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Developing creativity through outdoor physical activities: a qualitative exploration of contrasting school equipment provisions

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ABSTRACT

Creativity is described as an important cognitive process by which ideas are generated, developed and transformed. Despite the importance of creativity for students' intellectual development, the types of outdoor physical activities students engage in within primary schools according to creativity criteria has yet to be explored. The purpose of the Creative Recess Engagement during Activities Time Exploratory (CREATE) study was to qualitatively capture how physical activities developed by students ($n = 279$) meet creativity criteria in two primary school with differing playground equipment provisions. Using a momentary time sampling qualitative field note observation procedure, a combined total of 730 scans of the school grounds were undertaken with written accounts and analysed according to creativity criteria. The CREATE study provides exploratory insights into how the development of primary school students' creativity can be supported or hindered, by the type of equipment provisions made available for students' physical activities within school grounds.

KEYWORDS

Primary school; creativity; physical activity; school grounds; outdoor equipment

Background

The importance of outdoor strategies for developing students' physical activity

Widespread research has acknowledged that schools provide a vital setting for the development of students' health, wellbeing and physical activity habits to prepare students with skills to prevent future lifestyle-related diseases (Kriemler et al., 2011). Increasingly, research suggests schools need to determine outdoor strategies beyond structured classroom schedules to ensure students meet learning and curricular objectives in school grounds (Dobbins, Husson, DeCorby, & LaRocca, 2013; Hyndman, Mahony, Te Ava, Smith, & Nutton, 2017). This is especially important with students spending hundreds of hours within school grounds each year via morning recess, afternoon recess, after school and a range of practical classes (especially in physical education/sport classes) (Stratton, 2000). It is within the setting of school grounds that research continues to unearth numerous cognitive, social, emotional and physical developmental opportunities and benefits (Bundy et al., 2009; Engelen et al., 2013; Gibson, Cornell & Gill, 2017; Hyndman, Benson, & Telford, 2014; Hyndman, Benson, Ullah, & Telford, 2014; Mahony, Hyndman, Nutton, Smith, & Te Ava, 2017). Moreover, students often spend over 30 h per week within the school setting (Dobbins et al., 2013) which emphasises that strategies need to be continually explored to benefit school students in their journey to prepare for adult life beyond schooling.



Figure 1. A snapshot of the movable equipment school equipment context.

Movable equipment as a strategy to improve student health outcomes

Within Australian schools, the outdoor settings beyond formal classroom agendas have been less prioritised with the removal of facilities, restrictions on students' play policies and overcrowded spaces (Chancellor, 2013). To counteract such declines in student play opportunities, a range of 'structured' strategies have been conducted in a bid to develop students' engagement in learning opportunities via fixed structures, surface markings, weekly activity themes, fitness breaks, active supervision and sporting games and equipment (Dobbins et al., 2013; Hyndman, 2015; Kriemler et al., 2011). The other types of strategies that have been implemented have included 'unstructured' methods to encourage spontaneity and free-range play without a set agenda (Hyndman, 2015). Unstructured play opportunities have been shown to promote variety, choice and diversity to students' play engagement in primary school settings through the introduction of natural features (trees, rocks and gardens), play pods (assortment of materials) and everyday movable equipment (pipes, crates, buckets and so forth) (Hyndman, 2017). In addition to the benefits mentioned previously, feasibility, sustainability and cost-effectiveness of introducing movable equipment into school settings has resulted in increased playfulness (e.g. intrinsic play motivation, control and freedom), increased physical activity intensities (individually and area-level measurements), increased accumulated physical activity participation (pedometer measured), sustained physical activity participation over 2½ years, evolving play behaviours, short-term effects on physical quality of life, short-term effects on enjoyment of active play and teacher reported benefits to students' cognitive and social development (Gibson et al., 2017; Hyndman, 2017). The positive effects of introducing movable equipment into school settings suggest a method to help revolutionise students' engagement in creative, diverse and adventurous play for learning beyond the school classroom (Gibson et al., 2017; Mahony et al., 2017). Yet, despite a number of studies revealing the positive influences from the introduction of different equipment strategies (especially movable equipment) on students' physical development within school settings (Gibson et al., 2017; Hyndman & Lester, 2015a) or social development (Mahony et al., 2017), the explicit impact of equipment strategies on 'creativity' has yet to be fully explored. Nonetheless, Gibson et al. (2017) suggest an indirect and mediating route to develop creativity in school children can be through

physical activity behaviour, thus requiring further exploration. Such a link is supported by the positive influences from physical activity on both mental wellbeing (Fedewa & Ahn, 2011) and academic outcomes (Singh, Uijtdewilligen, Twisk, Van Mechelen, & Chinapaw, 2012). Engagement with school playground objects can provide an effective balance of both challenge and competence for 'flow' (Nakamura & Csikszentmihalyi, 2014). Research is therefore required to further investigate how movable equipment can be used by students during adventurous outdoor play for creative purposes and benefits.

Movable equipment, play and the cognitive values of developing creativity

The value of movable equipment for creativity has been recognised for approximately 180 years since Friedrich Froebel introduced the world's initial kindergarten institution with objects such as blocks, beads and tiles which students would use for designing, building and of course 'creating' (Garaigordobil & Berrueto, 2011). The introduction of movable equipment has the potential to improve creativity by increasing 'the number of kind of variables in it (the environment)' (Nicholson, 1972, p. 6). Creativity is the cornerstone of thinking and is described as a process by which ideas are generated, developed and transformed into value (Ennis, 1987). For example, when students solve movement tasks in different ways within the school setting, they are not only generating these movement ideas, but are also acting on those ideas via a form of 'creative flexibility' (Ennis, 1987). To develop students into creative thinkers, educators must provide students with potential opportunities to 'create'. The capabilities for students to be able to create and produce new conclusions, ideas and to solve problems are important for the human brain (Garaigordobil & Berrueto, 2011). Furthermore, a body of research has reported that creativity is often developed as part of experience, rather than genetics and is a form of positive psychology (Tettamanzi, Sarotti, & Frontino, 2009; Zachopoulou, Trevlas, Konstadinidou, & Group, 2006). An example of a school programme that attempted to develop creativity included facilitating tasks over 6 months that sought analogies relating to stories (Antonietti, Ignazi, & Perego, 2000). Similarly, it has been shown that creativity training can positively influence creativity until pre-university level (Ma, 2006). Creative play is vital for stimulating flexibility, curiosity, improvising, adaption to change, learning and solving problems (Garaigordobil & Berrueto, 2011). A study has even recognised that students' play can lead to creative benefits later in life (Russ, Robins, & Christiano, 1999). In the fast-changing world, it is likely children in the twenty-first century will need creative skills to solve new and unique problems to be productive adults (Johnson, 2007). Despite a body of literature reporting on the link between playing and creativity (Garaigordobil & Berrueto, 2011), schools and teachers need to support children's creative development, however, the types of activities students engage in within primary school environments according to creativity criteria from different equipment provision has yet to be fully explored.

The benefits of developing creative thinking through outdoor play behaviours

It has been shown that playing and learning are intricately linked (Garaigordobil & Berrueto, 2011, p. 610), 'as play provides new ways of exploring reality and different strategies to deal with it'. Indeed, play has been shown to be fundamental as an educational tool for promoting intellectual development (Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009; Lillymer, 2009; Smilansky, 1968). In 2008, it was proposed that a pedagogy be developed to not segregate play from learning, rather to emphasise the similarities between play and learning so that creativity in future generations is encouraged (Samuelsson & Carlsson, 2008). Play is a way for students to create unregulated strategies to deal with reality in a world where so much is regulated (Factor, 2004; Ginsberg, 2007). Students playing with equipment to experiment, explore and push boundaries is intimately like the process of learning. Given that capacities to think creatively are influenced by a setting (Howard-Jones, Winfield, & Crimmins, 2008), it is important to capture the sporadic acts of

spontaneity and adventure from students exposed to different school setting equipment provisions. By doing so, it can capture students' creative processes that students undertake and the movement strategies that they employ. The interactive development of creativity is underpinned by Vygotsky's social development theory which links play, cooperative interaction and creativity (Vygotsky, 1980). Vygotsky suggests that through students' play the development of imagination occurs via a combination of reconstructed previous experiences in which events are combined and emerging realities are constructed (Vygotsky, 1980). For Vygotsky, play is an imaginary situation which allows individuals to think beyond the constraints of everyday life. Imagination is described as contributing towards both artistic and scientific creativity (Amabile, 1983). The present Creative Recess Engagement during Activities Time Exploratory (CREATE) study builds upon previous research which has provided promise for students using both movable equipment and fixed equipment structures for imaginative play purposes (Gibson et al., 2017; Hyndman et al., 2014).

With students' outdoor physical activities often seen through the lens of simply 'physical' or 'social' developments (Gibson et al., 2017), there was scope in the present CREATE study to determine the potential of activities according to varying contexts on the 'cognitive' benefits of creativity. More cognitive effects emerging from school play behaviours are often overlooked and have received little investigation in research studies of school equipment provision (Gibson et al., 2017). The aim of the CREATE study was to therefore apply three components of 'creativity' criteria underpinned by Mayesky's (1998) points for encouraging creative thinking including (1) modification of movements and alternate methods of movement execution, (2) physical activities encouraging curiosity and taking initiative and; (3) interacting and communicating with others to find answers and propose ideas to investigate the types of creative activities primary school students develop during differing outdoor equipment provisions.

Methods

Recruitment

The CREATE study consisted of two catholic co-educational primary schools purposefully recruited due to the similar size, enrolment, geographical area, socio-economic status and school type. The two primary schools were in Regional Western Victoria, Australia and were recruited via a combination of electronic, phone and on-site communicative methods. Despite such similarities, the schools had alternative equipment provisions which were envisaged to be important for the observational objectives and qualitative written accounts of the CREATE study. Within each of the primary schools, all students (aged 5–12 years old) received a plain language statement detailing the research, alongside information consent forms.

In one primary school, there was a focus on the provision of movable equipment within the school grounds (Table 1; Figure 1). At this primary school, there were 123 consenting participants (response rate: 90%; males: 54%; mean age: 7.0). The other primary school consisted of more traditional school ground equipment provision (e.g. fixed structures such as slides and monkey bars) and had 152 consenting students (response rate: 86%, males: 46.7%, mean age: 8.2) (Table 1; Figure 2). Ethical clearance for the CREATE study was approved from the Human Research Ethics Committee, the Catholic Education Archdiocese alongside the subsequent approvals from the principals of both primary schools. Further comparisons in the dimensions of the primary school settings can be seen below in Table 1.

Direct observation (field note observations)

Multiple video cameras comprehensively captured the activities in the designated recording areas for each of the play contexts in the CREATE study (both the movable equipment school context and more traditional, fixed equipment context). Video-facilitated direct observation is reported to

Table 1. Characteristics associated with the primary schools with movable and traditional school ground equipment provisions in the CREATE study.

School setting characteristic	Primary school with movable equipment provisions	Primary school with traditional equipment provisions
Morning recess allocation time	● 30 min	● 15 min
Afternoon recess allocation time	● 30 min	● 45 min
Spaces within the school (Size)	● Large grass field (6094 m ²)- location of the movable equipment	● Large grass field (5250 m ²)
	● Hard surfaced play area (530 m ²)	● Hard surfaced play area (700 m ²)
		● Rock gardens area (100 m ²)
Example of the types of equipment within each primary school	● Climbing structures	● Fixed playground area (349 m ²)
	● Milk crates	● Ladders
	● Tyre tubes	● Slides
	● Cardboard boxes	● Monkey bars
	● Hay bales	● Flying fox
	● Flotation devices	● Surface markings (e.g. hopscotch, downball)
	● Pipes	● Large Sandpit
	● Buckets	
	● Assorted play balls	
	● Hula hoops	
	● Skipping ropes	
	● Mini sandpits	
Supervision Arrangements	● 1 × teacher at the grass field	● 1 × teacher at the top half of the school grounds (hard surfaced play area)
	● 1 × teacher at the hard-surfaced area	● 1 × teacher at the bottom half of the school grounds (grass field; basketball court)



Figure 2. A snapshot of the traditional school equipment context.

develop reliability of direct observation measurements (Loprinzi & Cardinal, 2011). Research assistants provided commentary to complement the coding of the footage. The footage was free from impediment during the video capturing. Scanning of the video footage occurred at 5-minute intervals at both the primary school with movable equipment provisions (5×scans per lunchtime recess at the primary school with movable equipment provisions from 30 min of footage) and at the primary school with traditional equipment provisions (8× scans per lunchtime recess at the primary school with traditional equipment from 45 min of footage). This scanning protocol of the videos was undertaken over five consecutive lunchtime periods from the video footage during two school terms (Term 2 and Term 3; totalling 730 direct observation scans).

First, the field note observations of the video footage were used to detail descriptive qualitative written accounts (Bogdan & Biklen, 1998; Morse, 1994) of the types of activities the students engaged in within both the primary schools with movable equipment and traditional equipment

contexts. The length of the video scans was dependent on the size of the school playground area vantage points being captured by the video footage. Next, the qualitative field notes were used in the CREATE study to record what could be seen, heard, experienced and thought of from written observations of students' engagement with the movable equipment (Bogdan & Biklen, 1998; Morse, 1994). Content analysis of the qualitative field notes was based upon identifying the type of physical activities the primary school students developed according to the criteria for creativity. The CREATE criteria framework consisted of (1) modification of movements and alternate methods of movement execution (e.g. modifying movements through the use of different types of equipment), (2) physical activities encouraging curiosity and taking initiative (e.g. activities with many different possibilities or alternative thinking processes) and (3) interacting and communicating with others to find answers and propose ideas (e.g. collaborating with other students to develop activities, spaces for activities and other activity outcomes) (Mayesky, 2014; Mayesky, 1998). The qualitative field note observations were collected by five education professionals with an average of 20 years teaching experience. All types of physical activities the primary school students engaged in were recorded via written accounts, categorised according to Mayesky's criteria for creativity and the field note data were checked for accuracy by one of the lead investigators. If any gaps in the qualitative data were identified, additional written accounts were included by the lead investigators. Due to both primary schools administering a school grounds policy of 'No Hat, No Play', gender observations were unable to be recorded. There were also no indoor observations conducted during the CREATE study.

Results

Tables 2–4 represent the types of physical activities (captured by written field note accounts) that were developed by the primary school students according to the criteria of creativity from both the school with movable playground equipment and the school with the more traditional fixed playground equipment. When examining the developed physical activities relating to the criterion: modification of movements and alternative methods of movement execution (Table 2), it was clear in both contexts of the CREATE study that the height of equipment was crucial for movement modifications such as jumping and landing to meet and exceed the heights of equipment. The height of equipment was also important for the students within the school with traditional equipment to reach up to perform gymnastics-like holds with the monkey bars equipment. The mobile nature of the movable equipment facilitated dragging movements of equipment and encouraged manipulation of the objects for different purposes, yet in the traditional equipment context school there was more focus on specific locations such as markings, flying foxes, down ball markings and the monkey bars (Table 2).

Table 2. Creativity criterion: the modification of movements and alternative methods of movement execution.

Primary school with movable equipment provisions	Primary school with traditional equipment provisions
• Convenient height of milk crates and hay bales facilitated regular jumping/landing practice to the ground, over and on to the equipment • Regular dragging movements of the equipment to desired spaces, rolling/bouncing/hula hooping with circular equipment • Other movements included hiding, swinging flotation devices, sleigh running with empty plastic sandpits • Foam swimming noodles (flotation devices) became an exploratory item for 'practicing grips', 'manoeuvring hands', javelin throwing, carrying/riding around the field and swinging movements against the wind	• Regular jumping up to and landing from monkey bars • Holds on monkey bars • Jumping and landings over obstacles, surface markings (e.g. hopscotch) and on the spot • Flip over on monkey bars • Sport-specific skills such as unstructured basketball/soccer dribbling practice and soccer kicking • Swinging and hanging for long periods on flying foxes • Unstructured 'downball' competitions (hit and bounce tennis ball into other squares)

When examining the developed physical activities relating to the criterion of physical activities encouraging curiosity and taking initiative (Table 3), it was observed that the activities and thinking processes associated with the primary school students utilising movable equipment tended to be more complex. From the written field note accounts, there was more emphasis on students solving movement problems and applying curiosity relating to the placement, repositioning and plans for the movable equipment within the designated play areas (Table 3; Figure 3). The development of movement initiatives was common with the movable equipment by adapting the equipment for different purposes and different spaces. In contrast, in the school with traditional equipment, the primary school students' curiosity and initiatives were often limited to less equipment, less interactions and the movements were often more simplified to a set location (Table 3).

The developed physical activities relating to the creativity criterion of interacting and communicating with others to find answers and propose ideas (Table 4) revealed that the students utilising the movable equipment tended to undertake a greater variety of roles during the activities which often resulted in more complex communication and interactions across wider spaces (Figure 4). The written field note accounts suggested there was more emphasis in the primary school students with the movable equipment with the utilisation of the space available and on recruitment of team members to assist with the more complex roles and interactions (Table 4). In contrast, the primary school students within the school with more traditional facilities were documented as demonstrating team roles, yet these were more focused on structured sporting competition. Planning of activity directions, instructions

Table 3. Creativity criterion: physical activities encouraging curiosity and taking initiative.

Primary school with movable equipment provisions	Primary school with traditional equipment provisions
• Solving movement problems such as where activity boundaries would be placed to not impede the building, constructing and imaginative play • 'Sleigh pushers/draggers/runners', 'sleigh riders', 'sleigh collectors' and orderly line of those waiting • Using space by repositioning equipment to different locations Movable equipment initiatives: • Rolling, stacking, sweeping, building tunnels/boats/rocket ships, balancing, hiding, clothing, sliding, jumping, landings, hula hooping, tobogganing, climbing, dragging, fencing, tug of war, instruments & activity bases	• Activity instances of running around other students • Having pushing competitions with hands • Incidental activity chasing balls off courts • Running upstairs and hanging on stair railing • Coordinated hopscotch challenges, running and following others across spaces • Learn to kick off the flying fox with feet to gain speed • Coordinate obstacle course runs around fixed equipment

Table 4. Creativity criterion: interacting and communicating with others to find answers and propose ideas.

Primary school with movable equipment provisions	Primary school with traditional equipment provisions
• Developed activity stations would consist of teams with set roles such as leader, cleaner, builder, collector/gatherer of equipment and observer of equipment • Group communication/interactions more complex • Working together to build, design and set up stations for physical activity • Teamwork skills to create spaces • Learning from other groups via a process of peer observation • Demonstrating patience when undertaking activities • Recruitment of team members • Negotiation skills	• Plan activity sequences on monkey bars or where to explore within school grounds • Following the leader (and teacher) during group walking and running • Instructing other students on specific skills and movements • Follow leaders, learn rules being developed and happy to be included during activities • Negotiating directions to run, targets for hoops and deciding who starts with the ball during an activity • Regular discussion of team selections, use of spaces/borders for activities and rules • Conduct running races to sets of equipment



Figure 3. A teacher watches over primary school students' curiosity relating to the placement, repositioning and plans for the movable equipment.



Figure 4. Primary school students planning and working together with the movable equipment stations.

on skills and rules and activity decision making were captured in the school with traditional playground equipment, yet again these tended to be restricted by set locations, a reduced space and within spaces that were busy with students. On occasions, the interaction and communications during the activities were simplified to following a leader or following a small group around the school grounds, planning and following the movements that were undertaken (Table 4).

Discussion

The CREATE study fills a unique gap within the international literature by applying three components of 'creativity' criteria to qualitatively investigate the types of creative physical activities primary school students develop within both a movable equipment context (i.e. mobile equipment) in comparison to a more traditional equipment context (i.e. fixed equipment). The results from the CREATE study showed that the provision of both movable equipment and more traditional equipment into school grounds have the potential to develop primary school students' creativity in unique ways. A range of equipment provision studies have been previously examined in schools to influence physical activity participation levels (Dobbins et al., 2013; Hyndman, 2017; Kriemler et al., 2011), yet this study uniquely examined the development of adventurous physical activities within schools according to creativity criteria. The findings from the CREATE study indicate that a variety of school equipment provisions can show promise for primary school students to ensure more complexity with their creativity development and to utilise spaces to collaborate in larger teams. Several similar activities were observed within the movable equipment and traditional equipment contexts, yet there were more limitations associated with having a school context with more traditional equipment. Observed limitations included being less able to move to different spaces, develop ideas, undertake more adventurous play and stretch equipment over bigger spaces, manipulate and design more structures.

Diversity of movements

Although the idea of using movable equipment in school grounds was initially developed in Denmark during the 1940s with an adventure-type focus, such provisions can pose potential negative perceptions from educators who desire orderly and aesthetically desirable playgrounds (Engelen et al., 2013). Yet it was demonstrated within the CREATE study that movable equipment can potentially develop a higher level of innovation and diversity for primary school students to address the criteria for creativity that included modifying and considering alternate modes of movement (criterion 1) by jumping, landing, rolling, swinging and bouncing the everyday equipment with different heights, locations and combinations of equipment. Curiosity (criterion 2) was emphasised by the positioning of equipment and innovatively exploring how to develop equipment stations and obstacle courses that could be manipulated, transformed and relocated at will. The interaction and communication of the primary school students to discover and propose ideas (criterion 3) could be effectively addressed with the collaboration between students to plan, design, construct, observe/learn from each other, negotiate and recruit team members for imaginative and constructive activities. In previous research, social interaction during students' physical activities in the school setting promote the highest level of enjoyment for primary school students (Hyndman & Chancellor, 2015; Hyndman, Chancellor, & Lester, 2015; Hyndman & Lester, 2015b; Hyndman, Telford, Finch, Ullah, & Benson, 2013). Another educative benefit of movable equipment meeting many components of the criteria for creativity is that activities can be replicated within the home and community with the equipment being based around household-type items. Understanding of the power of spontaneous and diverse free play from more unstructured equipment provisions continues to enhance and has strong potential to engage those that have less desire to connect with more competitive sporting activities (Dyment, Bell, & Lucas, 2009; Hyndman et al., 2014). Yet, although the findings from the CREATE study are encouraging, there is scope for further research on how other types of innovative strategies and equipment provisions can impact on students' development of creative physical activities in schools. Moreover, there is also potential to examine how physical activities within such contexts impact other elements of students' cognitive behaviour.

Diversity of the school context environment

The school setting should consist of a range of spaces for students to engage with and provide optimal opportunities for peers to interact with each other with structures that can be manipulated and develop imaginative endeavours (Malone & Tranter, 2003). The findings from the primary school students engaging with the movable equipment aligned with Titman's (1994) components of a good school ground by providing greater opportunities for students to extend themselves via challenges and risks, providing adequate opportunities to promote curiosity and intellectual engagement and developed shared ownership of spaces via activity developments. Yet, given the hectic nature of both equipment settings, it was apparent that a place for 'being' with elements of privacy was the component that least aligned with the primary school settings at an individual level. Small groups of students would collectively develop activity stations (with the movable equipment) or go wandering (traditional setting) along tree borders. The density of features with the movable equipment with many more equipment options available also stood out as another component within school settings that can develop students' engagement (Anthamatten et al., 2014) and utilisation of such spaces (Colabianchi, Maslow, & Swayampakala, 2011). Further research is required into other strategies that can be implemented into school settings that are cost-effective and can increase the density of equipment available.

Like the findings of the present CREATE study, research has indicated that there can be limitations from more traditional equipment facilities in schools for more 'open-ended' unstructured play due to possessing a set location, period or objective (Dyment & Bell, 2007; Hyndman, 2017). It has been reported that there can be less activity opportunities and variety facilitated by traditional types of school equipment (Dyment & Bell, 2007; Dyment et al., 2009), although increasing the amount of fixed school playground facilities has showed promise to increase primary school students' physical activity (Nielsen, Taylor, Williams, & Mann, 2010). The current CREATE study showed that primary school students engaging in more traditional contexts can be engaged in addressing many of the creativity criteria as the movable equipment context. Examples included primary school students using both types of facilities would jump over, up to, across and on to objects, follow leaders, instruct others on how to perform skills, plan and negotiate movement sequences. The main difference between the use of equipment to meet the creativity criteria was related to being able to conduct activities in evolving spaces, different combinations of equipment, the variety of equipment produced by the movable equipment provisions created more complex decisions and roles. The ability of the movable equipment to be manipulated to students' activity needs allowed the students to scaffold heights and distances in which they could jump towards. Previously, primary school students exposed to more stationary, fixed types of equipment have been reported to participate in lower levels of physical activity participation, enjoyment and less evolving physical activities (Hyndman et al., 2014). Such results can be linked to the reduction in availability to manipulate and utilise space by moving equipment to different locations to promote diversity in activities. An awareness of the amount of activities a child can perform with fixed piece of equipment across a school year (7 years of primary schooling) compared to mobile pieces of equipment continues to develop. Further research is warranted into the proportion of Australian schools that are adopting the use of mobile equipment such as movable equipment used in this study. With both movable equipment and traditional equipment contexts addressing creativity criteria, schools should consider the provision of both facilities to promote students' development. The development of movement capabilities from school equipment provisions can align with students meeting elements of 'physical literacy' by having opportunities to 'move with poise, economy and confidence in a wide variety of physically challenging situations...anticipating movement needs or possibilities and responding appropriately...with intelligence and imagination' (Whitehead, 2001, p. 131). The potential value of equipment provisions continues to be unearthed. Alternative school equipment strategies such as surface markings, staff-promoted recess activities, themed activity weeks in the school setting and the provision of greening programmes of trees, rocks and gardens could also be considered to determine impacts on creative movement and capabilities (Hyndman, 2017).

The potential for meeting indirect pedagogical goals

Evidence of a variety of student-centred strategies were identified during the CREATE study which are pedagogical goals for educators such as cooperative learning (specific team roles working together) and problem-solving initiatives. With educators constantly looking to develop students' learning with a range of pedagogical models, consideration could be given to attempting to develop students' tactical and technical skills via game sense approaches to engaging in sporting activities (Pill, Harvey, & Hyndman, 2017). Game sense approaches are characterised by developing game situations and promoting students' understanding of movement solutions (Pill et al., 2017). Primary school students could learn the dynamics of pedagogical approaches such as game sense to work with other students, develop questioning techniques and other strategies to mentor, involve and cooperate in the development of key life skills in the school setting. There was also evidence in the third creativity criterion of interactivity and communication of the students discussing rules, following rules, undertaking sporting roles and guiding others on skill components. Another pedagogical model that could be considered to develop primary school students' creativity could be the sport education model (Perlman, 2011) in which rules, roles and procedures of sports are followed closely. Nonetheless, the findings suggest that pedagogical model strategies should be considered to develop creativity and higher-level learning processes beyond the reach of formal, scheduled classes and warrants further research.

Implications and limitations of the CREATE study

Given a reduced flow of health behaviours that are developed between primary school into secondary school (Dollman, Norton, & Norton, 2005; Hyndman, 2016; Hyndman, Telford, Finch, & Benson, 2012; Pate et al., 2007), it is imperative that primary school teachers are aware of methods to increase students' engagement and uptake of skills in the school setting. A greater awareness of strategies for provision into school settings by educators could assist in developing more innovative, creative students capable of solving problems and making key decisions into the future. Although the novelty of school ground physical activity behaviours being examined through the lens of the overarching creativity framework is the primary focus and innovative aspect of the study, the authors acknowledge that further merging of the two concepts of both creativity and physical activity could be developed. It should be acknowledged that as the direct observation field note accounts were collected of school lunchtime recess, such findings may differ to creative activities developed during morning recess or after school activities. Although the primary goal of the CREATE study was to determine the types of creative physical activities students developed in different contexts, it should be acknowledged that the movable equipment context was introduced more recently than the traditional context. It is possible students embraced the equipment for creative options more readily than the students in the traditional context. Moreover, despite the qualitative observational nature of the CREATE study, the development or use of a quantitative observational measure of creative behaviours within school contexts could be warranted. Nonetheless, the intentions of the CREATE study were to capture how primary school students can utilise equipment to meet creativity criteria and it is hypothesised that the results would be similar. Although the focus of this study is on the often 'over-looked' cognitive benefits from physical activities that meet creativity criteria (Gibson et al., 2017), there is also scope for research to quantitatively unearth how such activities contribute to meeting national physical activity guidelines. This is especially pertinent given that less than one in five young people are meeting the recommended national physical activity guidelines. Enhancing creativity during students' physical activities within school settings could be a key strategy (Active Healthy Kids Australia, 2016).

As the CREATE study compared the creative physical activities developed across two Australian primary schools, the generalisability of the findings can be improved by conducting similar designed studies on larger cohorts of schools (Gibson et al., 2017). Moreover, as each of the field

note observers within the study were simply instructed to report on the types of activities that the students engaged with in the school grounds (e.g. the purpose of the study was not unveiled), no bias was anticipated to have occurred. Students can have greater opportunities to be themselves without restriction when engaging with the outdoor settings of schools, yet the learning possibilities of equipment provisions and other strategies in school grounds on students are just starting to be understood (Gibson et al., 2017). This is exemplified by recent Australian Health and Physical Education curriculum guidelines explicitly guiding teachers on how to use the curriculum to develop 'outdoor learning experiences' (Australian Curriculum and Reporting Agency [ACARA], 2016). The CREATE study provides exploratory insight to unearth the possibilities of school grounds for educational pursuits such as developing students' creativity.

Conclusion

It was demonstrated in this CREATE study that the provision of a variety of school equipment is imperative to ensure primary school students develop creative physical activities that are complex, interactive and promote greater utilisation of space in school settings. It was evident from the exploratory study that there were some similarities in how the creativity criteria was met by students' development of outdoor physical activities in each context, yet the mobile nature of movable equipment was observed to promote greater 'open-ended' ability for students to manipulate, adapt, construct, design, develop and relocate equipment for more complex purposes, roles and spaces. It is concluded that mobile equipment could be more appropriate for primary school students to develop their creativity and thus cognitive and social skills by working together to determine how to use the mobile equipment, although combining both equipment provisions can provide further options for students to be creative. Equipment that was fixed in the traditional context tended to restrict activities to specific locations and without being able to be mobilised, were unable to be relocated to activate and adapt varying school spaces. Educators can consider building upon the findings from the CREATE study to move beyond a physical focus of equipment provision in school settings to develop students' cognitive capabilities, social interactions and future innovations. As detailed by Hennessey (2010), the developmental components of creativity are a cornerstone for psychological progress. As a society we need to understand and achieve improved insight and understanding of creative processes, especially from school ground equipment provision to develop the cognitive capabilities of our next generation.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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