's class shall be part of the dance programme run in the school with the class teacher's involvement as part of the curriculum for this term. All of your child's classmates have been sent an assent and consent form with information sheet to take part in the measurement procedures.

How does my child agree to participate in this research?

Your child's participation to take part in the before and after evaluation (measurements) of the dance programme is voluntary. Your child can withdraw from the evaluation at any time. If he/she chooses to withdraw from the evaluation, then he/she will be offered the choice between having any data that is identifiable as belonging to him/her removed or allowing it to continue to be used. However, once the findings have been produced, removal of his/her data may not be possible.

Please also find attached child's assent form. If your child agrees to be part of the evaluation, he/she will need to sign an assent form. If you consent for your child to be part of my evaluation please sign the consent form. Both forms can be handed over to class teacher.

What are the benefits?

This evaluation will provide details on your child's academic performance, classroom behaviour and well-being before and after the dance programme. It will also provide an estimate of your child's physical activity for two weeks (before and after the dance programme).

How will my child's privacy be protected?

Through questionnaires, name and demographic details of the participants will be collected only for research purposes and these questionnaires will be destroyed once they are analysed. Data from the Actigraph (device used to measure Physical Activity) will be deleted after analysis.

The dance sessions shall be filmed (from the school IPad), with the school and researcher keeping a copy. However, the researcher's copy shall be destroyed after analysis. The researcher will be providing your child's class teacher an outline of the dance sessions, hence she will be clicking pictures as well. Relevant pictures shall be used for academic conferences and presentations, upon your consent and your child's assent (please find attached consent and assent forms).

Though your child's writing shall be used, name shall not be disclosed. Pseudonyms will be assigned to children, if they are to be mentioned either in the thesis or other publications.

What are the costs of participating in this research?

Your child's class will be asked to fill in questionnaires during the 1st and 6th week of the dance programme while at school. These two questionnaires may take about 20-30 min to fill in. They will be requested to wear an Actigraph belt for a week to measure Physical Activity, before and after a 6-week period. They will also be asked to fill in a daily compliance log (with your help if required) to record the times the Actigraph was not worn.

About 5 of the children from your child's class shall be asked to participate in a focus group interview. Your child may/may not be part of the focus group interview. This interview may take about 20-30 min, depending on the flow of the conversation.

What opportunity do I have to consider this invitation?

If you are happy for your child to be part of this research, please return the signed consent and child assent forms to the class teacher by Fri 28th July 2017.

Will I receive feedback on the results of this research?

Your child's individual results will be provided as a confidential feedback form sent home in a sealed envelope. The class results shall be sent to your child's class teacher. The school principal shall receive feedback on the overall results of both classes that participated in the research. School's participation will be acknowledged both in my thesis and in academic publications. Also, the school principal and participating teachers shall be sent a copy of the published article. Copy of the published article shall be sent to the parents if requested (researcher's contact details are below).

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, Assoc Prof Scott Duncan, scduncan@aut.ac.nz. Phone number: 09 921 9999, ext. 7678

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, Kate O'Connor, ethics@aut.ac.nz. Phone number: 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep a copy of this form for your future reference and return a signed consent form along with your child's assent form to the class teacher. You are also able to contact the research team as follows:

Research team:

Geeta Sharma
PhD student and primary researcher
AUT University
Geeta.sharma@aut.ac.nz

Assoc Prof Scott Duncan
Primary supervisor
AUT University
scott.duncan@aut.ac.nz

Dr Jennifer Nikolai
Secondary supervisor
AUT University
jennifer.nikolai@aut.ac.nz

Dr Nigel Harris
Tertiary supervisor
AUT University
nigel.harris@aut.ac.nz

Jane Carter
Dance educator and Research Assistant
Pocket Rockets
pocketedition.ontour@gmail.com

Please keep this form for your reference

Approved by the Auckland University of Technology Ethics Committee on Oct 6th 2016

Research feedback forms

Appendix 6. DG participant feedback form

HUMAN POTENTIAL CENTRE
AN AUT UNIVERSITY RESEARCH CENTRE

AUT UNIVERSITY

Dance research feedback report

To the parents of

Thank you for allowing your child to be part of this research during this Term. We hope your child enjoyed the dance sessions and participating in the research along with other classmates.
This research investigated the benefits of dance on children, by comparing the results of your child's class (who were part of the dance sessions) with another class of the same school (who were not part of the dance sessions). Below is a summary of the various measures that your child was assessed on.

Measures used		Score before intervention	Score after intervention
Academic performance (Maths)		75%	82%
Academic performance (Reading)		89%	70%
Well-being	Global well-being	100%	87%
	School well-being	81%	96%
	Resilience	100%	100%
	Health and Lifestyle	90%	75%
	Overall well-being	88%	89%
Classroom behaviour	Emotional problems	40%	0%
	Conduct problems	0%	0%
	Hyperactivity	0%	0%
	Peer problems	40%	20%
	Total problems	20%	5%
	Prosocial behaviour	90%	100%

MEASURES USED		SCORE BEFORE INTERVENTION	SCORE AFTER INTERVENTION
PHYSICAL ACTIVITY	Step counts	6355	4509
	Moderate to vigorous Physical activity (min)	20	12

(Guildelines: research suggests at least 60 minutes of moderate-to-vigorous activity is recommended for children per day; 12000 steps per day for girls and 15000 steps for boys).

https://e-asttle.tki.org.nz/ (for Academic performance)
https://www.awesomeschools.com/index.php (for Well-being)
http://www.sdqinfo.com/a0.html (for classroom behaviour)
http://www.health.govt.nz/our-work/preventative-health-wellness/physical-activity (for Physical Activity)

Here is a compilation of the themes that emerged from children's *Google Doc* stories, focus group interview and teacher interview:

1. The children loved the dance sessions. They found the activities "Hello Game", "Travelling" and "Festivals across the world" particularly fun and engaging.
2. The children choreographed their own Name Solos.
3. The children felt that the dance sessions helped their Place Values and Science.
4. It also enhanced their dance and musical awareness, creativity, leadership, co-operation.
5. Mrs Leggett has greatly learnt from the dance programme and reinforced the activities from the dance sessions into the classroom too. This has served as her Professional Learning Development.
6. Mrs Leggett observed they transferred the skills and experience outside the dance sessions to other school activities as well. She observed that they were more engaged and animated in class.

Our research team would like to thank your child for showing keen interest in wearing the accelerometer (belt measuring Physical Activity) for a total of two weeks and we appreciate your care in keeping the device safe. We hope that you and your child find the information presented in this report of interest and value. If you have any further queries please feel free to contact the research team.

Geeta Sharma
PhD student and primary researcher
AUT University
Geeta.sharma@aut.ac.nz

Assoc Prof Scott Duncan
Primary supervisor
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scott.duncan@aut.ac.nz

Dr Jennifer Nikolai
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Jane Carter
Dance educator and Research Assistant
Pocket Rockets
pocketedition.ontour@gmail.com

We wish your child a glorious future. Many thanks,

The research team

Appendix 7. Principal feedback form

HUMAN POTENTIAL CENTRE

AN AUT UNIVERSITY RESEARCH CENTRE

AUT UNIVERSITY

		Mrs X class		Mrs Y class	
Measures used		Week 1	Week 7	Week 1	Week 7
Physical activity	Step counts	9331	8122	8339	6976
	Moderate to vigorous Physical activity (min)	52	41	50	34

(Guildelines: research suggests at least 60 minutes of moderate-to-vigorous activity is recommended for children per day; 12000 steps per day for girls and 15000 steps for boys).

Further information about the measures used can be found from:

https://e-asttle.tki.org.nz/ (for Academic performance)
https://www.awesomeschools.com/index.php (for Well-being)
http://www.sdqinfo.com/a0.html (for classroom behaviour)
http://www.health.govt.nz/our-work/preventative-health-wellness/physical-activity (for Physical Activity)

Here is a compilation of the themes that emerged from children's *Google Doc* stories, focus group interview and teacher interview:

1. The children loved the dance sessions. They found the activities "Hello Game", "Travelling" and "Festivals across the world" particularly fun and engaging.
2. The children choreographed their own Name Solos.
3. The children felt that the dance sessions helped their Place Values and Science.
4. It also enhanced their dance and musical awareness, creativity, leadership, co-operation.
5. Mrs X has greatly learnt from the dance programme and reinforced the activities from the dance sessions into the classroom too. This has served as her Professional Learning Development.
6. Mrs X observed they transferred the skills and experience outside the dance sessions to other school activities as well. She observed that they were more engaged and animated in class.

Our research team would like to thank your school for showing keen interest towards this research. We appreciate the time, effort and co-operation that you and your staff showed. It was a pleasure for the primary researcher to be part of your school last Term.

We hope that you find the information presented in this report of interest and value. If you have any further queries please feel free to contact the research team.

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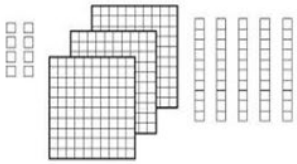
Measures

Appendix 8. Baseline AsTTle (Mathematics)

01. Each small square is equal to 1. There are 10 small squares in each strip. There are 100 small squares in each large square.
What number is shown?



- ⬭ 16
- ⬭ 358
- ⬭ 538
- ⬭ 835

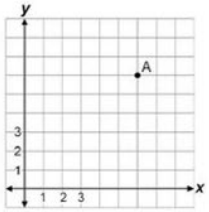
02. What is the ***least*** number you could make using all the numbers on these blocks?

- ⬭ Three thousand, six hundred and seventy-eight
- ⬭ Three thousand, eight hundred and seventy-six
- ⬭ Six thousand, three hundred and seventy-eight
- ⬭ Six thousand, eight hundred and seventy-three

03. What does '**2**' stand for in the number 4237?

- ⬭ 2
- ⬭ 20
- ⬭ 200
- ⬭ 2000

04. What are the coordinates of Point *A*?



- ⬭ (7, 7)
- ⬭ (6, 6)
- ⬭ (6, 5)
- ⬭ (5, 6)

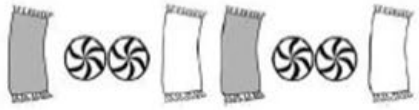
05. The census showed that three hundred and fifty-six thousand and ninety-seven people lived in Middletown.
Written as a number, that is

- ⬭ 350 697
- ⬭ 356 097
- ⬭ 356 907
- ⬭ 356 970

06. Which set of numbers is in order from greatest to least?

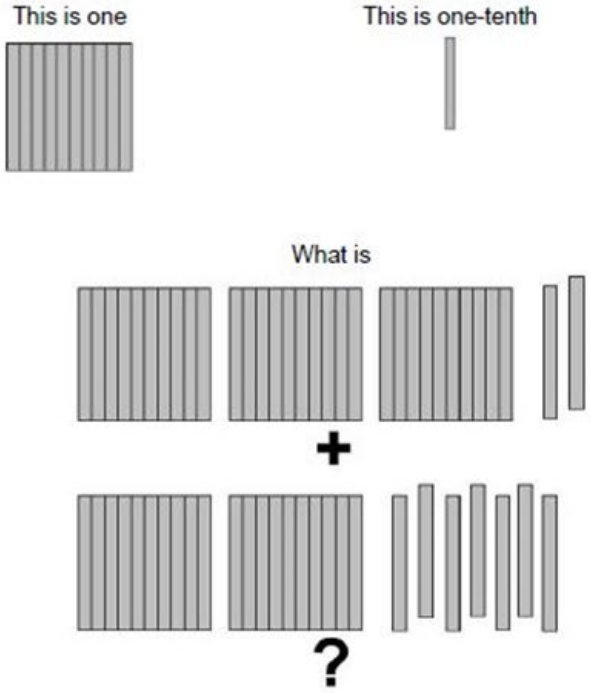
- ⬭ 147, 163, 234, 275
- ⬭ 275, 234, 163, 147
- ⬭ 275, 163, 234, 147
- ⬭ 163, 275, 234, 147

07. Look at this pattern.
Which of the following shows the same kind of pattern?



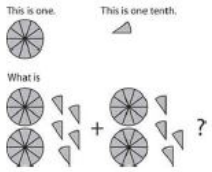
- ⬭ 
- ⬭ 
- ⬭ 
- ⬭ 

08. Use the information below to answer the question.



- ⬭ 1.5
- ⬭ 3.9
- ⬭ 5.9
- ⬭ 9.5

09.



- ⬭ 5.0
- ⬭ 4.9
- ⬭ 2.9
- ⬭ 0.1

10. What number would you have to subtract from 736290 to make the number 706290?

- ⬭ 3 000
- ⬭ 30 000
- ⬭ 30
- ⬭ 300 000

11. Which number has a 4 in the tens place and a 4 in the hundreds place?

- ⬭ 6424
- ⬭ 6244
- ⬭ 4462
- ⬭ 6442

12. What is the value of the 6 in the following number(s) in question12.?

6 432 955 _____

Appendix 9. Post intervention AsTTle (Mathematics)

01. Count by tens. Which number comes next?
20, 30, 40, ___

- ⬭ 10
- ⬭ 50
- ⬭ 60

02. When a spinner was spun it landed on Red 6 times, Blue 4 times, and Green 5 times. Which tally chart shows these results?

⬭

Spin Results	
Red	𝍸 | |
Blue	| | | |
Green	𝍸 |

⬭

Spin Results	
Red	𝍸 |
Blue	| | | |
Green	𝍸

⬭

Spin Results	
Red	𝍸
Blue	| | | |
Green	𝍸 |

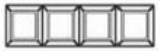
⬭

Spin Results	
Red	| | | |
Blue	𝍸
Green	𝍸 |

Use the following information to answer question 03

The chocolate bar shown below is divided into 4 equal parts.

03. Shade $\frac{2}{4}$ of the chocolate bar shown below.



On the line below, write a fraction to show the amount of the chocolate bar that you did **not** shade.

_____

04. Sophie has 527 seashells in her collection.
Which of these equals 527?

- ⬭ 5 + 2 + 7
- ⬭ 5 + 20 + 700
- ⬭ 500 + 20 + 7
- ⬭ 500 + 200 + 70

05. Which means seven hundred thousand five hundred ninety-two?

- ⬭ 70 592
- ⬭ 700 592
- ⬭ 705 920
- ⬭ 7 005 920

06. What is the value of the five in five hundred and twenty-six?

- ⬭ 5
- ⬭ 50
- ⬭ 500
- ⬭ 5000

07. What number is four hundred and five and three-tenths?

- ⬭ 45.3
- ⬭ 405.3
- ⬭ 453
- ⬭ 4005.3

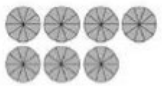
08. A number has nine ones, six tens, and eight hundreds. What is the number?

- ⬭ 869
- ⬭ 896
- ⬭ 968
- ⬭ 986

09. What is 583 607 rounded to the nearest hundred?

- ⬭ 583 000
- ⬭ 583 600
- ⬭ 583 700
- ⬭ 84 000

10. Which represents exactly 1.7?

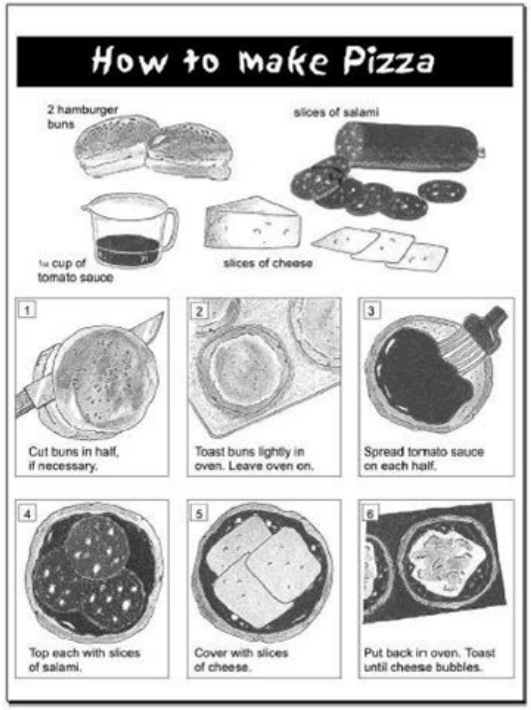
- ⬭ 
- ⬭ 
- ⬭ 
- ⬭ 

11. Which of the following statements is **TRUE**?

- ⬭ 83 521 > 85 432
- ⬭ 85 383 > 85 338
- ⬭ 53 785 > 53 875
- ⬭ 54 736 > 57 463

Appendix 10. Baseline AsTTle (reading)

Read How to Make Pizza and answer questions 01 to 04



01. According to the recipe, before you spread the buns with tomato sauce you need to

- ⬭ melt the cheese.
- ⬭ cut and toast the buns.
- ⬭ cover the bun with cheese.
- ⬭ cover the bun with salami.

02. One important piece of information that is missing from the recipe is

- ⬭ the order in which you add the toppings.
- ⬭ how to cut the buns.
- ⬭ the best time of day to eat pizza.
- ⬭ the temperature of the oven.

03. Put the numbers 1, 2 and 3 in boxes to show the correct order for making a pizza.

- ☐ Cover with toppings
- ☐ Put back into the oven
- ☐ Cut and toast buns

04. The pizza is cooked when the

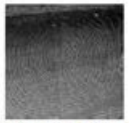
- ⬭ bun is brown.
- ⬭ sauce changes colour.
- ⬭ cheese changes.
- ⬭ salami is crisp.

Read Collecting Spiders' Webs and answer questions 05 to 08

COLLECTING SPIDERS' WEBS

Garden spiders, particularly orb web spiders, make beautiful webs that can be collected.

Step 1



Find a web. Check there are no spiders on it. If there are no spiders go to Step 2, if not find another web. Do not touch any spiders.

Step 2

Spray it with hairspray. Any type will do. This will make the web sticky.

Step 3

Shake powder over the web to make the shape of the web easy to see. The powder will stick to the hairspray.

Step 4

Then spray on more hairspray to make the powder stay in place. It will make the web even more sticky.

Step 5

Put a piece of cardboard behind the web. Using scissors, cut the web around the cardboard. The powdered web will stick to the cardboard. Using dark and colourful cardboard will help you to see the patterns more clearly. They also make an attractive display.

05. Which step gives the reader a warning?

- ⬭ Step 1
- ⬭ Step 2
- ⬭ Step 3
- ⬭ Step 4

06. What makes the spider web easy to see when it's on the cardboard?

- ⬭ The spider
- ⬭ The hairspray
- ⬭ The powder
- ⬭ The scissors

07. Which activity is repeated in step 4?

- ⬭ Finding a web
- ⬭ Shaking the powder
- ⬭ Cutting the web
- ⬭ Spraying the hairspray

08. After you find a web you should

- ⬭ spray it with hairspray.
- ⬭ shake on powder.
- ⬭ check for spiders.
- ⬭ press it onto cardboard.

09. Read the following sentence.
The merchant checked his stock to find out what he needed to order.
Without changing the meaning of the sentence, which word can **BEST** be used to replace the underlined part?

- ⬭ products
- ⬭ animals
- ⬭ soup
- ⬭ shares

10. Read the following sentence.
*The **construction** of the house will be completed next month.*
The Latin root ***"struct"*** in the word ***construction*** means

- ⬭ measure.
- ⬭ build.
- ⬭ study.
- ⬭ shape.

Appendix 11. Post intervention AsTTle (reading)

Use the following information to answer questions 01 to 03

Game Time

1 Duc has a game after school. He does not know what time it starts. He calls his friend Tony.

2 "What time is the **basketball** game?" Duc asks.

3 "At 5:30," Tony says. "But we should be at the gym by 5:00. Mr. West wants us to practise."

4 "Okay! See you there!" Duc says.

01. What is the story **MOSTLY** about?

- ⬭ When two boys will have a game.
- ⬭ Why a boy cleans a kitchen.
- ⬭ Where a boy works after school.
- ⬭ How two boys learn to play a game.

02. What will Duc probably do next?

- ⬭ Call Mr West.
- ⬭ Go to the gym.
- ⬭ Call Tony.
- ⬭ Cook dinner.

03. Which of these happens first in the story?

- ⬭ Tony goes to the gym.
- ⬭ Tony tells Duc when the game starts.
- ⬭ Duc says good-bye to Tony.
- ⬭ Duc calls Tony to ask a question.

A Bedtime Story

Anna is reading Scott's favourite book to him. He always asks to hear *Two Together*. It is a story about a girl named Rosa and her pet mouse Snowy.

In the story Rosa wishes for an adventure, and her wish comes true. First, Snowy grows until he is as big as a horse. Next, Rosa climbs onto Snowy's back. Then, Snowy begins to fly. They glide high over mountains and down into cities. They fly around the world in one day. They see many new things and encounter many interesting people. Finally, the two of them go home.

Scott smiles as Anna closes the book. "Thank you," he says.

"You're welcome," Anna answers. "Now hurry to bed. It's getting late."

04. Who reads aloud?

- ⬭ Rosa
- ⬭ Scott
- ⬭ Anna
- ⬭ Snowy

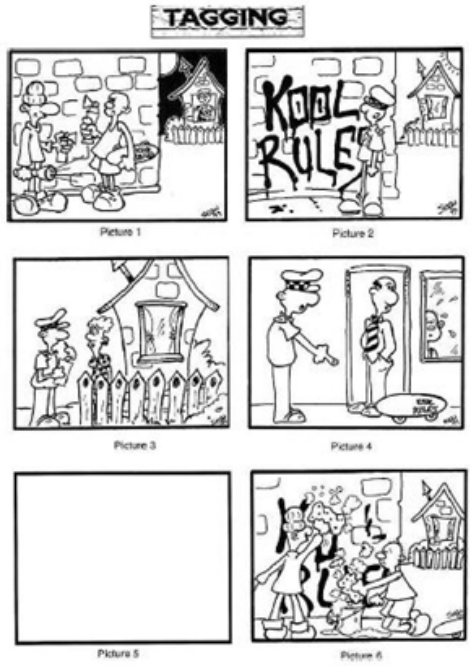
05. What will Scott probably do next?

- ⬭ Ask Rosa to read.
- ⬭ Fly with Snowy.
- ⬭ Go to sleep.
- ⬭ Play outside.

06. In this story, the word ***encounter*** means?

- ⬭ meet
- ⬭ read
- ⬭ think
- ⬭ hope

Use the following information to answer questions 07 to 09



07. Which two words **BEST** describe how the boy who appears in ***Pictures 4*** and ***6*** is feeling?

- ⬭ Picture 4: determined; Picture 6: happy
- ⬭ Picture 4: worried; Picture 6: sorry
- ⬭ Picture 4: satisfied; Picture 6: scared
- ⬭ Picture 4: angry; Picture 6: excited

08. What is the correct order of events?

- ⬭ Boys tag wall, wall is cleaned, policeman speaks to witness
- ⬭ Boys tag wall, policeman speaks to witness, boys clean wall
- ⬭ Policeman speaks to witness, boys tag wall, policeman cleans wall
- ⬭ Tagging is discovered, witness speaks to boys, policeman speaks to witness

09. Which of the following helps to show that the tagging happened at night?

- ⬭ Both boys are holding spray cans.
- ⬭ One of the boys is carrying a torch.
- ⬭ The woman is looking out of the window.
- ⬭ The policeman cannot see the crime being committed.

10. Choose the bubbles that show which word needs a capital letter. Mark each bubble.

billy went to visit his friend martin on thursday

Appendix 12. Strengths and difficulties questionnaire

Strengths and Difficulties Questionnaire

P or T 4-10

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of the child's behaviour over the last six months or this school year.

Child's name ..... Male/Female

Date of birth.....

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	☐	☐	☐
Restless, overactive, cannot stay still for long	☐	☐	☐
Often complains of headaches, stomach-aches or sickness	☐	☐	☐
Shares readily with other children, for example toys, treats, pencils	☐	☐	☐
Often loses temper	☐	☐	☐
Rather solitary, prefers to play alone	☐	☐	☐
Generally well behaved, usually does what adults request	☐	☐	☐
Many worries or often seems worried	☐	☐	☐
Helpful if someone is hurt, upset or feeling ill	☐	☐	☐
Constantly fidgeting or squirming	☐	☐	☐
Has at least one good friend	☐	☐	☐
Often fights with other children or bullies them	☐	☐	☐
Often unhappy, depressed or tearful	☐	☐	☐
Generally liked by other children	☐	☐	☐
Easily distracted, concentration wanders	☐	☐	☐
Nervous or clingy in new situations, easily loses confidence	☐	☐	☐
Kind to younger children	☐	☐	☐
Often lies or cheats	☐	☐	☐
Picked on or bullied by other children	☐	☐	☐
Often volunteers to help others (parents, teachers, other children)	☐	☐	☐
Thinks things out before acting	☐	☐	☐
Steals from home, school or elsewhere	☐	☐	☐
Gets along better with adults than with other children	☐	☐	☐
Many fears, easily scared	☐	☐	☐
Good attention span, sees work through to the end	☐	☐	☐

Signature ..... Date .....

Parent / Teacher / Other (Please specify):

Thank you very much for your help

Appendix 13. AWE questionnaire (modified version)

Assessing Wellbeing in Education (AWE)

First name:

Last name:

Class:

Kia Ora!
Below are some questions on **your** happiness at school and at home. Please read each question carefully and tick in the boxes given. There are **no right or wrong answers**. If you find any question hard to read or understand please raise your hand and we will come to help you!

1. How happy were you yesterday?

0 Did not feel happy at all yesterday	1	2	3	4	5	6	7	8	9	10 Felt happy all of the time yesterday

2. How worried were you yesterday?

0 Did not feel worried at all yesterday	1	2	3	4	5	6	7	8	9	10 Felt worried all of the time yesterday

3. In general, how happy or unhappy do you usually feel?

	Extremely happy
	Very happy
	Pretty happy
	Mildly (fairly good) happy
	Slightly happy
	Neutral (neither happy nor unhappy)
	Slightly unhappy
	Mildly unhappy
	Pretty unhappy
	Very unhappy
	Extremely unhappy

4. I connect to other students at school really well

0 Not at all like me	1	2	3	4	5	6	7	8	9	10 Completely like me

5. I feel good about my appearance (how I look)

0 Not at all like me	1	2	3	4	5	6	7	8	9	10 Completely like me

6. I feel like I fit in at my school

0 Not at all like me	1	2	3	4	5	6	7	8	9	10 Completely like me

7. I suffer from headaches, stomach pains or feel sick at school

0 Not at all	1	2	3	4	5	6	7	8	9	10 All of the time

8. I get bullied by students at school

0 Not at all	1	2	3	4	5	6	7	8	9	10 All of the time

9. I feel sad at school

0 Not at all	1	2	3	4	5	6	7	8	9	10 All of the time

10. I can face problems at school

0 Not at all like me	1	2	3	4	5	6	7	8	9	10 Completely like me

11. The teachers at school care about me

0 Do not care at all	1	2	3	4	5	6	7	8	9	10 Care about me really well

12. I tend to bounce back (recover) quickly after bad times

0 Not at all like me	1	2	3	4	5	6	7	8	9	10 Completely like me

13. In general, how happy are you with your health?

0 Extremely unhappy	1	2	3	4	5	6	7	8	9	10 Extremely happy

14. In general, how happy are you with the food that you have?

0 Extremely unhappy	1	2	3	4	5	6	7	8	9	10 Extremely happy

15. In general, how happy are you with your sleep?

0 Extremely unhappy	1	2	3	4	5	6	7	8	9	10 Extremely happy

16. In general, how happy are you with your Physical Activity and exercise?

0 Extremely unhappy	1	2	3	4	5	6	7	8	9	10 Extremely happy

Well done, thank you for answering these questions! Once you are done you can colour the sun, until it is time to collect everyone's questionnaire. Have a great day!

Appendix 14. Accelerometer compliance log

Name:

How to use the accelerometer this week

This small activity meter records general movement and allows us to get a better idea of your overall activity level. We will **not** be able to tell what kind of specific activity is happening. At first, the belt may feel slightly awkward, but after a few hours, you will probably get used to it and not notice it as much. It is **extremely** important for our study that you wear the meter properly. If it is not worn properly, we may have to send it back for you to wear again. Please follow these instructions carefully:

1. Wear the meter attached to the belt around your waist, just above your **right** hipbone. You can wear it either underneath or on top of your clothing.
2. Wear the meter so that the black strip (written Actigraph) is faced upwards.
3. Wear the meter **snug** against your body. If you have to, you can adjust the belt by pulling the end of the strap to make it tighter. Or, to loosen the belt, push more of the strap through the loop. **Wear the belt tight enough so that the meter does not move when you are being active.**
4. Please **put it on first thing in the morning** – either just after you get out of bed or just after you shower or take a bath in the morning.
5. **Do not submerge the meter in water** (swimming, bathing, etc.)
6. Keep the activity meter on all day (unless swimming or in the water).
7. At night, **take it off right before you go to bed. You should be wearing the meter for *at least* 12 hours each day.**
8. Do not let anyone else wear it.

We would appreciate it if you could please complete the tables on the following pages. Please try to complete the tables daily, rather than from memory at the end of the week. Please complete the table over the page and return this form to school on **17th May 2017.**

Many thanks once again for your interest and participation in the study

If you have any questions please don't hesitate to contact student Geeta Sharma geeta.sharma@aut.ac.nz
Project supervisor is Assoc Prof Scott Duncan scott.duncan@aut.ac.nz ph: 64 9 921 9999 ext. 7678

Name:

The expectation is that you will wear your accelerometer throughout your waking time. In the event that you remove your accelerometer please indicate this in the table below. Please complete the table below each day as accurately as you can.

	e.g.	Day 1: Tue 9/5/17	Day 2: Wed 10/5/17	Day 3: Thur 11/5/17	Day 4: Fri 12/5/17	Day 5: Sat 13/5/17	Day 6: Sun 14/5/17	Day 7: Mon 15/5/17	Day 8: Tue 16/5/17
1. What time did you **wake up**?	07:00								
2. What time did you **attach the accelerometer**?	07:00								
3. What time did you **remove the accelerometer** at night?	9:30								
4. What time did you **go to bed**?	9:30								
5. What other times during the day was the **accelerometer not worn**?	11:00–11:30								
6. What were you doing when you were **not** wearing the accelerometer	Swimming								

Belts collected on 17 May

If you have any questions please don't hesitate to contact student Geeta Sharma geeta.sharma@aut.ac.nz
Project supervisor is Assoc Prof Scott Duncan scott.duncan@aut.ac.nz ph: 64 9 921 9999 ext. 7678

Outline of dance sessions

Appendix 15. Outline of dance sessions handed over to School Three

Dance session	Date	Activities	Learning reflections (from researcher)
1	9/8/17	• **Laying out rules and expectations** • **Name Game:** a fun game, where children are introduced to Jane and vice versa. Children stood around in a circle, called out their names and represented a movement. • **Morph:** a game through which children learnt various States of Matter and representation. ❖ **Solid:** Children coming together as a group and standing still ❖ **Liquid:** Sliding across the floor as a low level ❖ **Gas:** running around the hall jumping around with high energy	• Children introduced to Creative Movement and come up with innovative movements. • Children were enthusiastic and energetic. • Many came up with their own creative movements • Few girls were already working collaboratively (by paring up) to represent liquid.
2	10/8/17	• **Continuation of Name Game** • **Continuation of Morph:** this time, transitions were added in-melting, freezing, evaporation and condensation. ❖ **Melting:** children slowly changing positions from solid state to liquid state from a high level to low level. ❖ **Freezing:** using robotic movements to demonstrate change of matter from liquid to solid ❖ **Evaporation:** children raising themselves off the ground (from liquid state) to gaining energy for gas state. ❖ **Condensation:** Children slowly losing energy for going down on the ground for Liquid state. Also characterised by "tick-tock" sound • **Letter construction:** Children constructed the first letters of their names for cool-down.	• Children by now, had understood that it was important to take responsibility of one's balance
3	15/8/17	• **Continuation of Name Game:** this time children had to add in their previous friend's move with their own. • **Morph:** Children were divided into two groups. While one group performed, another was the audience/choreographers/critique. The	• Children critiqued and provided feedback. • Children understood the various kinds of formations: horizontal, vertical, diagonal, random, parallel. • Teacher and researcher also took turns in cuing Morph activity

Dance session	Date	Activities	Learning reflections (from researcher)
		audience decided the starting and end position of the dancers. They also provided them feedback after the performance.	
4	16/8/17	• **Name Game** • **Morph**: Continuation of session 3, where children were divided into 4 groups. Audience critiqued the performers, while the dancers cued each other. Audience decided their starting and ending positions.	• Working collaboratively as a team • Moving according to the rhythm and dancing cues. • Providing and receiving constructive criticism. • Audience deciding starting and ending positions.
5	17/8/17	• **Name Game** • **Travelling**: children were introduced to this activity and got this pretty quickly. They were divided into rows of 3 and each row travelled across the Hall: ❖ **1st round**: walking 4 steps across together, pause, 4 claps, repeat till end of hall. At the end spin, jump and pose. ❖ **2nd round**: walking 4 steps backwards together, pause, 4 claps, repeat till end of hall. At the end spin, jump and pose. **3rd round**: travelling across on all fours, by jumping sideways (two arms go first and then legs follow)	• Traveling in a group • Keeping together as a group (while travelling as a row) • Creatively posing
6	22/8/17	• **Ground rules and expectations refreshed**: as the next 4 dance sessions were facilitated by Sarah and Geeta, the ground rules and expectations were refreshed. Children seemed to remember, the discussion on this during the first session. • **Dance Detective:** One kid is chosen as Detective in the group. Detective is sent out of sight for a while and Leader is chosen. Children copy the move of the Leader, without looking at them directly. Detective has to guess the Leader within 3 attempts. If he/she gets it right during first attempt, he/she becomes Detective for the next round as well. • **Travelling**: continuation from Travelling activity. This time, rows, columns and cells were explicitly mentioned. Sarah and Geeta cross-questioned to verify if the children understood or not. With shortage of time, there was only 1 round of children travelling across in a creative manner.	• Children learnt to show respect and follow instructions from Geeta. • Dance Detective helped in peripheral vision, i.e picking up the movement from the Leader without directly looking at him/her. • The Leader, got the opportunity of thinking quickly about a move. • Children thought about a creative way to travel across the hall, representing Anger. With limited time, we were unable to do more than that.
7	23/8/17	• **Dance detective**: the detective chose the theme for the Leader's movement. They would choose a segment from the Battle of the Mountains story.	Today's Dance Detective activity, provided the Leader ability to think about movements pertaining to a certain theme.

Dance session	Date	Activities	Learning reflections (from researcher)
		• **Performance of Battle of the Mountains:** children divided into groups of 4 and given the task of representing a section of the story. They were given a few minutes to discuss. Prior to performing, the performers asked the audience what they would like to be given feedback on. Rhythm, speed, steps, timings were some of the areas that the performers wanted to be given feedback on.	Performing task opened the doors for critique of reflection. Children worked collaboratively as a team and seemed to exhibit the task seriously. Children's creative movement could be clearly observed. Sound effects were also included by the performers. Audience provided constructive feedback.
8	**24/8/17**	**Travelling:** Groups 1-4 sit as 4 rows ready to get started in the Travelling Activity. Three rounds of travelling. • Hop, skip and jump across in rows • Travelling in frog jumps as columns (2 from each end) Leader assigned for each group and asked to come up with a Group Name. **Performance:** 1. Kids performed different segments of the story (known only to the performers). Group performs and audience needed to guess. 2. Kids got about 5 min to discuss and deliberate their segment. Leader decides choreography, starting position, ending position. 3. Groups 1,2 and 3 performed (ran out of time for group 4)	**Travelling:** Groups 1-4 sit as 4 rows ready to get started in the Travelling Activity. Three rounds of travelling. ❖ Hop, skip and jump across in rows ❖ Travelling in frog jumps as columns (2 from each end) Leader assigned for each group and asked to come up with a Group Name. **Performance:** 1. Kids performed different segments of the story (known only to the performers). Group performs and audience needed to guess. 2 Kids got about 5 min to discuss and deliberate their segment. Leader decides choreography, starting position, ending position. 3. Groups 1,2 and 3 performed (ran out of time for group 4)
9	**29/8/17**	**Dance Detective:** high level movement, fluid movement, animal movement themes. **Maui and the Sun:** The story was refreshed, central ideas were discussed and possible movements were brainstormed. This was slowly scaffolded into a game Musical Statues. Children were cued on representing various segments of the story and had to freeze when the music stopped.	It was a delight to watch the children came up with various creative movements, spontaneously working with a partner wherever needed.
10	**30/8/17**	**Maui and the sun (Musical statues):** Started off with Maui and the Sun story as musical statues. This was cued by Geeta, with Jane participating along with the children.	Children came up with interesting movements and were attentive to cues. They slowly made connections between clockwise and anti-clockwise bodily movements. Understanding of space. The letter writing helped them think creatively, keeping in mind dance educator's suggestions.

Dance session	Date	Activities	Learning reflections (from researcher)
		Clockwise and anti-clockwise: Jane introduced them to clockwise and anti-clockwise spinning as a whole class. She also asked them to turn in various angles to represent the time. **Letter writing:** children taught three ways of representing letters: body shape, air pathway or floor pathway. They were asked to represent the first letter of their name through shape, air pathway or floor pathway.	
11	**31/8/17**	**Dance Detective: warm-up game** **Clockwise and anti-clockwise (continuation):** Previous session's activity was continued. **Letter writing (cont):** transition between letters in a Name Solo were introduced. Children asked to work individually and demonstrate their Name Solos. Quite a few performed on stage with zeal.	Children came up with creative movements which were not even taught. A few girls embedded yoga with creative movement
12	**5/9/17**	**Cannon and Unison:** children in a circle, were introduced to Cannon and Unison activity. Jane slowly scaffolded them ensuring that too much instructions are not given in first session. Unison meant the children doing the same movement at the same time, whereas Cannon activity meant they did the same movement but after one person/ group has completed. Movements were: ❖ 3 jumps (count 1, 2, 3) ❖ Ready to spin (count 4) ❖ 1 spin (count 5 and 6) ❖ Reach up high (count 7) ❖ Bob down low (count 8) The group next divided into Group A and B. Group B started the dance sequence, when Group A where half-way through. **Letter-writing**: children worked on their Name Solos for cool-down	Children learnt the difference between performing as a group together and in contract with each other. They understood how to focus on their own group's sequence and ignoring the other group's sequence.
13	06/09/17	Mrs Nock and a few of her class children observed (and later participated) in the dance session. **Cannon and Unison:** brushed up from previous session. 4 part Cannon (as groups A, B, C and D) was both fun and challenging for the children, yet they managed to execute it well. **Dancer-mathematician activity**: Jane asked a few children (either in groups of 3, 4, 5 or 6) to represent a certain number. Children who represented the number were the **dancers** and the audience (who had to guess the number)	Children recognised the pattern of groups A &C, B &D moving together. Children were able to guess the number even before the group had completed representing the number. Ex: If the first dancer represented 4 movements and there were 4 dancers in total, children multiplied 4*4 to guess 16.

Dance session	Date	Activities	Learning reflections (from researcher)
		were the **Mathematicians**. The Dancers represented the number through spin, turn, jump or funny actions and each action represented 1 number. The Mathematicians counted the total number of movements done by the group and added it up to represent a number.	
14	07/09/17	**Place value activity:** children got into a circle and were introduced to the Place value activity. Each kind of movement represented a Place value. ❖ **Units:** lying down on the floor, each clap represents a number ❖ **Tens:** Hip-hop slide (each slide a number) ❖ **Hundreds**: spin ❖ **Thousands:** jumping up high, with arms raised. **Ex:** for the number 4352, children did 2 claps lying on the ground, 5 hip-hop slides 3 spins and 4 high jumps. They were later divided into groups of 7 and assigned a number to represent. 2 groups performed their number on stage, while the audience guessed the number.	Children understood the connection b/w levels and place values. They understood that as the number increased in value, the level of representation too changed. Children worked collaboratively, negotiating their movement while they represented this as a group. Ex: "I'll do the spin on a lower level, you do it on a higher level"; "I'll jump like this, you could do a different jump".
15	12/09/17	**Morph**: As warm-up **Place value activity (cont):** remaining groups from yesterday performed. **Name Solos Jam:** children asked to show their Name Solos in Jam style. They stood in a semi-circle and 3 kids represented their Name Solos simultaneously. Other children were cheering and encouraging them.	Children by now seemed to get better at guessing the number. The Jam gave them exposure and confidence to performing their Name Solos in a Jam. Children provided exposure to Hip-Hop culture.
16	13/09/17	**Cannon and Unison (cont):** this time there was focus on division, since division had not been explicitly mentioned in the previous session. 2-part, 4-part and 8-part cannon was carried out. **Hello:** an activity introduced with the objective of enhancing collaboration and team work. As children walked through the space they would represent a **Cannon and Unison (cont):** this time there was focus on division, since division had not been explicitly mentioned in the previous session. 2-part, 4-part and 8-part cannon was carried out. **Hello:** an activity introduced with the objective of enhancing collaboration and team work. As children walked through the space they would represent a certain movement or help each other out. The game will keep going only when people help each other out.	Children understood the motive behind Cannon and Unison activity and responded well. They understood that as a group, it was challenging to concentrate on their group's performance and ignore others. Since Jane had clearly mentioned that the activity will cease if they didn't help each other out, the children were very proactive and keen to participate. They understood the value of community, collaboration, social responsibility and patience.

Dance session	Date	Activities	Learning reflections (from researcher)
		The three moves were: ❖ **Spinning:** When a person made eye contact, they would spin on the spot. This could be either a high or low spin. ❖ **Greeting:** If someone offered a hand, the other person passing should accept the invitation. This should be done by offering his opposite hand, leaning back, balancing each other's weight, lowering each other down to the ground, spinning on the floor, sitting in an asymmetrical shape and then waiting for another person to help them. ❖ **Aeroplane:** if someone wants to fly, he/she stands in flying position (one leg in front of another, slightly bent, two arms raised up and stretched) while two people stand on either side of the person acting as engines. They place their arms on the person and give him/her a slight push for him/her to fly away.	
17	14/09/17	**Morph**: As warm-up **Hello (cont):** two movements added in ❖ **Machine**: if one person wants to represent a machine, he/she'll do repetitive movements until two other join in to complete the structure of a machine engine. ❖ **Statue:** one person poses like a statue and other two people link up in a similar fashion. **Name Solos jam (cont):** children performed their Name Solos in Jam Style, keeping in mind Open Day performance (on 19th Sep)	Hello activity was further solidified and so were the Name Solos.
18	18/09/17	**Open Day for parents:** Parents watched children performing Morph and their respective Name Solos in Jam format. They joined in children as they did the *Hello!* Activity. Brushed up from *Line formation* (vertical, horizontal, diagonal, clockwise rotation and anti-clockwise rotation), *Maui and The Sun* (as Musical Statues) and finally *Cannon and Unison.*	This was the final dance session and it appeared like the children have come a long way. The parents seemed quite happy enthusiastic as they participated in the *Hello!* Activity.

Published manuscripts

Appendix 16: Published manuscript of chapter two

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ARTICLE

Observing the Delivery of a Curriculum-Integrated Dance Programme Across Four New Zealand Primary Schools

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Abstract
This paper explains the design, development and delivery of a curriculum-integrated dance programme across four primary schools in Auckland, New Zealand. Four teachers and their respective classes (101 children in total) were part of the programme. Each class participated in 18 dance sessions at their schools during school hours. The dance educator delivered the dance programme and collaborated with each class teacher for planning and implementation. Various topics related to science, mathematics, English and Māori culture were covered in accordance with the term focus of each class teacher. The core values from the New Zealand primary school curriculum and New Zealand arts curriculum were embedded in the dance programme. The applicability, transferability (to other participant groups), challenges (such as time and venue) and evaluation design associated with the dance programme are discussed. Teachers' reflections are embedded with researcher observations as they describe the significance of the dance programme.

Keywords Curriculum-integrated dance programme · Creative movement · Collaborative dance research · New Zealand primary schools · New Zealand dance curriculum

Background

The current paper describes a curriculum-integrated dance programme that was implemented across four primary schools in Auckland (New Zealand) to investigate the integration of dance education into the New Zealand primary school curriculum. Creative movement-a form of movement using the body as a learning tool-formed an integral part of the dance programme as it has the potential to enhance student

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learning (Dow 2010; Leandro et al. 2018). Note that previous researchers have used the terms "dance education" and "creative movement" interchangeably; a similar approach has been applied to the present paper (Dow 2010; Leandro et al. 2018).

Dance as a Teaching Tool

Research in dance education has suggested that dance and creative movement may be effective in teaching curricular subjects such as geometry, literature or science, as children may develop a deeper understanding of the theory and application of abstract concepts (Gross 2011; Koff and Warner 2001; Moore and Linder 2012; Richard 2013). Embedding creative movement with dance-based teaching can potentially ignite cognitive learning in children, since physical movement deepens neural connections (Dow 2010; Richard 2013; Simpson Steele et al. 2016). Dow uses the term "vehicle" to describe dance as an effective teaching tool and affirms the pedagogical benefits of creative movement as a specific dance activity that fosters integrated learning (Dow 2010). She proposes that dance and creative movement could be embedded seamlessly into curricular teaching and tailored to fit any venue. Furthermore, Hanna suggests that dance can be considered economical in comparison to other art forms, such as music or visual arts, since "(the) students' own bodies are their instruments" (Hanna 2015, p. 22).

A US-based research project Teaching Artist Programme (TAP) found arts-based learning improved English oral skills among Hispanic children (Greenfader and Brouillette 2017). Primary teachers from a large school district in California (USA) were part of this 2-year programme to aid the integration of creative drama and dance into their teaching practice. During the first year, teachers and artists co-taught a total of 28 arts-based lessons (14 theater and 14 dance) and each lesson lasted 50 min. By the second year, teachers were able to develop and deliver arts-based lessons independently. Children who participated in TAP had significantly higher scores on the California English Language Development Test (CELDT) than control group students. Two other studies evaluating TAP have also demonstrated the benefits on other ethnic groups, particularly those with limited English-speaking ability (Christa Mulker et al. 2015; Christa Mulker and Liane 2013).

Another school-based study found the benefits of creative movement among children, where nine children had special needs (Skoning 2008). It was observed that when literature was taught through creative movement, children understood abstract ideas by transferring and applying their concrete knowledge of the subject. The author opines that generalist teachers can seamlessly integrate dance into their teaching, without prior experience or training in dance. She also suggests that teachers may develop a dance-embedded assessment despite lacking the ability to move creatively themselves (Skoning 2008). These studies suggest that creative movement can be applied and further developed by New Zealand primary school teachers in their classrooms, despite the teachers' minimal exposure to dance education and creative movement.

Current Status of Dance in New Zealand Primary Schools

Dance education researchers in the New Zealand context have emphasized both the benefits and need for generalist teachers to implement dance into their teaching practice (Beals et al. 2003; Hong; Renner 2015; Snook 2012b; Snook and Buck 2014). Most studies have shown that New Zealand primary teachers feel inadequate to embed dance into their teaching (Ashley 2010; Buck 2003; Snook 2012b). On the contrary, another study has shown that New Zealand primary teachers reported medium to high levels of self-efficacy towards dance and did not perceive dance as a challenge to teach (Renner 2015). However, all these studies acknowledge that pre-service and in-service teacher training have a pivotal impact on teaching practice (Ashley 2010; Buck 2003; Renner 2015; Snook 2012b). Lack of funding, heavy workload, tight teaching schedules and little time for planning may also be contributing factors for the integration of dance into curricular teaching (Beals et al. 2003; Buck 2003; Snook 2012b). Hence, in many primary schools dance is taught by a dance artist or dance educator for few interested students with minimal teacher involvement and curricular cross-over (Snook 2012a, b; Snook and Buck 2014). A sustainable and effective approach towards embedding dance with a curricular crossover could be through a dance-integrated teaching model delivered by the generalist teacher.

Upon release of the revised 2001 New Zealand Arts Curriculum, teachers across New Zealand were provided with Professional Learning Development (PLD) to facilitate the implementation of Arts, i.e. dance, drama, music and visual arts in their respective school curricula (Beals et al. 2003). The PLD occurred through after-school workshops which were facilitated by artists. Prior to the PLD, teachers were less confident in the implementation of dance as part of their teaching practice. Beals' assessment found the PLD had an impact on teachers' method of teaching, both as a reflective and curriculum-embedded form of learning. Teachers also reported a 25% increase in literacy and an increase in students' confidence and enthusiasm towards the Arts in general. Teachers further requested training and resources to facilitate the implementation of Arts, particularly dance (Beals et al. 2003).

Besides providing PLD to teachers, the New Zealand Ministry of Education released several resources to aid the integration of dance into the curriculum. Some of these were Dancing the Long White Cloud (DLWC), Kiwi Kids Dance, Discovering Dance-Teachers' Notes and the Dance Wall Charts. (Ashley and Anderson 2002; Ministry of Education 2002, 2005; New Zealand Ministry of Education 2006). Among these, the DLWC was specifically filmed to assist primary educators embed dance into their teaching practice (Ashley and Anderson 2002). This video resource was sent to every school in New Zealand along with supplementary reference booklet. Teachers from eleven Auckland schools were recruited to assist in the filming of the video resource, along with their classes. One class from each school participated in a dance-embedded learning programme developed by their respective class teacher and filmed as lessons. Outline of lesson planning, unit planning and learning assessment were covered

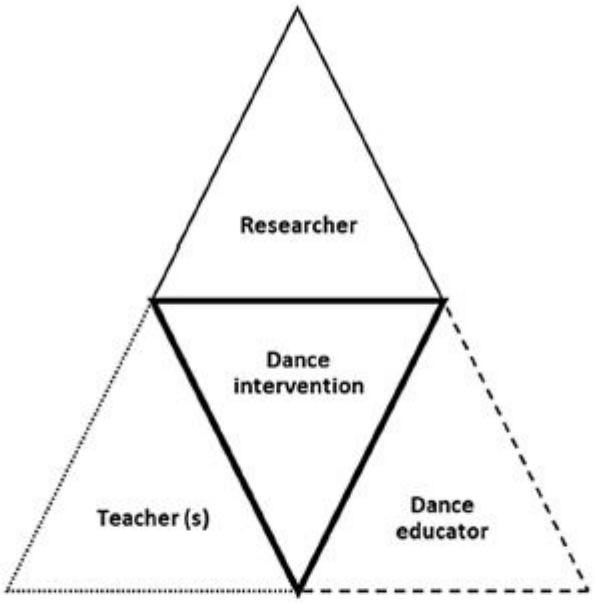

Fig. 1 Collaborative nature of the dance programme

in the supplementary reference booklet. Since the DLWC programme, there have been no large-scale PLD programmes to facilitate dance education at a national level. The reprinting of the resource stopped after lack of government funding and currently the DLWC is not easily accessible to New Zealand primary educators (O'Brien, P, personal communication, Oct 10, 2019) (Fig. 1).

A dance-integrated classroom teaching model has the potential to meet the teaching strategies mentioned in the New Zealand curriculum such as: supportive learning environment, reflective thought and action, shared learning and teaching as learning (The New Zealand curriculum for English medium teaching and learning in years 1–13, 2007). Despite recognising and acknowledging its benefits, dance is mainly perceived as an art form, rather than a form of learning (Snook 2012b). Even with little exposure to dance education, primary teachers can be supported to embed creative movement into their practice effectively.

Dance Educator and Classroom Teacher Collaboration

A partnership-based model between artists and teachers can provide teachers practical experience towards embedding dance and creative movement into their practice. This will not only act as a means of their PLD, but can potentially leverage kinesthetic learning among their class students (Greenfader and Brouillette 2017; Moore and Linder 2012). In the context of programmes in the USA, several such partnership-based models have been germinated as a means of PLD for teachers across

several states. The Visual and Performing Arts programme at San Diego schools (VAPA), Changing Education Through the Arts (CETA) by the Kennedy Center, Opening Minds through the Arts programme at Tucson Unified School District, The Teaching Artist Project (TAP) are a few examples of such a partnership-based model (Greenfader and Brouillette 2017; Smith 2009; San Diego Unified School District; Silverstein and Layne 2010). Here, artists and class teachers co-taught a series of curriculum-integrated dance classes, tailored to each teacher's term focus. Initially, teachers received the support of an artist to incorporate creative movement into their teaching practice. Over a period of time, they gradually developed confidence to independently plan and deliver dance-embedded lessons. Depending on the tenure of the respective programme, the training time for the teachers ranged from a few weeks to up to 2 years like the VAPA programme and TAP. Children who participated in these programmes, demonstrated an increase in academic learning, creativity and sustained interest towards the Arts (Greenfader and Brouillette 2017; Smith 2009; San Diego Unified School District; Silverstein and Layne 2010).

The Dance for Children programme was a collaboration between Montclair State University and Bradford School where BA (dance) students had placement in schools as part of their course requirement (McPherson 2014). Here they collaborated with class teachers to co-teach classes, which embedded curricular learning. As part of their course the students shared their experiences with their peers, school staff and professor to reflect and learn. Their learning was later assessed at the end of the placement. This "experiential learning" provided "deeper artistic experiences" for teachers and school children alike (McPherson 2014, p. 5).

In another study, a teacher and dance educator collaborated to develop and deliver dance-integrated geometry sessions (Moore and Linder 2012). Students demonstrated their understanding of geometric concepts through dance performances which they had developed in groups. Learning was assessed in reference to a rubric developed by their teacher. The sessions not only enhanced children's application knowledge of geometry but also enhanced reciprocal learning, social skills and provided a platform for critical appreciation of dance. In the New Zealand context, a similar collaborative model could be one strategy to ensure the sustainability of dance education in primary schools. This raises two crucial questions: (1) How can a curriculum-integrated dance programme be effectively delivered in New Zealand primary schools? (2) What are the perceptions of New Zealand teachers who participate in a curriculum-integrated dance programme?

Rationale and Significance of the Study

The current study was formulated to address the above questions by observing the development, delivery, applicability and transferability of a curriculum-integrated dance programme in New Zealand primary schools. The dance programme which took place between Oct 2016 and Dec 2017 was a collaborative effort between the participating teachers, a dance educator and the primary author. It was constantly refined based on the reflections from the teachers, dance educator, children and primary author. Finally, it was evaluated using a mixed methods approach (Clark 2007;

Giguere 2015). The programme reflected the four interrelated strands of the New Zealand Arts curriculum: Understanding the Arts in Context, Developing Practical Knowledge in the Arts, Developing Ideas in the Arts and Communicating and Interpreting in the Arts (New Zealand Ministry of Education 2000). It was closely aligned with the principles of effective pedagogy and many of the learning areas (such as science, English, social science, mathematics and statistics) of the New Zealand primary school curriculum (New Zealand Ministry of Education 2007). Unlike previous studies that focused on dance-embedded learning towards a single learning area, the dance programme from the current study covered a range of subjects (Leandro et al. 2018; LaMotte 2018; Moore and Linder 2012).

The dance programme provided teachers with exposure to a curriculum-embedded dance module and served as a unique approach to their PLD (Buck 2003; Beals et al. 2003). It acted as a catalyst for a cross-curricular approach towards learning and further emphasised the need for including dance as a curriculum-integrated activity in New Zealand primary schools (Snook 2012b). Although artist-teacher collaborations have taken place in the New Zealand context, few studies have specifically evaluated a dance programme (Ashley and Anderson 2002; Beals et al. 2003). Moreover, there is a gap in literature surrounding the acceptability and delivery of a curriculum-integrated dance programme in New Zealand primary schools (Buck 2003; Snook 2012b).

The current paper describes the planning, delivery and feasibility of a curriculum-integrated dance programme across four New Zealand primary schools. The activities covered across all four schools are explained in tandem with children's acceptability of the programme. Teachers' perceptions of the dance programme are explored along with observations from the research team. The programme was evaluated using a mixed methods approach and the following section describes this in detail.

Design of the Study

Evaluation Design

The recruitment of schools for this study commenced after seeking ethical approval (reference number 16/303) from the Auckland University of Technology Ethics Committee (AUTEC). This study was part of the primary author's PhD project, where she evaluated a curriculum-integrated dance programme in the New Zealand context. Eight primary school teachers across four primary schools participated in this project with their class children and the teachers decided the Dance Group (DG) class and Control Group (CG) class. The DG class took part in the dance programme with their class teacher, while the CG class did not participate in the dance programme but were evaluated on the same quantitative measures as the DG class. The DG teachers made it compulsory for all their children to participate in the dance programme, as it involved curricular learning and was part of their term focus. DG (n = 101) and CG (n = 86) children were part of the evaluation only after obtaining parental consent and child assent. Separate evaluation reports were sent to the school

principals, teachers and parents. Photos in this study have been used after obtaining parental consent and child assent.

A mixed methods evaluation design was used to evaluate the dance programme, since the impact of the dance programme needed to be understood holistically through quantitative and qualitative measures. This is similar to previous studies in the New Zealand and overseas context (Beals et al. 2003; Greenfader and Brouillette 2017; Renner 2015; Werner 2001). Quantitative evaluation procedures were conducted at baseline and post intervention intervals for both DG and CG participants. Academic performance, psychological wellbeing, classroom behaviour and physical activity were evaluated through the Assessment Tools for Teaching and Learning (AsTTle) questionnaire, Assessing Well-being in Education (AWE) questionnaire, Strengths and Difficulties Questionnaire (SDQ) and Actigraph accelerometer, respectively. In order to understand children's perceptions of the dance programme, DG children were asked to journal their learning experiences either through Google Docs or *SeeSaw0F*.[1] About five children from each school were chosen by their teacher to participate in a focus group interview in their school. Teachers were interviewed separately, where they reflected upon the dance programme and its applicability to their teaching practice. The findings of these evaluation procedures shall be disseminated in future publications.

Intervention Design

In addition to previous research in dance education, the research team has coined a definition based on the observations and reflections gathered throughout the dance programme conducted in this study (Leandro et al. 2018; Moore and Linder 2012; Skoning 2008). Thus, their applied definition describes a curriculum-integrated dance programme as a series of dance sessions, encompassing various curricular activities using the principles of dance education and creative movement. The dance programme was informed by cycles of action research learning for the primary author and dance educator in response to participants (children and teachers). Applied reflection (or reflexivity) on the part of the primary author and dance educator between one school (in one term) and the next over four terms played a significant role in this study (Kalendra and Cook 2017). Discussions were held with the participating teacher and dance educator usually each week. This significantly added to the improvisational approach of reacting with presence and responsiveness to the children's needs and suggestions (Giguere 2015). It also fostered ongoing reflective journaling that cumulatively informed, not only individual lesson plan but also pedagogical approaches and thematic ties with the classroom curriculum in the dance programme throughout and between school terms (Marsick and Gephart 2003). Many activities were repeated, applied and transferred to other schools (see Table 1). The dance activities were derived from various texts; few were created by the dance educator (Ashley 2014; Kaufmann and Dehline 2014) (Fig. 2).

[1] SeeSaw is an online platform, where children share their learning through written reflections, videos or pictures amongst peers, teachers and parents.

Table 1 Activities covered in the dance session

School One Oct-Dec 2016	School Two May-July 2017	School Three July-Sep 2017	School Four Oct-Dec 2017
Name Game			
Letter construction and name solos			
Travelling			
States of Matter (morph)	Kenwood says	States of Matter (Morph)	Prefix Game
Representation of geometrical shapes	Dance detective		
Prefix Game	Vertebrates activity	Maui and the Sun; Battle of the Mountains	Plant Life Cycle
	Frog life cycle	Canon and Unison for multiplication and division	
	Measurement activity	Place value activity	
	Butterfly life cycle	Hello!	
	Seven sisters of Matariki	Clockwise and anti-clockwise	Festivals across the world

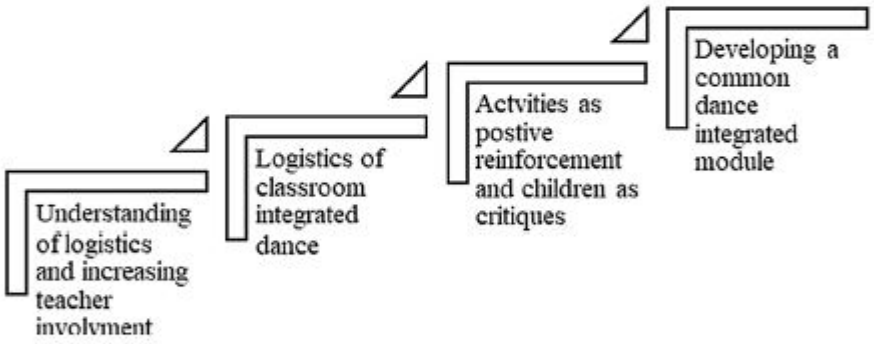

Fig. 2 Stages of reflexive cycles in all four schools

Prior to the start of the dance programme, detailed discussion took place between participating class teachers, the dance educator and the primary author regarding the theme of the dance module. Previously, artists have tailored PLD according to teachers' and children's needs both in New Zealand and overseas (Beals et al. 2003; Richard et al., Diego Unified School District; Smith 2009; Werner 2001). While the dance educator provided structure and content to the dance programme, the class teacher shared her expertise on curricular subjects, children's learning behaviour and special needs. The teacher also helped with logistics associated with the programme such as booking the school hall, bringing children to the hall and supplying props for specific activities. Physical activity, teamwork, critical appreciation, reciprocal learning and choreography were part of the dance programme in varying intensities

Fig. 3 Salient features of the dance programme

and frequencies (Kassing and Jay 2002a, b). The sessions took place at times that suited the teacher and dance educator, usually in the school hall.

The dance sessions were designed bearing in mind children's special needs and comforts. For example, a child with autism who did not want to lie on the floor and represent the motion of a bicycle through his legs was encouraged to use his arms instead. By making the dance programme a compulsory part of their term focus and teaching, the Dance Group (DG) class teachers ensured all children in their class actively participated in the dance programme. The dance module had certain common activities for all schools but varied in theme according to each teacher's term focus and requirements. The dance educator and primary author sought feedback continuously from the participating teacher to ensure curricular learning and applicability (Fig. 3).

During the first dance session at each school, the dance educator and children outlined five important ground rules. Appropriate management strategies such as positive enforcement (marbles in the jar) strict warning and punishment (time-out) were decided by the teacher, according to children's age and special needs (Clark 2007). The dance educator and relief teacher would enforce these management strategies during the class teacher's absence. Activities were tailored according to the density of the class (usually 25 children per class) and location (either classroom or hall). Children's creative movements were enthusiastically praised, thus providing

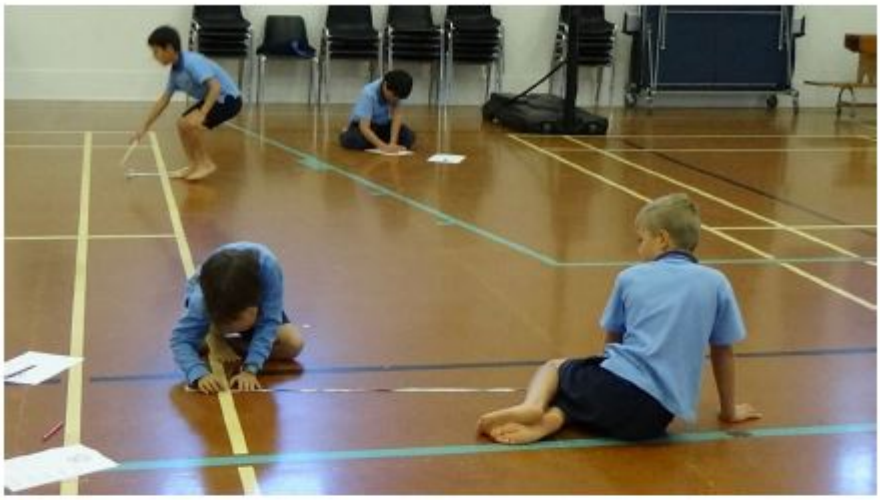

Fig. 4 Children measuring their partners' hip-hop slide, which was later plotted in a bar graph

a sense of autonomy, ownership, critiquing ability and pride (Bradley and Szegda 2012; Contant 2015; Dow 2010; Richard 2013).

Children's active participation in the dance programme played a pivotal role in this research. Their written reflections helped to explore the children's perceptions of these activities and determined its applicability to the subsequent sessions. Teachers played a vital role in the enquiry towards these activities, either before, during or after the dance sessions. For example, Teacher Four prompted children's journal writing through questions like "How were the first three dance sessions? What did you enjoy the most?" Also, regular discussions and timely feedback from teachers ensured that the dance sessions were effective for all children.

The dance educator kept the children engaged during the dance activities and teachers applied the activities in their classroom teaching. This ensured that both teachers and children remained in touch with the activities in between dance sessions. For example, Teacher Two generated enquiry towards the Bar Graph activity by first explaining the requirement and use of a bar graph in the classroom. Children then plotted their hip-hop slides in a bar graph, which had been physically represented and measured in a dance session. Later, the entire class represented the plotted bar graph of a single child and were asked to reflect upon the activity through *See Saw* (Fig. 4).

All four DG teachers appreciated the collaborative nature of the dance programme and felt "it served as professional learning and development" (Teacher Three interview, 29 Sep 2017).

> I think it was a real strength that you [primary author] and Jane [dance educator] worked with me. You didn't come in and say 'these are what the sessions are going to look like'. It was more of how it can back up what I was doing in the classroom… (Teacher Four interview, 11 Dec 2017)

Fig. 5 Relief teacher from School Two assisted in dividing the children into rows and columns

A weekly update on the activities and observed learning outcomes was e-mailed to the DG teacher. Frequent meetings between the teacher, dance educator and primary author enabled continuous refinement of the dance programme. Dance sessions were video-recorded, appropriate documentation were taken; copies of videos and photographs were handed over to the DG teacher at the end of the dance intervention. This not only served as a source of reference but also as a means of enquiry, reflection and rich source of data (Richard et al. 2012; Richard 2013).

Feasibility and Logistics Associated with the Dance Programme

Prior planning of activities ensured that the dance sessions could be conducted either in the school hall or in a classroom. Each dance session lasted 45 min, three times per week for a period of 6 weeks. Hence, each DG class was exposed to a total of 18 dance sessions. If the DG teacher was on leave or had other teaching duties, a relief teacher would be appointed by the school to assist managing the children (see Fig. 5). In School Two, the participating DG teacher was away for many sessions, and the relief teacher played a prominent role in facilitating the dance programme. Although the teacher took primary responsibility for behaviour management and discipline, the dance educator also utilised a few activities that yielded positive reinforcement to keep the children engaged and motivated.

The first few dance sessions in every school started with the Name Game activity. In this activity DG children, class teacher, dance educator and primary author stood in a circle and consecutively said their names accompanied by a movement. Others mirrored him or her. This activity served as a means of introducing the children to the dance educator and primary author, while also providing their first choice of creative movement.

Fig. 6 Children utilising their sweaters as props to represent the cocoon stage of a Butterfly Life Cycle

Dance Detective was a "popular" and "fun" activity used frequently throughout the dance programme, either for warm-up or cool-down *(Teacher Four interview, 11 Dec 2017)*. A leader silently led various movements amongst the circle of dancers, while the detective- unaware of what the leader was doing- had three chances to identify the leader of movements. The DG class teacher decided the leader and detective as a means of reinforcing positive behaviour. She also chose the theme of creative movement such as animal movements (e.g. frog jump), high movements (e.g. waving arms on tiptoe) or robotic movements (e.g. stiff movement of limbs and trunk) for each round.

Table 1 provides an overview of the activities common and different to each school. Activities were transferred and applied to subsequent schools, according to nature of participants, term focus and time.

The venue of a dance session played an important role in deciding the activities to be covered. At Schools Two and Three, due to unavailability of school hall, six sessions took place in the classroom. Activities such as Frog and Butterfly Life Cycle, a series of creative movements depicting life cycles of a frog and butterfly; Letter Construction, representing letters through body movements; Kenwood Says, choreographic representation of a rabbit's lifestyle and habitat were covered in the classroom. The restricted space was not a hindrance to the dance programme, but further ignited children's creativity. For example, a boy from School Two utilised the camera tripod to represent his "burrow" from Kenwood Says. Another example is represented in Fig. 6.

The DG teachers started integrating dance and creative movement into their teaching practice and found the activities transferrable to other spheres of their teaching. For example, Teacher One used Name Solos as an eye break (brief 5 min interval from desk-based school work); Teacher Two further developed the Vertebrates activity, by asking children to create a representation of their favourite animal;

Fig. 7 Children representing "gas" state where particles are in high energy

Teacher Three incorporated mathematical concepts into her art lessons. They were all keen to start their own activities keeping the taught dance activities as a template. For example, Teacher Three planned an activity to represent flow of electricity using The Life Cycle activity template. The dance sessions were video recorded, photographs were snapped and weekly outline of the activities were documented; all were shared with the DG teacher. These provided a reference which could be further improvised to align with their respective teaching styles and curriculum objectives.

Children's energy and curiosity were plainly evident throughout the dance programme. For example, during the States of Matter activity (a choreographic piece representing the various states of matter) a boy from School One imagined and demonstrated plasma in front of the entire class. Another example from School Three is represented in Fig. 7.

Transferability to Other New Zealand Schools

Prior to the dance programme, DG teachers had very little or no training in dance education. Their involvement before, through planning and preparation; during, through participation; and after the dance programme through regular debriefs and interviews provided them a holistic understanding of what a curriculum integrated dance session could look like.

> I wish dance education was like that [the dance programme] across the board rather than a teacher that just takes 'dance' or I guess like anything that they go out for with our specialist teachers and it was really integrated into my classroom programme and vice versa… I changed my programme to suit where we were going with dance as well (Teacher Four interview, 11 Dec 2017)

This is similar to another New Zealand study, where teachers preferred someone with whom they could work, learn and discuss their programmes as opposed to outsourcing it to an expert in dance (Snook and Buck 2014). The authors raised the concern of generalist teachers perceiving artists as "cut above" meaning slightly higher up in the dance teaching hierarchy (Snook and Buck 2014, p. 22). The authors recommend for "dance education artists to be employed within schools" (Snook and Buck 2014, p. 25).While this may seem feasible from a short-term perspective, we are concerned that its sustainability may involve challenges. Teachers may rely on dance educators, as opposed to being in control themselves. This could in turn, limit dance being taught during specific timings only, as opposed to being an integral part of the teacher's practice. The hierarchical model will therefore continue; and teachers will continue to take a back-seat. Also, funding is a major challenge particularly for teaching arts in New Zealand primary schools (Beals et al. 2003; Snook 2012b). Hence, employing a dance education artist within a school may not be economically feasible.

However, a non-hierarchical, peer-mentored and curriculum-oriented approach (similar to this study) could be a more effective means of achieving a more sustainable model towards dance integration in primary classrooms. Since long-term funding of a dance education expert across all schools poses a possible barrier, short-term hiring for teachers' PLD could be considered instead. Ongoing discussion with other teachers and peer support should constitute an integral component during and beyond the PLD. If school funding permits, the dance educator could facilitate a follow-up session.

In this project, the hiring of a dance educator had multiple benefits. Primarily, she acted as a catalyst and ignited dance embedded learning in the four participating schools. Secondly, her involvement with the participating DG class teacher prior, during and after the dance sessions acted as PLD for the teacher. Finally the hiring of a dance educator provided teachers with the opportunity to reflect on their teaching methods, observe the children, evaluate their learning and apply the activities into their teaching practice.

> … it's just the team building sort of thing and having a bit of fun… working with them and being one of them was quite good. They could have a bit of fun with me rather than me just being the teacher (Teacher One interview 15 Dec 2016)

In New Zealand primary schools, children's learning is assessed holistically and not just through report cards. The school assembly was one such platform where children demonstrated their learning and were assessed by their teacher. Besides, it also provided a platform for DG teachers to demonstrate the children's learning from the dance programme to the entire staff and parents. Teacher Four added:

> For the teachers it showcased that dance doesn't have to be traditional dancing, that it can be just movement to a piece of music that is related to a piece of our learning as well (Teacher Four interview, 11 Dec 2017)

Proactive participation, timely feedback and input of innovative ideas from the teachers played a prominent role in the dance programme. This lies in similarity to a previous New Zealand-based study where the author observed the teachers found "…strategies in constructivist teaching approaches, past experiences, school relationships and resources to teach dance" (Renner 2015, p. 160). In the absence of the dance educator, the teachers and primary author worked together to deliver some of the dance sessions. The authors of this study believe that a similar dance module could be utilised and integrated into other New Zealand schools.

Challenges and Limitations of the Dance Programme

Limited time to plan and execute the dance programme was a major challenge for the DG class teacher and dance educator. Fitting a 6-week dance intervention into a 9-week school term proved challenging, particularly when the dance educator had to plan a dance programme specific to the curricular and thematic variations of different schools and terms. On several occasions, the dance sessions barely lasted 20 min because of other school activities and confusion in hall bookings. Understanding and applying school subjects into dance-embedded activities in only 6 weeks was a major challenge for the dance educator, especially in Schools One and Two. Catering to children's learning styles and their behavioural issues were major challenges, as was the need to keep them constantly engaged and attentive.

A New Zealand primary school teacher with curricular teaching expertise, effective child management strategies and a well-planned framework may not necessarily experience similar challenges. An effective peer support system however, may place teachers in a better position to understand and respond to these challenges.

The dance programme took place in only four primary schools in Auckland. These schools were of Decile 10 ranking and were restricted to the North Shore region of Auckland, usually comprising of children from upper socio-economic background. Development, delivery and transferability of a dance embedded curriculum across lower deciles, varied socio-economic backgrounds and regions could be the focus for another study. Finally, the present study was an observation of the delivery of a short-term dance programme. The long-term impact and feasibility of a dance programme in New Zealand primary schools requires further research.

Recommendations

Lack of government funding is a major hindrance towards embedding dance and creative movement into primary school teaching (Snook and Buck 2014; O'Brien, P, personal communication, Oct 10, 2019). Similar to the DLWC, fresh video resources would need to be filmed, bearing in mind the current academic focus of New Zealand primary educators. Reprinting and redistribution of the DLWC may also be considered, as currently this resource is not easily accessible for most primary educators (O'Brien, P, personal communication, Oct 10, 2019).

For a dance-embedded curriculum to be successful across New Zealand primary schools, teachers require constant support and professional development, without which they may fall back into their old teaching styles (Beals et al. 2003; Snook 2012a, b). While Snook recommends employing a dance artist in schools to aid the integration of dance into curricular teaching, this may not necessarily provide generalist teachers with either the skills or confidence to embed creative movement into their teaching (Snook and Buck 2014). Potentially, this could lead to a programme where dance artists take most of the responsibility for dance-embedded learning, as opposed to a model where teachers take ownership.

The current study demonstrates that hiring a dance educator to collaborate with primary teachers can be an effective form of PLD. We recommend the brief hiring of a dance educator to collaborate with teachers, create a curriculum-embedded dance program, provide training and later offer ongoing consultation when required. This has the potential to germinate a sustainable teaching model, where trained teachers share their experiences with their respective colleagues by co-teaching or by inviting other teachers to observe their class. In the current study relief teachers were appointed to cover the absence of DG teachers, providing them with exposure to the dance programme as well.

Teachers are likely to mirror their training and personal experiences in their teaching styles (Snook and Buck 2014). Hence, teacher training courses play a crucial role in shaping effective teaching practice. Exposure to dance education should be cultivated in teachers' pre-service training and early careers. Embedding dance education as an integral part of teacher training courses could be proposed as an effective way to ensure that student teachers perceive dance as an essential part of their practice, rather than an optional art form. Although teacher training courses may provide exposure to dance education and application, they are not uniform throughout New Zealand. Teacher training courses may allocate designated hours to dance education, practice and assessment. After the course, student teachers then integrate their learnt experiences, develop their own teaching style and inject creativity into teaching practice.

University students majoring in dance at undergraduate or postgraduate levels, could be encouraged to apply their studies through placements at primary schools as part of their course requirements. Students with an interest or experience in dance education may also be given the opportunity. They may be asked to collaborate with a class teacher, co-create and co-teach a dance curriculum aligned with their term focus. A previous research incorporating a similar model demonstrated the benefits such a collaboration offered to the involved teachers and students (McPherson 2014).

Further research needs to be conducted in order to understand the feasibility of a dance programme across a range of school deciles throughout New Zealand. It would also be worth investigating how a diverse sample of DG teachers implement the dance sessions into their teaching practice over a long term.

Concluding Remarks

This research was conducted to test the delivery and feasibility of a curriculum-integrated dance programme across four Auckland primary schools. The dance programme was well-received and encouraged by the schools as it aligned well with their respective school charters and overall school philosophy. Four teachers at their respective primary schools, collaborated with a dance educator to create a dance programme that was learning-oriented, feasible, malleable and highly engaging for the children. They worked off each other's strengths using the teachers' expertise in subject-learning and the dance educator's expertise in creative movement and choreography. Teachers were proactive, reflective and innovative in transferring the dance activities into their teaching practice. Their dedication, sense of ownership and involvement facilitated the dance programme across all four schools.

Despite the limitations of such a small sample size, time constraints and school decile, this research provided an overview of the applicability and transferability of a curriculum-integrated dance programme in New Zealand primary schools. This dance programme, provided a unique opportunity for teachers and students to understand the applicability of dance and creative movement in their subject learning. The collaborative, triangular mentorship model used in this research is also a contribution to literature and practice both in New Zealand and overseas. The evaluation procedures of this project will be disseminated in future publications.

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Human Kinetics
BRIEF REPORT

Effects of a Curriculum-Integrated Dance Program on Children's Physical Activity

Geeta Sharma, Tom Stewart, and Scott Duncan

Background: Curriculum-integrated dance programs are a promising but relatively under-researched strategy for increasing children's physical activity (PA). The aim of this study was to determine the impact of a curriculum-integrated dance program on children's PA. **Methods**: A total of 134 primary children aged 7–9 years from 4 New Zealand schools were assigned to either a dance group (n = 78) or a control group (n = 56). The dance group participated in a 6-week curriculum-integrated dance program during school time. Although the dance program focused on curricular learning, fitness and coordination were embedded in the dance sessions. Intensity of PA varied according to the focus of each dance session. PA was measured at baseline and postintervention using a waist-mounted ActiGraph GT3X+ accelerometer for 8 consecutive days. **Results**: There were no significant intervention effects on PA levels between the dance and control groups postintervention. **Conclusion**: Dance-embedded learning did not increase overall levels of PA in this study. Future studies may consider assessing longer term effects of a dance-based intervention, or programs that place more focus on PA promotion.

Keywords: dance-embedded learning, accelerometry, primary school children

Empirical evidence suggests that children's regular participation in school-based physical activity (PA) may improve their academic performance, neurocognition, classroom focus, and well-being.[1,2] Research also suggests that physically active lessons, which constitute movement-based learning, may foster children's understanding toward subjects such as mathematics, social sciences, or language arts.[2] Such lessons may improve children's retention due to the interplay between experiential learning and visual learning. Furthermore, with the increase in childhood obesity worldwide, embedding PA and movement into school teaching may be an effective mechanism to reduce obesity, while also promoting children's learning. Moreover, empirical evidence suggests that movement-based learning may significantly increase children's PA levels and may have flow-on effects increasing their fitness and well-being.

Dance is a form of movement that encompasses creative, physical, and mental health benefits for primary school children.[3–6] When embedded into primary school teaching, dance may provide a deeper learning experience for children. As such, dance may be considered the connecting link between physical education and art education, which constitute 2 of the 8 learning areas mentioned in the New Zealand (NZ) primary school curriculum.[1] Recognizing the benefits of PA, aerobic programs such as Jump Jam are implemented by many primary schools across NZ. However, as a form of mass physical education, such programs have little curricular crossover and may have limited scope for creative movement. Dance-embedded learning at the individual class level may be a sustainable and effective teaching tool to keep children active and promote learning. In order to expose children and teachers to dance and creative movement, a curriculum-integrated dance program was developed.

A curriculum-integrated dance program is a series of dance sessions that encompasses various curricular activities using the principles of dance education and creative movement.[7] Although research suggests that dance may contribute to increased PA levels in children, the impact of a curriculum-integrated dance program on children's PA levels is under research.[8] Moreover, previous studies have been conducted outside school hours with minimal teacher participation and curricular crossover.[9–12] This study evaluated changes in PA levels from a 6-week dance program, which was developed around the existing NZ primary school curriculum. With previous studies suggesting that PA levels may differ across certain subgroups, the study also investigated differences in PA levels among gender, ethnicity, and special needs.

Methods

This study was a cluster-randomized controlled trial that evaluated the effects of a curriculum-integrated dance program on PA among primary school children in Auckland, NZ. Data were collected 1 week prior to the intervention (baseline) and at the conclusion of the 6-week intervention (follow-up). The Auckland University of Technology Ethics Committee approved the data collection for this project, which took place between September 2016 and December 2017 (application number 16/303).

Participants

A total of 4 primary schools located in the North Shore region of Auckland were asked to participate in the study. Within each school, 1 class was assigned to the dance group (DG) that received the intervention, and 1 class was assigned to the control group (CG) that did not receive the intervention. Hence, 4 DG classes and 4 CG classes participated in the study. Study details were explained to the children, and they were given time to ask questions. Written informed assent and consent were obtained from children, parents, and teachers prior to participation. Children from various ethnic backgrounds and learning abilities participated in the study. Children of Polynesian ethnicities, such as Māori and Pacific Island, were categorized as "Māori/Pasifika"; children from all Asian

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countries (eg, India, China, Sri Lanka) were categorized as "Asian"; and children of European ethnicity (eg, NZ, Australian, British) were categorized as "European." Children attending English language classes and those with cognitive impairments or speech difficulties were categorized as "special needs."

Prior to conducting the study, a power analysis was performed using G*Power software.[13] With a conservative effect size estimate of 0.25 based on a previous curriculum-integrated PA intervention,[14] an alpha of .05, and 80% power, a total sample size of 128 participants was estimated (64 participants in each group).

The Dance Program

The dance program was delivered by a dance educator, with DG teachers and their children participating in the dance sessions. The module of the dance program differed across all 4 schools and was tailored to meet the teachers' term focus, such as science, Māori culture, or environmental studies. Teachers played a key role in the development of the dance program, with detailed discussions taking place between the DG teacher, dance educator, and primary author. It was envisaged that the dance program would serve as teachers' professional learning development and help instigate movement-based teaching into their teaching practice.

In each school, the dance program was delivered 3 times per week over a 6-week period. Thus, each school took part in 18 dance sessions. Each session varied between 30 and 45 minutes. Topics such as Canon and Unison (mathematics), plant life cycles (science), Maui, and The Sun (Māori culture) were covered in close alignment with the learning areas outlined in the NZ primary school curriculum. The sessions involved creative movement, critical appreciation, recreation, teamwork, and collaboration, which also aligned with the core competencies and values outlined in the curriculum.

The volume and intensity of PA differed across the dance sessions, given the varied lesson plans and the availability of space. For example, the *Traveling Activity*—in which children traversed the school hall in various movements and permutations—involved moderate and vigorous intensities of PA; however, *Life Cycle* (which was conducted in the classroom) involved low-intensity PA due to space constraints. *Dance Detective* and *Hello* involved low-intensity PA and were applied as a means of positive reinforcement. As all 4 participating teachers had little to no experience in dance-embedded teaching, the activities from the dance program were designed to be simple, malleable, and embeddable within their practice. Teachers were given an outline of the dance sessions, inclusive of instructional photos and videos. Further details about the development and delivery of the dance program and its applicability to NZ primary schools can be found elsewhere.[7]

Measures

The ActiGraph GT3X+ (ActiGraph LLC, Pensacola, FL) was used to assess light, moderate, and vigorous PA. These devices are small ($46 \times 33 \times 15$ mm) and lightweight (19 g) and have been used extensively in studies with children.[14,15] Each device was initialized to log raw data at 30 Hz for 1 week before the intervention (baseline time point) and 1 week after intervention (follow-up time point) using the ActiLife software (version 6; ActiGraph LLC). The devices were worn on a waist belt positioned over the participant's right hip. Children were asked to wear the belt during waking hours and to remove the belt during showering and swimming (or other water-related activities). Children completed a compliance log, where they recorded the times the accelerometer was worn and removed. After a week, the devices and compliance logs were collected from the school.

After the data collection in each school, data were downloaded and aggregated to 30-second epochs before minutes of sedentary, light-, moderate-, and vigorous-intensity PA were estimated by applying the Evenson cut points.[14,16] Sixty minutes or more of consecutive 0 counts was considered nonwear time.[17] Children had to have at least 8 hours of accelerometer wear time on at least 3 days (for both baseline and postintervention time points) to be included in the analysis.[14] Of the 187 children that took part in this study, 134 met the inclusion criteria. These participants were then used to perform a post hoc power calculation, taking into account the design effect of school-based recruitment.[18] Using moderate- and vigorous-intensity PA as the outcome, an intracluster intraclass correlation coefficient of .0012, and a mean cluster size of 33, the effective sample size was 127 participants—in line with the target sample size stated above.

Statistical Analysis

Baseline characteristics of the sample were calculated and presented as mean (SD) for continuous variables, and n (%) for categorical variables. Independent sample *t* tests and chi-square tests were conducted to compare the characteristics of the DG and CG participants at baseline for each intensity of PA: sedentary, light, moderate, and moderate-to-vigorous.

For each of the PA outcome variables, a general linear model (analysis of covariance) was fit to examine the effect of the intervention while adjusting for the corresponding baseline value, as well as age, gender, ethnicity, special needs status, and accelerometer wear time. Interactions between treatment group, gender, and special needs were also examined. Estimated means and pairwise contrasts between each level of the categorical independent variables (treatment group, gender, and special needs) were computed. The adjusted *r* squared and partial eta-squared metrics were calculated for each model to indicate effect size. An alpha of .05 was implemented, and all analyses were conducted using IBM SPSS Statistics (version 26; IBM Corp, Armonk, NY). It should be noted that using linear mixed models to account for school clustering effects was considered, but given that these models resulted in similar estimates (and the small number of unique random effect levels), results from the more parsimonious general linear model are presented.

Results

Table 1 shows the participant demographics at baseline. There was a small but significant difference in vigorous PA at baseline: DG children had 2 more minutes per day of vigorous PA than the CG children ($P = .039$). There were also significant differences in age and ethnicity between the 2 groups. The CG was slightly older ($P = .013$) and had a higher proportion of European participants but a lower proportion of Māori/Pasifika and Asian participants ($P = .002$). The DG had approximately 0.5 fewer valid days of accelerometer wear time compared with the CG ($P = .033$). There were no differences in the proportion of children with special needs or of each gender.

Table 2 shows the main intervention effects for each intensity of PA (DG–CG). These estimates represent the differences postintervention, while holding the other variables in the model constant. For each outcome variable, the difference between the DG and CG was small; no significant effects on any intensity of PA

Table 1 Participant Characteristics and PA Levels at Baseline

Variable	DG (n = 78)	CG (n = 56)	*P* value
Age	8.64 (0.41)	8.84 (0.45)	**.013***
Gender			
Male	35 (45%)	27 (48%)	.702
Female	43 (55%)	29 (52%)	
Ethnicity			
European	34 (44%)	40 (71%)	**.002***
Asian	33 (42%)	15 (27%)	
Māori/Pasifika/others	11 (14%)	1 (2%)	
Special needs			
Special needs	9 (12%)	4 (7%)	.396
Non special needs	69 (88%)	52 (93%)	
Physical activity			
Baseline wear time, min/d	727 (80)	739 (71)	.109
Baseline valid number of days	6.6 (1)	7.1 (1)	**.033***
Baseline sedentary PA, min/d	323 (70)	338 (68)	.204
Baseline light PA, min/d	355 (50)	347 (56)	.338
Baseline moderate PA, min/d	39 (16)	41 (16)	.32
Baseline vigorous PA, min/d	10 (7)	8 (1)	**.039***
Baseline MVPA, min/d	49 (21)	54 (21)	.137

Abbreviations: CG, control group; CI, confidence interval; DG, dance group; MVPA, moderate to vigorous PA; PA, physical activity. Note: Data are presented as mean (SD) or n (%). Bolded *p* values represent a statistically significant difference between DG and CG. *P* value from independent samples *t* test or chi-square test where appropriate. *$P < .05$.

Table 2 Intervention Effects on PA Levels

		95% CI				
Activity	*B*	Lower	Upper	*P* value	r^2_{adj} [a]	η_p^2 [b]
Sedentary	6.56	−16.13	29.25	.568	.58	.002
Light	3.82	−24.56	16.92	.717	.56	.002
Moderate	−0.12	−5.37	4.97	.964	.41	.001
Vigorous	−1.06	−5.01	2.90	.598	.18	.005
MVPA	−0.75	−8.81	7.31	.854	.36	<.001

Abbreviation: CI, confidence interval; MVPA, moderate to vigorous PA; PA, physical activity. Note: Results obtained from linear models, after adjusting for age, gender, ethnicity, special needs status, wear time, and baseline value. Coefficients are presented as minutes per day postintervention for the DG relative to the CG. [a]Adjusted *r* squared for linear model. [b]Partial eta-squared for intervention.

were observed. The between-group difference equated to −0.8 minutes per day of moderate–vigorous PA, −0.1 minute per day of moderate PA, 6.6 minutes per day of sedentary, 3.8 minutes per day of light PA, and −1 minute per day of vigorous PA. Figure 1 presents the estimated difference in means between the DG and CG overall, and for each level of gender and special needs status.

Discussion

The current study evaluated the effects of a curriculum-integrated dance program on children's PA in the NZ primary school setting. The findings from this study revealed no significant treatment effects on PA as a result of a curriculum-integrated dance program. There were no significant differences in the various levels of PA between the DG and CG.

The intervention from the current study involved a combination of PA, curricular learning, and dance. Given the novelty of the dance program, it is difficult to compare the findings with previous research, which have evaluated changes in PA levels either through movement-based learning[14] or dance[12] as separate studies. Although one PA-based learning program did find a 12% increase in daily PA levels in the treatment group,[14] there was little crossover with dance or a creative movement component. The study spanned 3 years, a factor likely to have contributed to the significant result.[14]

There may have been several factors which contributed to the lack of significant effects in the current study. First, the core component of the dance program was curricular learning through creative movement and dance. As the program had to cater to the needs of the participating teachers and children, the curricular focus and intensity of PA during the dance sessions differed. Although fitness and coordination were key components of the program, the intensity of these components may not have been sufficient to produce significant effects. This also meant that the program did not have a specific focus on health-based education, which may have contributed to the lack of PA behavior change observed.

Previous work has suggested that when teachers are well informed about their children's PA levels, they are more likely to increase movement-based activities in their teaching, thereby decreasing sedentary behavior.[19] In the current study, each teacher was provided a summary report (with baseline and postintervention PA results) after the completion of the dance program in their schools. Had the teachers been given a report of baseline PA data, they may have placed more emphasis on movement in their classroom teaching, which may have led to differences in PA levels at postintervention.

Limitations and Implications for Future Research

There were several limitations of this study. Given that the randomization of participants occurred at the class level (and not the school level), the possibility of contamination effects across classes within the same school cannot be ruled out. Furthermore, as the dance program module differed across schools, a standardized volume and intensity of PA could not be maintained for each intervention class. Future research could consider developing a long-term intervention where all participants receive a similar PA stimulus. We should also point out that although the study used to estimate the expected effect size had a curriculum-integrated approach,[14] the intervention was not specifically dance-focused. Therefore, it is possible our sample-size calculation may have been based on an overestimated effect size. Furthermore, the accelerometers were removed at certain times during the day (eg, water-based activities), and several children forgot to wear the devices again. This nonwear time across the sample may have impacted the overall findings of the study. As such, future researchers may consider utilizing waterproof devices such as the Axivity AX3. These devices can be attached directly to the skin or worn on the wrist and may improve 24-hour wear-time compliance.[20] Although fitness, balance, and coordination were essential components of the dance program, these could not be quantitatively assessed, and future studies may want

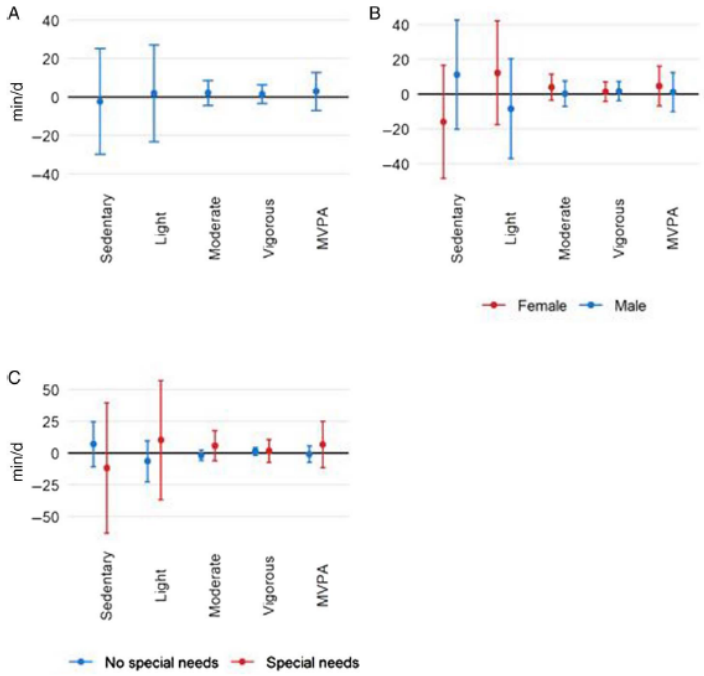

Figure 1 — Estimated mean difference (DG–CG) in physical activity levels. Intervention effects on physical activity: (A) overall effects for each intensity; (B) effects by gender; and (C) effects by special needs group. Results are post hoc contrasts from linear models, adjusted for covariates (gender, ethnicity, special needs status, wear time, and baseline value). Displayed as mean difference (95% CI) from the control group. CG indicates control group; CI, confidence interval; DG, dance group; MVPA, moderate to vigorous PA; PA, physical activity.

to take this into consideration.[3,21] With a growing body of literature suggesting the role of arts in public health, future studies may consider evaluating and devising dance-based interventions around health education.[22] Topics related to exercise, nutrition, and obesity may be covered in these interventions and may be evaluated using mixed-methods procedures.

Conclusion

Although there were no significant intervention effects on PA outcomes, the methodology utilized in the current study is unique and may provide the impetus for further research on PA-based learning programs in schools. Future researchers may need to devise more robust and sustainable learning interventions that are physically engaging, creative, and promote children's holistic development. This study may contribute to the literature on dance education, physical education, and school-based interventions.

Note

[I]English, the arts, health and physical education, learning languages, mathematics and statistics, sciences, social sciences, and technology are the 8 learning areas of the NZ primary school curriculum.

References

1. Biddle SJH, Asare M. Physical activity and mental health in children and adolescents: a review of reviews. *Br J Sports Med*. 2011;45(11):886–895. PubMed ID: 21807669 doi:10.1136/bjsports-2011-090185
2. Norris E, Shelton N, Dunsmuir S, Duke-Williams O, Stamatakis E. Physically active lessons as physical activity and educational interventions: a systematic review of methods and results. *Prev Med*. 2015;72:116–125. PubMed ID: 25562754 doi:10.1016/j.ypmed.2014.12.027
3. Anjos IdVCD, Ferraro AA. The influence of educational dance on the motor development of children. *Rev Paul Pediatr*. 2018;36(3):337–344. doi:10.1590/1984-0462/;2018;36;3;00004
4. Moore C, Linder SM. Using dance to deepen student understanding of geometry. *J Dance Educ*. 2012;12(3):104–108. doi:10.1080/15290824.2012.701175
5. Richard M. Dance as a language of learning and a source of embodied knowledge. *Phys Health Educ*. 2013;79(1):6–10.
6. Simpson Steele J, Fulton L, Fanning L. Dancing with STEAM: creative movement generates electricity for young learners. *J Dance Educ*. 2016;16(3):112–117. doi:10.1080/15290824.2016.1175570
7. Sharma G, Nikolai J, Duncan S, Carter J. Observing the delivery of a curriculum-integrated dance programme across four New Zealand

primary schools. *NZ J Educ Stud*. 2020;55(1):29–47. doi:10.1007/s40841-019-00151-2
8. Robertson-Wilson J, Reinders N, Bryden PJ. Dance interventions to increase physical activity among youth: a systematic review. *Kinesiol Rev*. 2016;5(3):170–188. doi:10.1123/kr.2016-0010
9. Adkins M, Brown GA, Heelan K, Ansorge C, Shaw BS, Shaw I. Can dance exergaming contribute to improving physical activity levels in elementary school children? *Afr J Phys Health Educ*. 2013;19(3):576–585.
10. Cain KL, Gavand KA, Conway TL, et al. Physical activity in youth dance classes. *Pediatrics*. 2015;135(6):1066–1073. PubMed ID: 25986023 doi:10.1542/peds.2014-2415
11. Jago R, Edwards MJ, Sebire SJ, et al. Effect and cost of an after-school dance programme on the physical activity of 11–12 year old girls: the Bristol Girls Dance Project, a school-based cluster randomised controlled trial. *Int J Behav Nutr Phys Act*. 2015;12(1):128. PubMed ID: 26437720 doi:10.1186/s12966-015-0289-y
12. O'Neill JR, Pate RR, Hooker SP. The contribution of dance to daily physical activity among adolescent girls. *Int J Behav Nutr Phys Act*. 2011;8(1):87. PubMed ID: 21816074 doi:10.1186/1479-5868-8-87
13. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Met*. 2009;41:1149–1160.
14. Donnelly JE, Greene JL, Gibson CA, et al. Physical Activity Across the Curriculum (PAAC): a randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Prev Med*. 2009;49(4):336–341. PubMed ID: 19665037 doi:10.1016/j.ypmed.2009.07.022
15. Cain KL, Sallis JF, Conway TL, Van Dyck D, Calhoon L. Using accelerometers in youth physical activity studies: a review of methods. *J Phys Act Health*. 2013;10(3):437–450. PubMed ID: 23620392 doi:10.1123/jpah.10.3.437
16. Evenson KR, Catellier DJ, Gill K, Ondrak KS, McMurray RG. Calibration of two objective measures of physical activity for children. *J Sports Sci*. 2008;26(14):1557–1565. PubMed ID: 18949660 doi:10.1080/02640410802334196
17. Troiano RP, Berrigan D, Dodd KW, Mâsse LC, Tilert T, McDowell M. Physical activity in the United States measured by accelerometer. *Med Sci Sports Exerc*. 2008;40(1):181–188. PubMed ID: 18091006 doi:10.1249/mss.0b013e31815a51b3
18. Donner A, Klar N. *Design and Analysis of Cluster Randomization Trials in Health Research*. London, UK: Wiley; 2010.
19. Hodgin KL, von Klinggraeff L, Dauenhauer B, et al. Effects of sharing data with teachers on student physical activity and sedentary behavior in the classroom. *J Phys Act Health*. 2020;17(6):585–591. doi:10.1123/jpah.2018-0711
20. Duncan S, Stewart T, Mackay L, et al. Wear-time compliance with a dual-accelerometer system for capturing 24-h behavioural profiles in children and adults. *Int J Environ Res Public Health*. 2018;15(7):1296. PubMed ID: 29933548 doi:10.3390/ijerph15071296
21. Ordóñez AF, Polo B, Lorenzo A, Shaoliang Z. Effects of a school physical activity intervention in pre-adolescents. *Notes. Phy Edu Sprorts*. 2019;136:49–61. doi:10.5672/apunts.2014-0983.cat.(2019/2).136.04
22. Bungay H, Vella-Burrows T. The effects of participating in creative activities on the health and well-being of children and young people: a rapid review of the literature. *Perspect Public Health*. 2013;133(1):44–52. PubMed ID: 23308007 doi:10.1177/1757913912466946