Teachers' and students' perspectives of participating in the 'Active Classrooms' movement integration programme

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1.1 Abstract

This paper evaluates perceptions of 5 teachers and 129 students of participating in an 8-week primary school movement integration intervention. Following training and provision of resources, teachers were asked to teach 2 active lessons each day. Teachers completed questionnaires at post-intervention. Students participated in 'draw and write' activities and focus group interviews. Teachers reported great satisfaction, noting student enjoyment, enhanced teaching and learning, and provision of resources as contributing to the success of the programme. Students expressed high levels of enjoyment, with emphasis on peer-engagement, perceived health benefits and improved academic motivation.

Keywords: draw and write, primary school, movement integration, classroom, physical activity, behaviour change

1.2 Introduction

To meet the needs and challenges of our ever-changing society, educational systems must constantly evolve and develop. Movement integration - teaching curriculum content using physically active methods - has become increasingly popular to serve as an intervention for combatting poor PA levels among school-aged children (Norris *et al*. 2015, Webster *et al*. 2015). PA has been linked to many health benefits for children including reduced risk of premature morbidity from cardiovascular disease, cancer, diabetes, respiratory disease, and obesity, as well as, contributing to higher self-esteem, positive mental health, improved cognition and academic performance (Have *et al.* 2016, Hill *et al*. 2011, WHO 2010). However, only a minority of children and young people globally are meeting the recommendation of 60 minutes of MVPA daily (WHO 2010). This is particularly true to Ireland with findings that only 19% of primary children (Woods *et al.* 2010) meet this public health recommendation with significant decreases observed with age (Inchley *et al.* 2016). This has resulted in a growing concern around children's inactivity levels. The World Health Organisation (2016) devised a European PA strategy which identified schools as key locations to implement PA interventions. However, with an already overcrowded curriculum, core academic subjects such as literacy and numeracy are being prioritised over PE and PA breaks (Mahar *et al.* 2006). In fact, schools have been acknowledged as one of the main environments of inactive behaviour, with the sedentary nature of lessons carried out in the classroom identified as a contributory factor to physical inactivity among this age group (Martin and Murtagh 2015b; Holt *et al*. 2013). In order to address this problem a multi-component Comprehensive School Physical Activity Program (CSPAP) is supported by the Centers for Disease Control and Prevention (2013) encouraging schools to provide students with multiple opportunities for accumulating PA during the school day. One component of the programme suggests the integration of PA into academic lessons in the classroom. This suggestion has been supported by evidence which illustrates that integrating movement into academic lessons has the potential to not only improve students' MVPA levels during the school day (Dunn, *et al*. 2011, Goh *et al.* 2014, Liu *et al.* 2007, Riley *et al*. 2015), but also to enhance facilitators of learning such as concentration, cognition, time-on-task (de Greeff *et al.* 2016, Mullender-Wijnsma *et al.* 2015), executive functions such as organisation (Have *et al.* 2016) and academic achievement (Donnelly *et al.* 2009, Donnelly and Lambourne 2011, Norris *et al.* 2015, Reed *et al.* 2010). However, research studies have reported that such interventions cannot be successfully implemented or sustained without teacher

and student approval (Martin and Murtagh 2015b, Cothran *et al*. 2010, Dishman *et al.* 2005, Hodges *et al.* 2015, Howie *et al*. 2014, McMullen *et al*. 2014).

Teachers influence the amount and intensity of PA their students are exposed to during class time, therefore teachers and their attitudes play a central role in determining the success or failure of classroom–based interventions (Martin and Murtagh 2015b, Fullan 2007). Student enjoyment has also been found to moderate and mediate the effects of PA interventions, as well as teacher approval of such programmes (Martin and Murtagh 2015b, Howie *et al.* 2014, McMullen *et al.* 2014). Increased enjoyment of active lessons has led to increased engagement in the lessons and increased PA levels (Dishman *et al.* 2005). In evaluations of teacher perceptions of classroom-based PA programmes teachers have emphasised the importance of student 'buy-in' if such programmes are to be successfully implemented (Benes *et al.* 2016, Hodges *et al.* 2015). In addition, students' PA self-efficacy has been identified as a factor which determines their participation in PA (Trost *et al.* 2001). Enjoyment has been acknowledged as the primary mediator of this self-efficacy (Lubans *et al.* 2008, van Stralen *et al.* 2011). Therefore, teacher attitudes and student enjoyment should be key components in the evaluation of classroom based programmes. While few previous studies which integrate movement into academic content have considered teacher and student perceptions, existing findings are promising. Teacher interviews, student questionnaires and focus groups revealed that both teachers and students reported positive attitudes towards the Active Science Curriculum in which PA data were gathered and used in science lessons (Finn and McInnis 2014). PA was integrated into mathematics in the EASY Minds study (Riley *et al.* 2015) and results indicated high satisfaction and enjoyment of the programme. Such positive teacher and student attitudes towards classroom based programmes contribute towards their success in improving student PA levels.

The 'Active Classrooms' programme was developed to improve the MVPA levels of primary school students during class time and throughout the entire school day. This programme sought to change the behaviour of teachers towards teaching academic content of English and Mathematics lessons using physically active pedagogies. The Behaviour Change Wheel (BCW) framework (Michie *et al.* 2011) was used in the development of the programme. This involved the identification and evaluation of potential barriers, and outlining of intervention content and implementation options in

order to assist teachers in overcoming these barriers to change their behaviour towards teaching using physically active methods (Martin and Murtagh 2015a). Preliminary findings of the 'Active Classrooms' study reveal that students accumulated eight minutes of MVPA daily during the intervention lessons (Martin and Murtagh 2015b). Given the aforementioned need to evaluate teacher and students' experiences of any classroom-based programme, this paper intends to give students a voice by evaluating their enjoyment and exploring teacher insights of their experiences of the programme.

1.3 Methods

1.3.1 Study Design

The 'Active Classrooms' cluster randomised controlled trial is an 8- week intervention programme which was designed to evaluate the effects of movement integration lessons on the MVPA levels of primary school children, during class time and throughout the entire school day. The effects of the intervention on students' MVPA levels are reported in Martin and Murtagh (2017). The current paper reports teacher and student perceptions of participating in the programme. Design conduct and reporting of these qualitative aspects of the study adheres to the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong *et al.* 2007). Further details of the study design are outlined in the study's protocol paper (Martin and Murtagh 2015a) and findings of the pilot study have been previously reported (Martin and Murtagh 2015b). The 'Active Classrooms' trial is registered with an International Standard Randomized Controlled Trial Number (ISRCTN14265493).

1.3.2 Recruitment and Study Participants

Ethical approval was granted by the Mary Immaculate College Research Ethics Committee, Limerick, Ireland. Using the Department of Education and Skills database, 31 primary schools were identified as meeting the study's eligibility criteria which include situation within a 20-km radius of the university, co-educational and having a minimum of 20 students per class to meet sample size requirements (180 students) (Martin and Murtagh 2015a). The order in which schools were invited to participate was determined by a random number generation function in Microsoft Excel. To recruit the target number of 10 schools, invitations were sent to 21 schools. Time and space restraints, and/or participation in other programmes prevented 7 schools from participating and despite follow-up contact being made, 4 schools failed to respond to the invitation. Ten schools agreed to participate. One classroom teacher in 3^{rd}- 5^{th} class

from each participating school and his/her students (aged 8-12 years) were invited to participate in the study. The researcher met with the principal and participating teacher to outline the requirements of the study. After baseline data collection at Week 0, schools were randomly allocated into a delayed treatment control or 'Active Classrooms' intervention group at a ratio of 1:1. All participating students and teachers in the intervention group were eligible to participate in the programme evaluation elements.

1.3.3 Participants

Teachers of 3rd- 5th class (children aged 8 – 12 years) in each school were invited to participate. Consent forms were completed by all participating principals and classroom teachers prior to obtaining parental consent and assent from students in each participating class. All students in classes randomised to the intervention group took part in movement integration lessons each day over the 8-week period since they were part of the teacher's instruction; however, feedback on their perceptions of the programme was only obtained from those who granted consent and assent (n = 129). All students in control classes received regular instruction and did not complete evaluations post-intervention. All teachers (n = 5) in the intervention group who returned signed consent forms, taught English and Maths lessons using physically active methods and completed open ended evaluation questionnaires.

1.3.4 Intervention

'Active Classrooms' is an 8-week PA intervention programme designed based on the Behaviour Change Wheel framework (Michie *et al.* 2011). Details on the use of this behaviour change theory and its application in the design of the 'Active Classrooms' study have been published previously (Martin and Murtagh 2015a). Through inclusion of a 1-hour workshop the programme intended to educate and train teachers to assist them in changing their behaviour towards integrating physically active teaching methods into academic subjects in the classroom. Details on the training content have been published previously (Martin and Murtagh 2015a). This workshop included self-reflection by the teachers to identify barriers to performing the behaviour (time, space, resources etc.). To help overcome these barriers teachers in the intervention group then received 40 lesson ideas, teaching resources and reminders to implement the lessons. They were encouraged to set targets and had assistance with planning to teach using movement integration (Martin and Murtagh 2015a). The lesson ideas that were

provided to teachers (20 English and 20 Mathematics) were linked to specific strands and strand units of the English and Mathematics Primary School Curriculum in Ireland (NCCA 1999) and intended to complement the teaching of specific content within these subjects by engaging students in physical activities during the lessons. They were designed to last a minimum of 10 minutes but could be extended and adapted to fit with the teachers' schedules and curricular planning. Teachers were asked to integrate at least one active English lesson and one active Mathematics lesson daily. They were also requested to maintain a daily record log indicating when and what intervention lessons they taught. This log served as a self-monitoring tool for teachers to perform the behaviour and an evaluation of their fidelity to the programme. Teachers in the delayed-treatment control group did not receive any training, resources or information regarding the active lessons during the study and were requested to continue teaching English and Mathematics lessons as normal throughout the 8-week period.

1.4 Data Collection Procedures and Measures

1.4.1 Student Enjoyment

Deemed essential for the effectiveness of PA interventions with children (Howie *et al.* 2014, McMullen *et al.* 2014), student enjoyment of the Active Classrooms programme was evaluated. Drawing provides an alternative means of meaningful expression for young people (Thomson 2009) and it provides researchers with insights into their experiences, opinions, opportunities and barriers to PA (Azzarito 2016). The draw and write technique combined with focus group discussions have been regarded as developmentally appropriate strategies to use with primary school aged children (Knowles *et al.* 2013, Te One 2007) and were adopted in this study to evaluate their experiences of the programme. Children's explanations of their drawings through verbal and written text allow their images to be adequately contextualised and interpreted by the researcher (Christensen *et al.* 2008, Veale 2005). Although the 'draw and write technique' has been used previously in health and education based research to evaluate children's perceptions of PE (Koekoek *et al.* 2009), sport education (MacPhail *et al.* 2003), recess interventions (Knowles *et al.* 2013), and exercise and sport in general (Burrows *et al.* 1999), it is a technique which has not been frequently used to evaluate the attitudes of students towards classroom-based PA interventions. The 'draw and write technique' allows students to convey elements of the programme which are prominent and important in their minds, and illustrate experiences which they may not otherwise be able to verbalise effectively (Pridmore *et al.* 1995). The students' pictures

and words are presented verbatim eliminating researcher interpretation therefore, contributing to the uniqueness of this study.

All children completed the draw and write task at baseline prior to allocation into intervention and control groups. To standardise the task teachers were provided with worksheets and a script of instructions. Teachers were asked to instruct the children in English to 'draw a picture of themselves in an English lesson and in a Maths lesson and to write a description of each one.' These instructions were also printed on the children's worksheets (See Appendix O). Upon completion of the 8–week Active Classrooms programme students in the intervention group were asked to repeat this task. The week following the intervention a randomly selected subsample of 4 students from each class in the intervention group were invited to participate in focus group discussions with the researcher. The female researcher was familiar to the children as she had previously visited the classroom. Focus groups were held with each sub-group of children in vacant classrooms, in their own schools, with only the researcher and participants present. Classroom doors were left ajar allowing the focus groups to be visible to the classroom teacher/ principal or other staff members throughout. Discussion questions were framed around the children's experiences, drawings and written texts. The focal questions were adapted from the EASY Minds study (Riley *et al.* 2014) and have been outlined previously in the Active Classrooms pilot study (Martin and Murtagh 2015b). The main questions focused on eliciting descriptions of the children's experiences of their previous English and Maths lessons and the active lessons. They were asked if they enjoyed their previous lessons and the active lessons and if so to explain specifically what they enjoyed about them. They were asked if the active lessons helped them learn and if being active made the lessons more interesting/exciting. The children were also asked additional questions specific to their drawings such as, 'can you explain what is happening in this picture?' and 'can you tell me who these people with you are?' Each focus group discussion was recorded and later transcribed by the researcher. These techniques were piloted and results previously published (Martin and Murtagh 2015b).

1.4.2 Teacher perceptions

Teachers were asked to complete a questionnaire consisting of open ended questions adapted from the ToyBox study (Androutsos *et al.* 2014) which addressed areas such as: teacher and student enjoyment, teaching and learning, factors which supported or

inhibited the implementation of the intervention, difficulties or challenges they faced, their perceptions on the effectiveness and sustainability of the programme and their suggestions on how to the programme could be improved. A sample of questionnaire items are outlined in Appendix P.

1.5 Data Analysis

The analysis of qualitative data gathered through focus group discussions, drawings and written texts was guided by the phases of thematic analysis as outlined by Braun and Clarke (2006). This process of thematic analysis is not linear but recursive with movement forwards and backwards throughout the phases particularly as themes are identified, reviewed, defined and refined to ensure that each theme and all of the themes in combination accurately represent the data set (Braun and Clarke 2006). The six steps applied in the thematic analysis were: 1. Familiarisation with the data, 2. Generation of initial codes, 3. Search for themes, 4. Review of themes, 5. Definition and naming of themes and 6. Production of the report. Further details are outlined in Figure 6.4.

The primary researcher immersed herself in the data through transcribing the focus group and written data verbatim (Smith *et al.* 2009), reading and re-reading the transcripts and taking notes of initial ideas. A reflective diary was maintained enabling the researcher to acknowledge her impact on data analysis (Fade and Swift, 2011). This reflective diary allowed decisions and changes of direction and emphasis to be tracked. Interesting features of the data were coded in a systematic fashion across the entire data set and coding ceased when it no longer added anything substantial to the overall analysis (Braun and Clarke 2006). Data relevant to each code from both the student interviews and written statements were collated. Themes and sub-themes were then created using tables in Microsoft Excel 2010 to assist with data management. The themes are strongly linked to the data and were identified using the inductive approach (Patton 1990). Each theme was considered individually and in relation to the other themes generated. Thematic ‘networks’ of the analysis are presented graphically in Figure 6.1 below under the guidance outlined by Attride-Stirling (2001). Latent themes identifying underlying ideas, assumptions and conceptualisations that shape the content of the data were examined and a rich description of the data set is outlined in the results section below. Where opposing cases existed they were documented and compared against the data and existing literature.

Teacher satisfaction and sustainability of the programme were evaluated using open-ended questionnaire items. Responses to these qualitative questions were coded and themed using the process outlined above. Direct quotations are reported in the results to illustrate emergent themes.

1.6 Results

1.6.1 Participants

All participating classroom teachers in each of the five primary schools (1 per school) randomly allocated to the intervention group, participated in the evaluation of the 'Active Classrooms' programme. This group consisted of 3 male and 2 female Irish Caucasian teachers ranging in age from 25-35 years. All 5 teachers in the intervention group returned completed teacher evaluations. One hundred and thirty one students in the intervention group (69 boys, 62 girls) returned signed consent and assent forms to participate. The average age of the students was 8.9 years (± .95). The ethnicity of participating students was as follows: Irish 91.5%, UK 0.9%, other European 4.8%, Asian 1.3%, US/Canadian 0.7%, African 0.5%, Australian 0.1%, Latino 0.1% and other 0.2%. One hundred and twenty nine students (69 boys, 60 girls) completed the write and draw task post-intervention. Twenty students (4 per class, 9 boys and 11 girls) participated in focus group discussions.

1.6.2 Student Perspectives

All children participating in the study completed the draw and write task at baseline. Similar data were presented by students in the control and intervention groups with the majority of students drawing images of themselves seated at their desks while completing written work in books or copybooks. Their written descriptions mention words such as "sitting down", "boring", "reading", "writing" and "doing sums" (see Figure 6.3 [image a & b, both female students]). A small number of students wrote that they "liked" or "enjoyed" aspects of their English and Mathematics lessons and some stated that the content of their English lessons was "fun" or "interesting" or that they were "good" at a particular topic in Mathematics (see Figure 6.3 [image c, male student]) and see Figure 6.2 [image b, female student]). Few of the baseline drawings illustrate engagement or interaction with their peers (see Figures 6.2 and 6.3 [images a, b and c]). This perspective of English and Mathematics lessons changed at post intervention with students in the intervention group predominantly presenting themselves happily engaging in some form of PA with their peers while learning (see

Figure 6.3). The students' illustrations presented in Figure 6.2 and Figure 6.3 clearly depict this change in students' attitudes towards English and Mathematics lessons from baseline to post-intervention. It is evident through the drawings that enjoyment for the students extended beyond satisfaction with the content of the lessons as identified at baseline to delight with the way in which the content was taught through active methods (see Figure 6.2 [image e, female student]). The children's drawings provide great insight into how the movement integration lessons were conducted and managed by classroom teachers. The integration of PA and subject content is clearly evident in most illustrations (see Figure 6.2 [images h and I, both female students] and Figure 6.3 [image h, male student]). Images of the children playing in groups (Figure 6.2 [images e and h, both female students]), exercising on the floor (Figure 6.3 [image d, female student]), instructions written on the white board and classroom furniture moved to the side/background are clear portrayals of the teachers' classroom management and planning (see Figure 6.2 [images h and I, both female students] and Figure 6.3 [image h, male student]). These images provide rich data of the students' experiences of the programme which extends far beyond written or verbal description.

Data from the five student focus group discussions (n = 20, 9 boys and 11 girls) and the draw and write tasks completed by 129 students (69 boys, 60 girls) in intervention classes were combined and analysed using the thematic analysis process outlined above to evaluate student perceptions of the programme post-intervention. Focus group interviews ranged in duration from 15 to 30 minutes. Feedback was obtained from the participants by checking back (Greene and Hogan 2005) with them during discussions to ensure that their opinions and intentions were accurately presented. One researcher coded and analysed the data. Themes which emerged were 1. a sense of change from previous lessons, 2. enjoyment, 3. enhanced learning, 4. feeling energised and healthy and 5. social interaction. Connections between each of these themes were very clear throughout the data. For example, the students expressed that enhanced learning was a result of enjoyment experienced through the lessons, socially interacting with their peers, engaging in PA, as well as being interested and excited about the lessons. Similarly, student enjoyment was a result of peer social interaction, variety in the lessons, and engagement in PA. Therefore, although these themes will be discussed individually in detail below, they don't completely stand-alone but interconnect with one another. Figure 6.1 illustrates the interconnectivity between the themes.

1. A sense of change from previous lessons: Students expressed how they used to "just sit down" and do their Maths and English but that "we don't sit to do our English anymore. We are up out of our seats doing activities like push ups…" (student 1, male). Another child expressed how "I think English lessons have got way better because there is more exercise in them!" and "The maths lessons really improved" (student 2, female). Many of the students agreed that "we used to sit down and do sums and writing in our copies" (student 3, male) and that "lessons before Active Classrooms...were boring" (student 4, male), "…hard … and long" (student 5, female).
2. Enjoyment: A recurrent theme amongst the students was a sense of enjoyment of the Active Classrooms' lessons. Some students expressed enjoyment of the lessons and engaging in PA making statements such as "I like doing active classrooms. I like everything about it, the jumping jacks, running on the spot, everything" (student 6, male) and "we started having way more fun because of all the exercise" (student 7, female). Others expressed how their enjoyment of the lessons motivated them to learn "it made you want to do more English because you were doing the exercises. It made it fun … so the next day when you go in to school your like "oh yes!, English time", we get to do the activities" (student 8, female). Many children experienced enjoyment from the variety and novelty the lessons presented. A student commented that the group were "happy and excited for the next lesson to see what we would be doing…next. We really enjoyed it" (student 9, male). Others acknowledged the enjoyment experienced while learning. "You were learning but it was fun. It was a fun way to learn it" (student 10, female). Another group of students agreed that "nearly everyone in the class loved the English lessons" and "…lots of people liked the maths because it is still fun to do the sum and then do the exercise" (students 11-13, female, male, male). This was echoed in several discussions and written texts with students writing "we love doing the English lessons" (student 14, male) and "I loved every exercise in Maths, especially 'the ball game'. I'd say my whole class favoured that one because it's fun even when you have to do 9 squat jumps. I enjoyed …these 8 weeks of exercises" (student 15, female). Enjoyment of the lessons is clearly depicted throughout the drawings with big smiles drawn on students' faces (see Figure 6.2).
3. Enhanced learning: The participants on the whole expressed how the active lessons contributed to their learning with comments such as "I really liked doing these maths. They were so fun. It really helped me improve on my maths" (student 16,

male) and "…you learn it quickly when you're being active" (student 10, female). They found that "when you're being active your brain is doing one thing and its already active and getting the signals better than it would be if you were just sitting down writing with a pencil" (student 12, male) and "your brain responds a bit more and it's a lot easier to do your sums" (student 17, male). Others commented on how the lessons helped them focus "…it made you concentrate more on your work and definitely in maths too because it made you think more about your tables" (student 8, female), "you really had to think about the answers because you had to do an activity to go with it" (student 9, male). Other students emphasised the enjoyment experienced and the learning that occurred as a result with statements such as "it helps us learn in a fun way" (student 17, male), "it made it easier for us to learn our maths because we were having fun" (student 9, male), "you were learning but it was fun. It was a fun way to learn it" (student 12, male). An interesting perspective arose from one of the focus groups (student 10, female) in which a student stated that "they [the lessons] were trying to trick kids into learning Maths because some of them were so fun" and another agreed that "ya some of them were half fun and half maths and you don't really know it but they're actually teaching you more than you will know" (student 14, male). Others commented on how the active lessons motivated them to learn "it made us like maths more because now we like doing them and we get our maths done quicker" (student 18, male), "It's not that fun when you're looking at a blank page and everyone is so bored so they try not to do it. But when you're exercising you want to finish because you're learning it in a fun way" (student 19, female) and "it made our lessons more interesting" (student 20, female). One student made a recommendation to further develop the programme saying "I thought it was a really good idea to start the exercises mixture with Maths and English and if you made easier ones the little children would really enjoy it because it's actually helping them learn and they would find it really fun with the activities and stuff" (student 16, male).

4. Feeling energised and healthy: Many of the students recognised the health benefits of the active lessons. Students made comments such as "I love doing Maths and exercise together. It's good for your brain and body" (student 21, male [see Figure 6.3, image e]), "we were getting exercise and that was the best thing about it" (student 7, female). They identified that "it's really good to keep fit" (student 8, female), and that by being active in the lessons "you get much better exercise and fitter" (student 9, male). They associated being active in the lessons with enjoyment

and felt that they were exercising without even realising it. One participant said “my favourite exercise is the ball game because it’s really fun and it doesn't really feel like your exercising” (student 22, female [see Figure 6.3, image f]). Regarding the same ball game another student wrote “this is my favourite lesson of all time. It helped me to do lots of exercise. I like this game” (student 23, male). The students also reported that they felt energised after the active lessons. Two students in different focus groups commented on how the active lessons benefitted their playtime and the other children in their groups joined in in agreement. One student stated “now after the active classrooms it’s [playtime] a lot better because your legs are already warmed up, your muscles and stuff [are warm] and you can run properly” (student 10, female). Others felt that they “…had energy after the exercises” (student 1, 3 and 18, all male) and that “it made you feel like you wanted to do it again” (students 1 and 3, both male). Many students also expressed that they were “tired” and “thirsty” (students 2, 5, 11, 14, 19 and 20, male and female) after the active lessons but one student clarified that “it was in a good way like we had done exercise and my heart was pumping really fast” (student 2, female). Overall the students claimed that they “love to do all of the exercises” and that they found “the games very fun!!!” (student 24, female [see Figure 6.2, image d]).

5. Social interaction and influence: Many students drew images of themselves in the lessons with their peers and many of them commented on the interaction with them (see Figure 6.2 [image e and h, both female]). They reported how engaging with their friends added enjoyment to the learning and exercise experiences presented through the active lessons. Students made the following statements: “In maths it's fun because we do some group work and I love to do it with my friends” (student 25, female), “Me and my friends love doing jumping jacks” (student 26, female), “I drew a picture of me and my best friend Claire doing jumping jacks” (student 27, female [see Figure 6.2, image i]). “I am doing jumping jacks with my class. It is very fun” (student 28, male), “Here the class are pretending to canoe…all of us are having fun” (student 29, female [see Figure 6.2, image e]) and “I had so much fun with my friends” (student 30, female). Further to this, another group of students explained how they took it upon themselves to extend the activities to the playground, including other groups of students who were not participants in this study. The students said that “sometimes we did the activities ourselves out in the playground and other children from other classes would join in and it made break time even more fun” (student 4, male).

Overall the students reported very positive attitudes towards the programme with one group concluding that "all we can say is we're happy and want to keep on going and maybe even add an Irish one" (student 13, male).

1.6.3 Teacher Satisfaction

Four themes emerged from the data provided by teachers in their responses to the open-ended questions. These include 1. academic benefits, 2. sustainability of the programme, 3. student enjoyment and 4. difficulties/challenges faced. Each of these will be explored in the following paragraphs.

1. Academic benefits: *Improved teaching*: Teachers expanded on their satisfaction with the 'Active Classrooms' programme explaining that they were pleased with how the lessons improved their teaching by adding variety and providing them with new ideas for integrating PA into academic lessons. One teacher stated that "I find that it is a great way to break up the maths lesson…" (Teacher 1, male) and another stated that "…the Active Classrooms gave me great ideas for various strands [of the curriculum]" (Teacher 2, male).

   Enhanced learning: The teachers also appraised the programme highly with regard to student learning and facilitators of learning such as time-on-task and concentration. One teacher explained how the "children were learning without even knowing. Tables can be boring for them but they loved the games" (Teacher 3, female). Other teachers also agreed that "children take in more information when they are active as their concentration levels rise" and that active lessons "help to keep the children motivated" (Teacher 1, male). Another also stated that the students were "more focused for the rest of the day" (Teacher 4, male).

   Reinforced curricular content: Teachers found that the lessons were useful to supplement and reinforce what they were covering in class stating that "there were great ways to practice our tables in fun ways" (Teacher 3, female), "it is a great way to revise over topics previously learned e.g. grammar" (Teacher 1, male) and "I liked to use the lessons to supplement the topics we were covering" (Teacher 5, female).

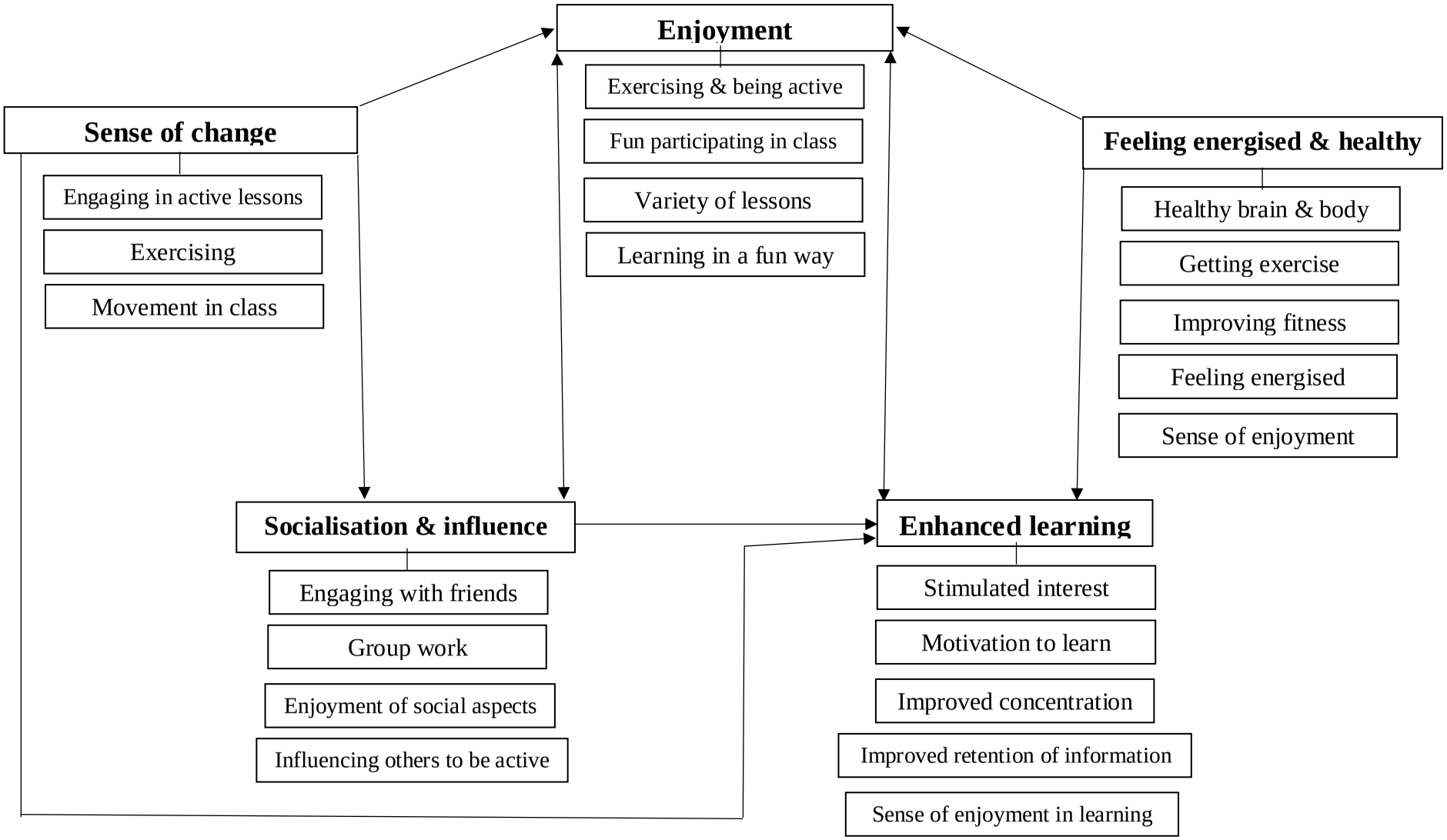

Figure 6.1 Themes and subthemes identified in student data and interconnectivity between them

2. Sustainability of the programme: Teachers highlighted their satisfaction with the programme and their intentions to continue using it, making statements such as "…it is an excellent programme and one which I will continue to use throughout the year" (Teacher 1, male) and "I will include PA as part of maths regularly" (Teacher 2, male).

   Approval of the lessons and resources provided: Teachers indicated their favourite lessons with the following statements: "I really liked some of the oral language lessons" (Teacher 5, female), "I loved the fun activities for Maths" (Teacher 3, female). Teachers expanded further on their approval with the format, content, adaptability and application of the programme stating that the "activities are easy to differentiate for classes/groups (Teacher 5, female) and that they "will certainly use the format of the lessons and apply them to other stories etc." (Teacher 2, male). They found that the lessons were "very well laid out and easy" to "follow" and "implement" (Teacher 1, 2 and 5). One teacher stated that the lessons were "perfectly pitched" to the class level (Teacher 2, male). Teachers were impressed with the provision of plentiful resources stating that there were "very good supplies" and "ample lessons to choose from" (Teacher 5, female) and that the "resource cards etc. made teaching lessons quite easy" (Teacher 2, male).

3. Student enjoyment: The teachers acknowledged their students' enjoyment of the programme highlighting that the children "loved" (Teacher 3, female) and "enjoyed the lessons" (Teacher 4, male) and that they "really looked forward to the various activities" (Teacher 1, male). Some teachers specified which lessons the children favoured mentioning that "the children loved the spelling lessons" (Teacher 5, female) and "creative writing lessons" (Teacher 3, female). They also found that students were highly active during the lessons with Teacher 5 (female) stating that "the children really enjoyed it and they were much more active".

4. Difficulties/ challenges faced: *Time, space and regaining control*: Although the teachers expressed great satisfaction with the programme they also identified difficulties they experienced. Four out of the five teachers mentioned time or space constraints. Two teachers claimed that both time and space were issues with Teacher 5 (female) stating that "some weeks were just too busy…space was also an issue, although we have a large room, it's a large class so we needed to move rooms for some activities" and Teacher 3 (female) reiterating this stating "I had 2 challenges. First was space in the classroom and second was trying to fit them in everyday". Two teachers claimed that time was their only challenge with statements such as

"The only problem I faced was time constraints" (Teacher 1, male) and "the time needed for English lessons posed a challenge at times … trying to get everything covered and active lessons was a challenge" (Teacher 2, male). One teacher mentioned that adapting the lesson posed a challenge maintaining that "sometimes it takes a bit of thinking as to how to integrate/ adapt the lesson" (Teacher 2, male). Regaining classroom control was the final challenge which emerged. One teacher suggested that "trying to settle children after active lessons was challenging" (Teacher 4, male).

The evidence presented illustrates that overall the teachers were very satisfied that the 'Active Classrooms' programme enhanced their teaching and students' learning. A recommendation which emerged is to "maybe introduce more pair and/or group work activities as part of the lessons" but the general feeling from the teachers was that overall they "would change very little" (Teacher 2, male). Resources provided, adaptability of the lesson ideas and student enjoyment were highlighted by teachers as elements contributing to its success.

1.7 Discussion

The findings of the current study demonstrate that both teachers and students positively perceive the Active Classrooms intervention which integrates PA into the academic content of English and Mathematics lessons. Although not without its challenges, teachers were highly satisfied with the programme, specifically identifying student enjoyment, enhanced teaching and learning, improved PA levels, and provision of resources as its main strengths. Students reiterated their enjoyment of the programme with peer interaction, added variety, enhanced learning, and health benefits being repeatedly identified as contributors. Many of these outcomes are synonymous with findings from other studies which evaluated teacher and/or student perceptions of classroom based PA programmes (Benes *et al.* 2016, Finn and McInnis 2014, Hodges *et al.* 2015, McMullen *et al.* 2014, Riley *et al.* 2016). Presentation of the students' perceptions in its raw format contributes to the uniqueness of this study.

The high level of student enjoyment reported by both teachers and students who participated in the 'Active Classrooms' study is an important finding. Enjoyment has also been linked to students' academic motivation (Vazou *et al.* 2012) and student attitudes towards participating in PA (Dishman *et al.* 2005). On evaluating the

perceptions of two teachers and 47 female students involved in the Active Science Curriculum, Finn and McInnis (2014) reported the emphasis teachers placed on how their students 'loved the activities'. This enjoyment was also highlighted by the students themselves. The authors concluded that enjoyment experienced as a result of participating in the Active Science Curriculum promoted positive attitudes towards using PA in the classroom and towards exercise in general. High enjoyment levels and positive attitudes towards participating in PA were also experienced by students in the EASY Minds study (Riley *et al.* 2016). Our findings that students enjoyed the lessons in the Active Classrooms study confirms these previous results from studies implemented in the United States and Australia demonstrating that movement integration can enhance the experience of students in the classroom. As student enjoyment has been mentioned throughout the literature with respect to teacher acceptability and sustainability of such programmes (Howie *et al.* 2014, McMullen *et al.* 2014, Stylianou *et al.* 2016) it should be seen as a notable finding.

Both teachers and students in the 'Active Classrooms' study acknowledged that integrating movement into English and Mathematics lessons enhanced teaching and learning in the classroom. Teachers reiterated how the active lessons increased their students' engagement with academic content and made learning more interesting and enjoyable for the children, therefore resulting in better concentration, enhanced learning and increased academic motivation. This is supported by many of the students' expressions of how English and Maths lessons became more "exciting" and "interesting" with the integration of PA. Students expressed how "happy" they were with the change and how much they enjoyed the activities. Similar findings were evident in previous studies which evaluated teacher and/or student perceptions of such programmes (Benes *et al.* 2016, Finn and McInnis 2014, Hodges *et al.* 2015, Riley *et al.* 2016). Both Finn and McInnis (2014) and Riley *et al.* (2016) highlighted the positive effect the programme had on students' attitudes towards the academic subject which integrated movement and Hodges *et al.* (2015) reported that teachers noticed positive improvements in their students' ability to learn. This illustrates that engaging students in physically active academic lessons may be a vital approach in tackling student disengagement and subsequently leading to improved academic performance (Doig 2005). Enhanced learning is reported to be a product of students perceiving active lessons to be more interesting and enjoyable (Martin and Murtagh 2015b, Riley *et al.* 2016, Vazou *et al.* 2012). Therefore, despite many teachers' beliefs that engaging

students in PA in the classroom may detract from their academic performance (Morgan and Hansen 2008), research indicates that lessons such as the 'Active Classrooms' which engage children in movement can result in greater learning outcomes. Students who participated in three years of Physical Activity Across the Curriculum (PAAC) achieved significantly higher scores in standardised tests than the comparison group (Donnelly and Lambourne 2011). Similarly, engagement in the Texas I-CAN! active lessons also produced moderate significant benefits for students' academic achievement (Bartholomew and Jowers 2011). These are strong grounds for movement integration in classrooms, and since enhanced learning and student enjoyment have a large impact on teacher acceptability of physically active academic programmes these outcomes should continue to be considered with respect to such interventions.

Students in our 'Active Classrooms' study highlighted health benefits they perceived they were achieving from the lessons, and these health benefits were regarded as an important element contributing towards their participation in and satisfaction with the programme. A previous study which evaluated student perspectives of the 'Active Science Curriculum' also reports similar findings (Finn and McInnis 2014). Other studies which have evaluated the effect of perceived health benefits on students' PA found that changes in perceived health benefits are related to changes in PA (Dishman *et al.* 2004, Haerens *et al.* 2008, Taymoori and Lubans 2008). Identification of this element by the students themselves is a noteworthy finding since it may be a factor which contributes to their 'buy-in' of such classroom-based PA interventions.

An aspect which emerged through the student data which was not mentioned by teachers, was the students' enjoyment of engaging with their friends while participating in the active lessons. This finding did not emerge in other studies which evaluated teacher or student perceptions of movement integration interventions however, it was the dominant theme emerging from a study which examined children's views, experiences and perceptions of recess (Knowles *et al.* 2013). The importance of peer interaction was also highlighted in a study which evaluated students' perspectives of PA promoting school environments (Banville *et al.* 2016). Banville et al. (2016) found that through students participating in common PA experiences at school, communities of practice for healthy behaviours were established. Social interactions with their peers have been regarded as one of the major reasons for children enjoying recess and engagement in PA (Blatchford *et al.* 1990, Coulter and Woods 2011, Evans 1996, Jago

et al. 2011). Through these social interactions students are enabled to develop friendships, and social skills (Murray and Ramstetter 2013) which have been deemed essential for their cognitive performance, social development and adjustment to school (Pellegrini and Bohn 2005). Our finding in the present study illustrates the importance of peer interaction for student engagement with programmes. The social interaction experienced by the students during the active lessons could possibly bring about gains which extend beyond enjoyment to cognitive functioning, socialisation and positive attitudes towards school.

The provision of lesson ideas, resources and training on how to implement active academic lessons added to teacher acceptability of the 'Active Classrooms' programme. Teachers commented on how useful it was to be provided with lesson ideas and how easy it was to adapt and implement them since the resources were readily available. Many researchers agree that for such interventions to be successful, training for teachers is essential (Benes *et al.* 2016, Carson *et al.* 2014, Naylor *et al.* 2006, Riley *et al.* 2016). However, the provision of resources to teachers has caused some debate in the literature. In the study by Benes *et al.* (2016), teachers suggested that until materials along with professional development training are provided, integrating movement would not likely occur. Other researchers argue that providing teachers with pre-prepared lessons and materials removes their autonomy (Riley *et al.* 2016). For the present study, when analysing teacher behaviour through the BCW framework (Michie *et al.* 2011) in advance of developing the intervention (Martin and Murtagh 2015a), it emerged that teacher preferences for traditional instruction are partly due to the belief that active methods require much more preparatory time, and the lack of quality teaching and learning resources available for implementing active lessons (Niemi 2002). To overcome this barrier both lesson ideas and resources were provided to the teachers in our study. However, it is worth noting that the teachers mentioned that they adapted the lessons to suit their teaching needs and the needs of their students, therefore illustrating that they had adopted the practice and were able to apply it in other lessons. To further investigate this issue future research could compare a movement integration programme which provides teachers with prepared lesson materials and a programme which focuses on teaching teachers the skills required to adapt their existing lessons.

Many previous studies which examine teacher perceptions of classroom based PA interventions identify time, space and regaining classroom control as challenges faced

by teachers (Benes *et al.* 2016, Cothran *et al.* 2010, Stylianou *et al.* 2016). Each of these were mentioned as challenges in the current study however, they did not emerge as major issues for the teachers. A statement by one teacher in the current study that "trying to get everything covered and active lessons was a challenge" suggests that some teachers may have seen the lessons as additional to their classroom work. However, it is clear from their comments that most teachers used the lessons to "reinforce", "revise", "supplement" and "practice" what they were already teaching in the classroom. This adjustment to their behaviour may be owing to the emphasis, in the teacher training workshop, on substituting inactive with active methods to teach their existing academic lessons. As suggested by previous studies, the use of the teacher training session to adequately prepare them to manage movement in the classroom (McMullen *et al.* 2014, Webster *et al.* 2015) was incorporated into the design of the 'Active Classrooms' study. Although one teacher mentioned that it was difficult to resettle the children after the lessons it was not a prevalent problem in the current study. Finally, since classrooms in Ireland can be very over-crowded with large class sizes and furniture, it is not surprising that two teachers in the current study identified space as an issue. Many of the 'Active Classrooms' lessons were designed to be implemented in tight spaces but, to add variety and accommodate for larger classroom spaces, others involved more locomotor type movements and these were most likely the lessons which teachers stated had to be carried out outside of the classroom. Future development of the programme should consider including lesson ideas suited to both small and medium classroom spaces.

1.8 Limitations

This study has a number of limitations that warrant attention. Firstly, although the schools were randomly selected, teachers in the study are those who agreed to participate and may have been positively disposed to promoting PA in the school setting. Secondly, teachers participating in the study were aware that the primary researcher who conducted the workshops also developed the 'Active Classrooms' programme and resources. This may have influenced teacher responses. However, the use of questionnaires, rather than face-to-face interviews, with teachers is likely to have allowed them to objectively evaluate the programme.

1.9 Conclusions

This study illustrates that integrating movement into academic lessons was well received by both students and teachers. 'Active Classrooms' has been shown to both improve PA levels in the classroom (Martin and Murtagh 2015b, Martin and Murtagh in press) and enhance students' attitudes towards academic lessons and classroom PA. Students expressed great enjoyment of participating in the programme, highlighting their satisfaction with the activities, perceived health benefits and social interactions during the lessons. Teachers identified enhanced teaching and learning which occurred as a result of student enjoyment, improved concentration and motivation to participate. They also felt that since training, lesson ideas and teaching materials were provided, it was feasible to integrate PA into their classrooms, subsequently improving PA levels without sacrificing students' academic performance. Therefore, this study demonstrates that when designing and evaluating programmes which integrate movement into the classroom, teacher satisfaction and student enjoyment are essential components for researchers to consider.

By integrating PA into the school setting through changes in behaviour and education the 'Active Classrooms' study supports public health policy at national (Department of Health 2013) and international level (WHO 2008). This study supports the contention that pedagogies can be modified by teachers and teacher educators to include movement integration in the classroom as an approach to improve students' overall health and wellbeing. Changing teacher behaviour towards using physically active methods in teaching academic content may be an approach to promote both health and academic benefits for students. Training for teachers is a vital component to ensure that they are equipped with the skills, knowledge, materials and confidence required.

Future research should directly evaluate learning and academic performance outcomes as a result of teaching using physically active methods. Additionally, a large-scale community-based trial should examine the effects of the programme where teacher workshops are delivered by trained facilitators as part of a continuous professional development service rather than solely by researchers.

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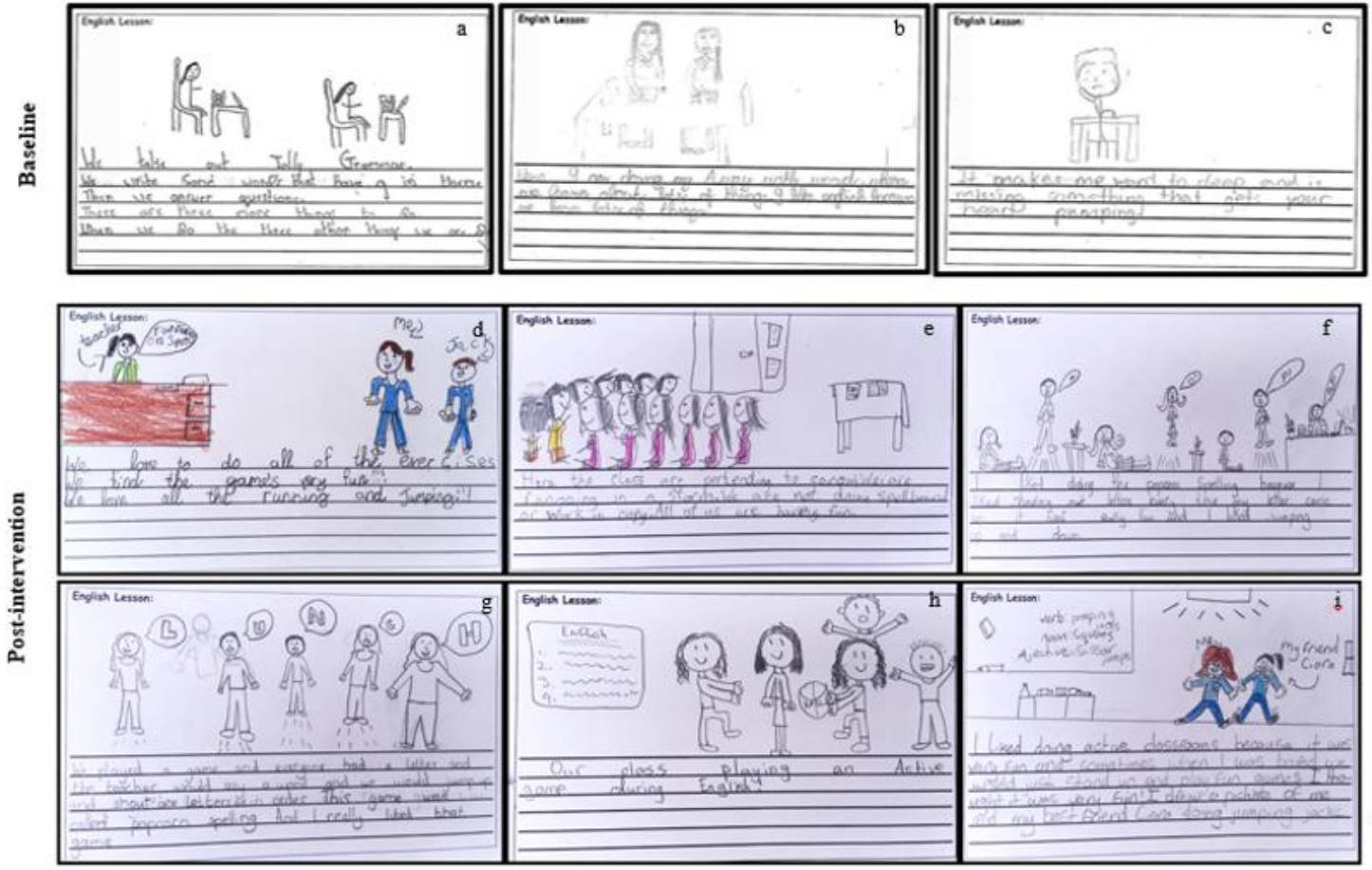
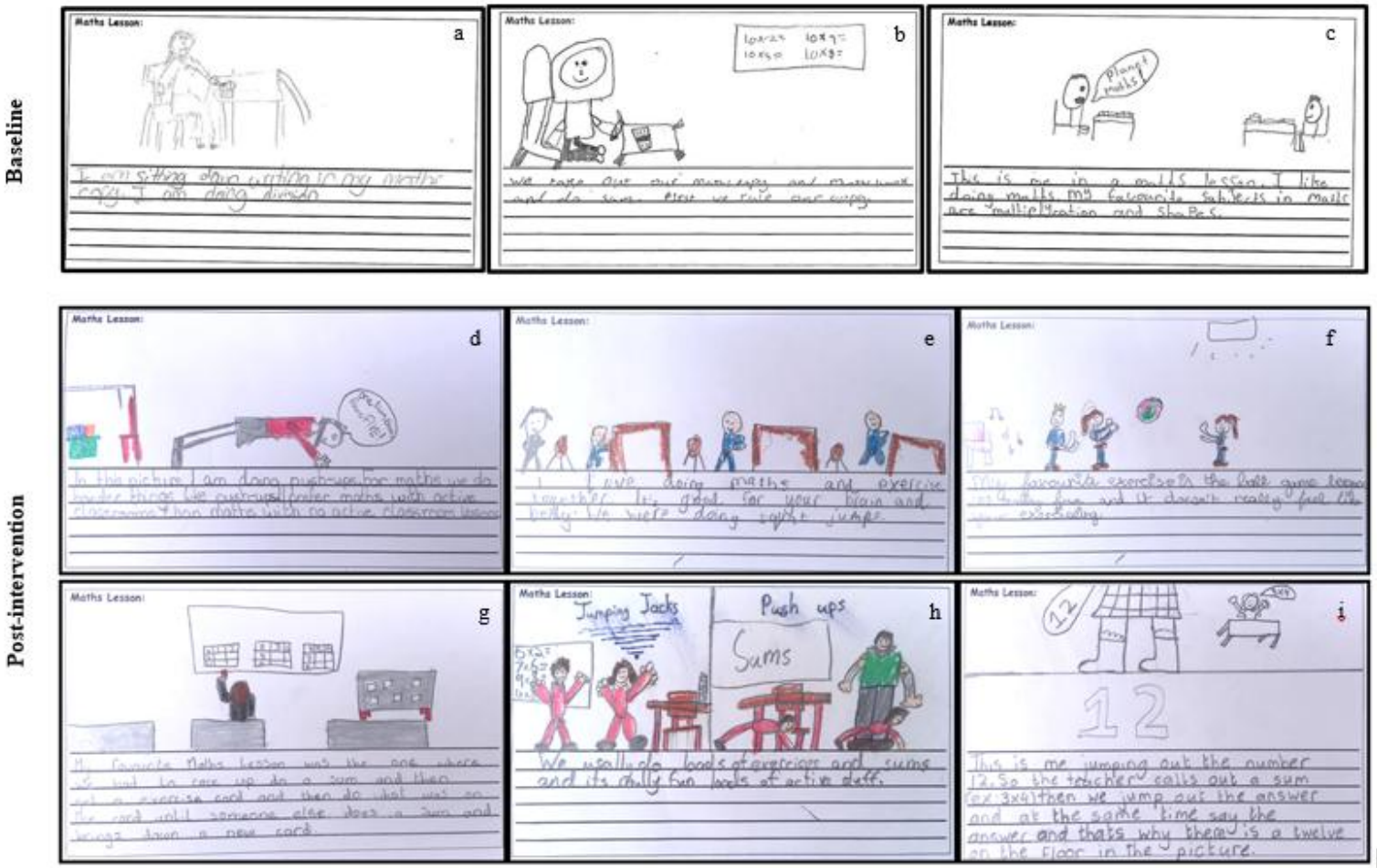


*** Note**: The following clarifies the children's written statements which accompany the drawings:

a. We take out 'Jolly Grammar'. We write some words that have g in them. Then we answer questions. There are three more things to do. When we do the three other things we are done.
b. Here I am doing my 'Away with Words' where we learn about lots of things. I like English because we learn lots of things.
c. It makes me want to sleep and is missing something that gets your heart pumping.
d. We love to do all of the exercises. We find the games very fun!!! We love all the running and jumping!!!
e. Here the class are pretending to canoe. We are canoeing in a storm. We are not doing 'Spellbound' or work in a copy. All of us are having fun.
f. I liked doing 'popcorn spelling' because I liked shouting out letters every time my letter came up. It was really fun and I liked jumping up and down.
g. We played a game and everyone had a letter and the teacher would say a word and we would jump up and shout our letters in order. This game was called 'popcorn spelling' and I really liked that game.
h. Our class playing an active game during English.
i. I liked doing Active Classrooms because it was very fun and sometimes when I was bored we would just stand up and play fun games. I thought it was very fun! I drew a picture of me and my best friend Claire doing jumping jacks.

Figure 6.2 Samples of the children's illustrations and descriptions of themselves in English lessons at baseline and post-intervention*



*** Note**: The following clarifies the children's written statements which accompany the drawings:

a. I am sitting down writing in my maths copy. I am doing division.
b. We take out our maths copy and maths book and do sums. First, we rule our copy.
c. This is me in a maths lesson. I like doing maths. My favourite subjects [topics] in maths are multiplication and shapes.
d. In this picture, I am doing push-ups. For maths we do harder things like push-ups. I prefer maths with 'Active Classrooms' than maths with no 'Active Classrooms' lessons.
e. I love doing maths and exercise together. It's good for your brain and body. We were doing squat jumps.
f. My favourite exercise is the ball game because it's really fun and it doesn't really feel like you're exercising.
g. My favourite maths lesson was the one where we had to race up to do a sum and then get an exercise card and do what was on the card until someone else does a sum and brings down a new card.
h. We usually do loads of exercises and sums and it's really fun [doing] loads of active stuff.
i. This is me jumping out the number 12. So, the teacher calls out a sum (e.g. 3 x 4) then we jump out the answer and at the same time say the answer. That's why there is a 12 on the floor in the picture.

Figure 6.3 Samples of the children's illustrations and descriptions of themselves in Maths lessons at baseline and post-intervention*

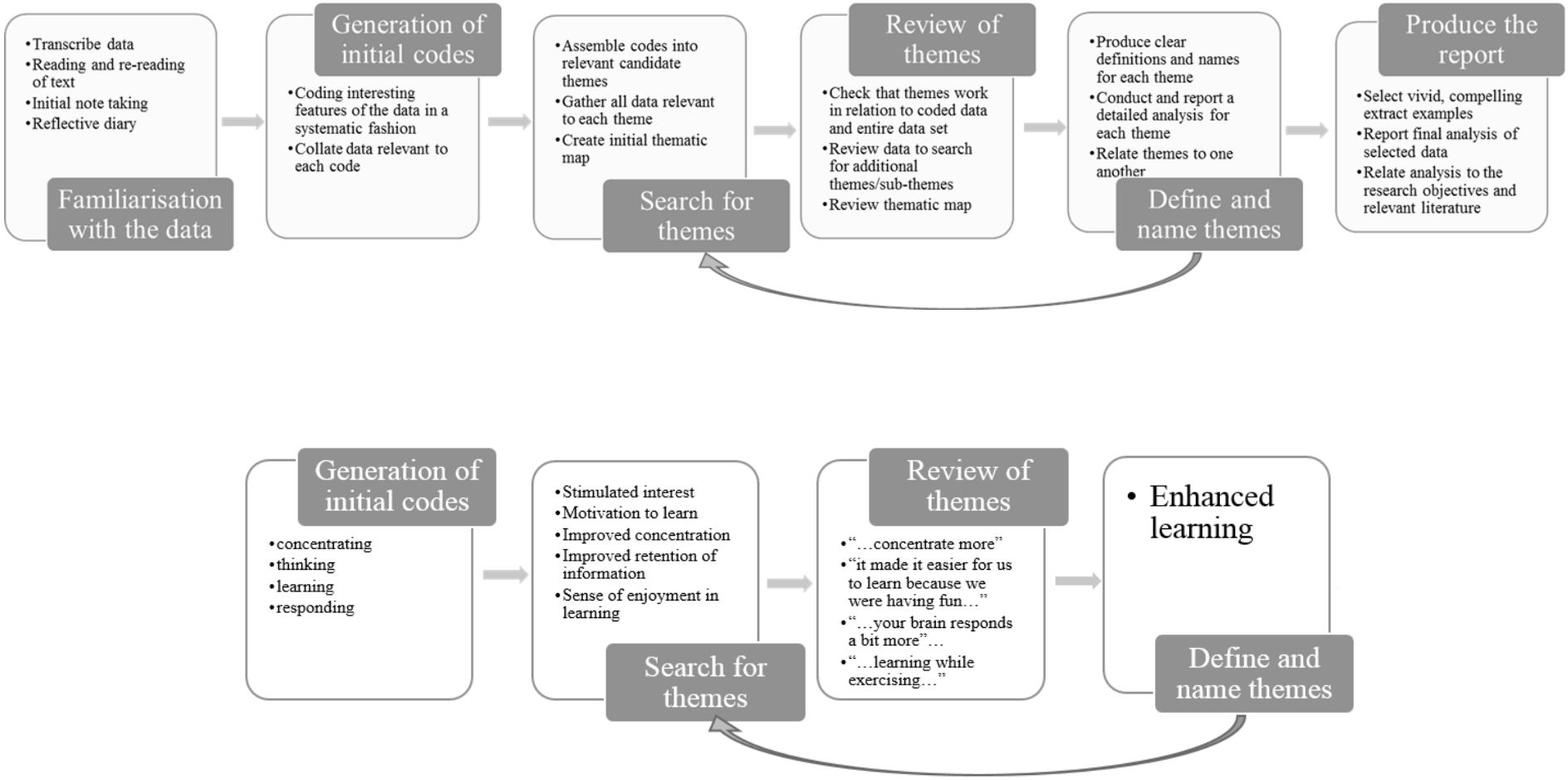


Figure 6.4 Thematic Analysis Flow Chart based on Braun and Clarke (2006) and its application in the development of the 'enhanced learning' theme

1.12 References

Androutsos, O., Apostolidou, E., Iotova, V., Socha, P., Birnbaum, J., Moreno, L., De Bourdeaudhuij, I., Koletzko, B., & Manios, Y. (2014). 'Process evaluation design and tools used in a kindergarten-based, family-involved intervention to prevent obesity in early childhood. The ToyBox-study', *Obesity Reviews*, 15 Suppl 3, 74-80.

Attride-Stirling, J. (2001) 'Thematic networks: an analytic tool for qualitative research', *Qualitative Research*, 1(3), 385-405.

Azzarito, L. (2016). '" Moving in My World": From school PE to participants-centered art exhibitions', *Journal of Teaching in Physical Education*, 35(1), 38-53.

Banville, D., Kulinna, P. H., Dyson, B., Stylianou, M., Colby, R., & Dryden, C. (2016). 'Feeling refreshed Aotearoa/New Zealand students' perspectives of the role of healthy behaviours in schools', *European Physical Education Review*, 0, 1-19.

Bartholomew, J. B. and Jowers, E. M. (2011) 'Physically active academic lessons in elementary children', *Preventive Medicine*, 52 Suppl 1, S51-4.

Benes, S., Finn, K. E., Sullivan, E. C. and Yan, Z. (2016) 'Teachers' Perceptions of Using Movement in the Classroom', *Physical Educator*, 73(1), 110-135.

Blatchford, P., Creeser, R. and Mooney, A. (1990) 'Playground games and playtime: the children's view', *Educational Research*, 32(3), 163-174.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), 77-101.

Burrows, C., Eves, F. and Cooper, D. (1999) 'Children's perceptions of exercise-are children mini-adults?', *Health Education*, 99(2), 61-69.

Carson, R. L., Castelli, D. M., Kuhn, A. C. P., Moore, J. B., Beets, M. W., Beighle, A., Aija, R., Calvert, H. G. and Glowacki, E. M. (2014) 'Impact of trained champions of comprehensive school physical activity programs on school physical activity offerings, youth physical activity and sedentary behaviors', *Preventive Medicine*, 69, S12-S19.

Centers for Disease Control and Prevention [CDC]. (2010). *The association between school-based physical activity, including physical education, and academic performance.* Atlanta, GA: US Department of Health and Human Services.

Christensen, P. and James, A. (2008) *Research with children: Perspectives and practices*, London, Routledge.

Cothran, D. J., Kulinna, P. H. and Garn, A. C. (2010) 'Classroom teachers and physical activity integration', *Teaching and Teacher Education*, 26(7), 1381-1388.

Coulter, M. and Woods, C. B. (2011) 'An exploration of children's perceptions and enjoyment of school-based physical activity and physical education', *Journal of Physical Activity and Health*, 8(5), 645.

de Greeff, J. W., Hartman, E., Mullender-Wijnsma, M. J., Bosker, R. J., Doolaard, S. and Visscher, C. (2016) 'Long-term effects of physically active academic lessons on physical fitness and executive functions in primary school children', *Health Education Research*, 31(2), 185-194.

Department of Health (2013) *Healthy Ireland: A framework for improved health and wellbeing 2013 – 2025*, Dublin, Stationery Office.

Dishman, R. K., Motl, R. W., Saunders, R., Felton, G., Ward, D. S., Dowda, M. and Pate, R. R. (2004) 'Self-efficacy partially mediates the effect of a school-based physical-activity intervention among adolescent girls', *Preventive Medicine*, 38(5), 628-636.

Dishman, R. K., Motl, R. W., Saunders, R., Felton, G., Ward, D. S., Dowda, M. and Pate, R. R. (2005) 'Enjoyment mediates effects of a school-based physical-activity intervention', *Medicine and Science in Sports and Exercise*, 37(3), 478-487.

Doig, B. (2005) *Research pointers to practice: A review of research to inform middle years mathematics teaching and learning*, Adelaide: Australian Association of Mathematics Teachers.

Donnelly, J. E., Greene, J. L., Gibson, C. A., Smith, B. K., Washburn, R. A., Sullivan, D. K., DuBose, K., Mayo, M. S., Schmelzle, K. H. and Ryan, J. J. (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.

Donnelly, J. E. and Lambourne, K. (2011) 'Classroom-based physical activity, cognition, and academic achievement', *Preventive Medicine*, 52 Suppl 1, S36-42.

Dunn, L. L., Venturanza, J. A., Walsh, R. J. and Nonas, C. A. (2012) 'An observational evaluation of Move-to-Improve, a classroom-based physical activity program, New York City schools, 2010', *Preventing Chronic Disease*, 9, e146.

Erwin, H., Abel, M., Beighle, A. and Beets, M. (2011a) 'Promoting children's health through physically active math classes: a pilot study', *Health Promotion Practice*, 12(2), 244-51.

Evans, J. (1996) 'Children's attitudes to recess and the changes taking place in Australian primary schools', *Research in Education*, 56, 49.

Fade, S. and Swift, J. (2011) 'Qualitative research in nutrition and dietetics: data analysis issues', *Journal of Human Nutrition and Dietetics*, 24(2), 106-114.

Finn, K. E. and McInnis, K. J. (2014) 'Teachers' and Students' Perceptions of the Active Science Curriculum: Incorporating Physical Activity Into Middle School Science Classrooms', *Physical Educator*, 71(2), 234-253.

Fullan, M. (2007) *The new meaning of educational change*, London, Routledge.

Goh, T. L., Hannon, J., Webster, C. A., Podlog, L. W., Brusseau, T. A. and Newton, M. (2014) 'Effects of a Classroom-Based Physical Activity Program on Children's Physical Activity Levels', *Journal of Teaching in Physical Education*, 33(4), 558-572.

Greene, S. and Hogan, D. eds., (2005) *Researching children's experience: Approaches and methods*, London: Sage.

Haerens, L., Cerin, E., Maes, L., Cardon, G., Deforche, B. and De Bourdeaudhuij, I. (2008) 'Explaining the effect of a 1-year intervention promoting physical activity in middle schools: a mediation analysis', *Public Health Nutrition*, 11(05), 501-512.

Have, M., Nielsen, J. H., Gejl, A. K., Ernst, M. T., Fredens, K., Støckel, J. T., Wedderkopp, N., Domazet, S. L., Gudex, C. and Grøntved, A. (2016) 'Rationale and design of a randomized controlled trial examining the effect of classroom-based physical activity on math achievement', *BMC Public Health*, 16(1), 304-314.

Hill, L. J., Williams, J. H., Aucott, L., Thomson, J. and Mon-Williams, M. (2011) 'How does exercise benefit performance on cognitive tests in primary-school pupils?', *Developmental Medicine and Child Neurology*, 53(7), 630-5.

Hodges, M. G., Hodges-Kulinna, P., & Kloeppel, T. A. (2015). 'Fitness for life primary: stakeholders' perceptions', *Physical Education and Sport Pedagogy*, 20(3), 299-313.

Holt, E., Bartee, T. and Heelan, K. (2013) 'Evaluation of a Policy to Integrate Physical Activity Into the School Day', *Journal of Physical Activity & Health*, 10(4), 480-487.

Howie, E. K., Newman-Norlund, R. D. and Pate, R. R. (2014) 'Smiles Count but Minutes Matter: Responses to Classroom Exercise Breaks', *American Journal of Health Behavior*, 38(5), 681-689.

Inchley, J., Currie, D., Young, T., Samdal, O., Torsheim, T., Augustson, L., Mathison, F., Aleman-Diaz, A., Molcho, M., Weber, M. and Barnekow, V. (2016) *Growing up unequal: gender and socioeconomic differences in young people's health and well-being. Health Behaviour in School-aged Children (HBSC) study: international report from the 2013/2014 survey*. Copenhagen: WHO Regional Office for Europe.

Jago, R., Macdonald-Wallis, K., Thompson, J. L., Page, A. S., Brockman, R. and Fox, K. R. (2011) 'Better with a buddy: influence of best friends on children's physical activity', *Medicine & Science in Sports & Exercise*, 43(2), 259-265.

Knowles, Z. R., Parnell, D., Ridgers, N. and Stratton, G. (2013) 'Learning from the experts: exploring playground experience and activities using a write and draw technique', *Journal of Physical Activity and Health*, 10(3), 406.

Koekoek, J., Knoppers, A. and Stegeman, H. (2009) 'How do children think they learn skills in physical education', *Journal of Teaching in Physical Education*, 28(3), 310-332.

Liu, A., Hu, X., Ma, G., Cui, Z., Pan, Y., Chang, S., Zhao, W., & Chen, C. (2007). Report on childhood obesity in China (6). 'Evaluation of a classroom-based physical activity promotion program', *Biomedical and Environmental Sciences*, 20(1), 19-23.

Lubans, D. R., Foster, C. and Biddle, S. J. (2008) 'A review of mediators of behavior in interventions to promote physical activity among children and adolescents', *Preventive Medicine*, 47(5), 463-470.

MacPhail, A., Kinchin, G. and Kirk, D. (2003) 'Students' Conceptions of Sport and Sport Education', *European Physical Education Review*, 9(3), 285-299.

Mahar, M., Murphy, S., Rowe, D., Golden, J., Shields, A., & Raedeke, T. (2006). 'Effects of a classroom-based program on physical activity and on-task behavior', *Medicine & Science in Sports & Exercise, 38*(12), 2086-2094.

Martin, R. and Murtagh, E. M. (2017) 'Active Classrooms: A cluster randomised controlled trial evaluating the effects of a movement integration intervention on the physical activty levels of primary school children', *Journal of Physical Activity and Health*, 14, 290-300 http://dx.doi.org/10.1123/jpah.2016-0358

Martin, R. and Murtagh, E. M. (2015a) 'An intervention to improve the physical activity levels of children: Design and rationale of the 'Active Classrooms' cluster randomised controlled trial', *Contemporary Clinical Trials*, 41(0), 180-191.

Martin, R. and Murtagh, E. M. (2015b) 'Preliminary findings of Active Classrooms: An intervention to increase physical activity levels of primary school children during class time', *Teaching and Teacher Education*, 52, 113-127.

McMullen, J., Kulinna, P. H., & Cothran, D. (2014). 'Physical activity opportunities during the school day: Classroom teachers' perceptions of using activity breaks in the classroom', *Journal of Teaching in Physical Education, 33*(4), 511-527.

Michie, S., van Stralen, M. M. and West, R. (2011) 'The behaviour change wheel: a new method for characterising and designing behaviour change interventions', *Implementation Science*, 6(1), 42-52.

Morgan, P. J. and Hansen, V. (2008) 'Physical education in primary schools: Classroom teachers' perceptions of benefits and outcomes', *Health Education Journal*, 67(3), 196-207.

Mullender-Wijnsma, M. J., Hartman, E., de Greeff, J. W., Bosker, R. J., Doolaard, S. and 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.

Murray, R. and Ramstetter, C. (2013) 'The crucial role of recess in school', *Pediatrics*, 131(1), 183-188.

Naylor, P. J., Macdonald, H. M., Zebedee, J. A., Reed, K. E. and McKay, H. A. (2006) 'Lessons learned from Action Schools! BC--an 'active school' model to promote physical activity in elementary schools', *Journal of Science and Medicine in Sport*, 9(5), 413-23.

NCCA (1999) *Primary School Curriculum*, Department of Education and Science, Dublin, Ireland: Stationery Office.

Niemi, H. (2002) 'Active learning—a cultural change needed in teacher education and schools', *Teaching and Teacher Education*, 18(7), 763-780.

Norris, E., Shelton, N., Dunsmuir, S., Duke-Williams, O. and Stamatakis, E. (2015) 'Physically active lessons as physical activity and educational interventions: A systematic review of methods and results', *Preventive Medicine, 72*, 116-125.

Patton, M. Q. (1990) *Qualitative evaluation and research methods*, London: Sage.

Pellegrini, A. D. and Bohn, C. M. (2005) 'The role of recess in children's cognitive performance and school adjustment', *Educational Researcher*, 34(1), 13-19.

Pridmore, P. and Bendelow, G. (1995) 'Images of health: exploring beliefs of children using the'draw-and-write'technique', *Health Education Journal*, 54(4), 473-488.

Reed, J. A., Einstein, G., Hahn, E., Hooker, S. P., Gross, V. P. and Kravitz, J. (2010) 'Examining the impact of integrating physical activity on fluid intelligence and academic performance in an elementary school setting: a preliminary investigation', *Journal of Physical Activity & Health*, 7(3), 343-351.

Riley, N., Lubans, D. R., Holmes, K. and Morgan, P. J. (2014) 'Rationale and study protocol of the EASY Minds (Encouraging Activity to Stimulate Young Minds) program: cluster randomized controlled trial of a primary school-based physical activity integration program for mathematics', *BMC Public Health*, 14(1), 816-825.

Riley, N., Lubans, D. R., Holmes, K. and Morgan, P. J. (2016) 'Findings From the EASY Minds Cluster Randomized Controlled Trial: Evaluation of a Physical Activity Integration Program for Mathematics in Primary Schools', *Journal of Physical Activity & Health*, 13(2), 198-206.

Riley, N., Lubans, D. R., Morgan, P. J. and Young, M. (2015) 'Outcomes and process evaluation of a programme integrating physical activity into the primary school mathematics curriculum: The EASY Minds pilot randomised controlled trial', *Journal of Science and Medicine in Sport*, 18(6), 656-661.

Smith, J. A., Larkin, M. H. and Flowers, P. (2009) *Interpretative phenomenological analysis: theory, method and research*, London: Sage.

Stylianou, M., Kulinna, P. H. and Naiman, T. (2015) '… because there's nobody who can just sit that long':Teacher perceptions of classroom-based physical activity and related management issues', *European Physical Education Review*, 1356336X15613968.

Taymoori, P. and Lubans, D. R. (2008) 'Mediators of behavior change in two tailored physical activity interventions for adolescent girls', *Psychology of Sport and Exercise*, 9(5), 605-619.

Te One, S. (2007) 'Participatory-research methods with young children: Experiences from the field', *Early Childhood Folio*, 2007, 11, 21-26.

Thomson, P. (2009). *Doing visual research with children and young people*. London: Routledge.

Tong, A., Sainsbury, P. and Craig, J. (2007) 'Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups', *International Journal for Quality in Health Care*, 19(6), 349-357.

Trost, S. G., Kerr, L., Ward, D. S. and Pate, R. R. (2001) 'Physical activity and determinants of physical activity in obese and non-obese children', *International Journal of Obesity & Related Metabolic Disorders*, 25(6), 822-829.

van Stralen, M. M., Yildirim, M., te Velde, S. J., Brug, J., van Mechelen, W. and Chinapaw, M. J. (2011) 'What works in school-based energy balance behaviour interventions and what does not? A systematic review of mediating mechanisms', *International Journal of Obesity*, 35(10), 1251-1265.

Vazou, S., Gavrilou, P., Mamalaki, E., Papanastasiou, A. and Sioumala, N. (2012) 'Does integrating physical activity in the elementary school classroom influence academic motivation?', *International Journal of Sport and Exercise Psychology*, 10(4), 251-263.

Veale, A. (2005) 'Creative methodologies in participatory research with children' in *Researching children's experience: Approaches and methods*, 253-272, London: Sage.

Webster, C., Russ, L., Vazou, S., Goh, T. and Erwin, H. (2015) 'Integrating movement in academic classrooms: understanding, applying and advancing the knowledge base', *Obesity Reviews*, 16(8), 691-701.

Woods, C. B., Tannehill, D. and Walsh, J. (2010) 'The children's sport participation and physical activity study (CSPPA)', *Fifth Physical Education, Physical Activity and Youth Sport (PE PAYS)*, 1.

World Health Organisation [WHO] (2010) *Global recommendations on physical activity for health*, Geneva, Switzerland: World Health Organisation.

World Health Organisation [WHO] (2008) *School policy framework: Implementation of the WHO global strategy on diet, physical activity and health*, Geneva, Switzerland: World Health Organisation.

World Health Organisation [WHO] (2016) 'EUR/RC65/9 Physical activity strategy for the WHO European Region 2016–2025', *Available from:* http://www.thehealthwell.info/node/927643, [Accessed: 9th July 2016].