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The risk is that there is 'no risk': a simple, innovative intervention to increase children's activity levels

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School playgrounds offer everyday opportunities for physically active and social play that combats obesity, develops skills, and promotes well-being. However, teachers' fear of the legal consequences of injury can elicit over-zealous risk reduction with the result that playgrounds lack challenge, and the potential benefits of play become limited. In this research, we trialled a simple, cost-effective strategy to encourage children to be more active and social on a school playground. Over 11 weeks, we made available materials with no fixed purpose (e.g. car tires, boxes) to a playground of children aged five to seven. Accelerometers showed children became significantly more active. Interviews with teachers suggested children also became more social, creative, and resilient. However, despite no incidence of injuries, teachers perceived an increased risk and encountered dilemmas regarding duty of care. We conclude that future interventions should address issues of 'surplus safety' at individual, school, system, and policy levels.

Keywords: playgrounds; social interaction; duty of care; surplus safety; play materials

Introduction

The nature of children's play in school grounds has changed considerably over the last few decades. Changes to the playgrounds and policies of some Australian schools have reduced children's opportunities for active, creative, and diverse play. The most serious of these changes include: the removal of play equipment; the reduction in the time given to recess (i.e. lunch and other recess periods); the amalgamation of schools in the name of greater economic efficiency, which in turn places greater numbers of children in a single space; and the implementation of restrictive rules about children's use of school grounds that force teachers into a policing, litigation-conscious role (Evans 1997, 1998; Evans and Pellegrini 1997).

Changes in children's play in school grounds may be part of a broader development of 'risk anxiety' pervading contemporary life (Scott, Jackson, and Backett-Milburn 1998). Increased concern with risk in society is demonstrated in the protective discourse whereby adults regard children as vulnerable and in need of protection from the dangers of modern society (Tranter and Sharpe 2007). As a consequence, children's opportunities for independent play have been progressively restricted. The age at which

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children are allowed out to play without supervision has been increasing (Hillman, Adams, and Whitelegg 1990; Tranter and Pawson 2001); children are more likely to be driven or accompanied to their play activities (Fotel and Thomsen 2004; O'Brien 2003); and play activities are more likely to be adult-organised or -supervised and indoors (Isenberg 2002; Tranter 2006).

All of these changes to children's play are, at least in part, related to the desire of adults responsible for children to protect those children from danger. However, many parents and teachers are narrowly focused on the risk of one type of 'danger': physical injury. They are seemingly unaware of a host of other dangers that potentially come *as a result of* restricting active play. The potential for children to become afraid to use their bodies actively is among the risks of being overly concerned with protecting children from injury in their school grounds (Steinsvik 2004). The diminution of opportunities for physically active play, in turn, contributes to a risk of being overweight and developing associated health problems (e.g. Type 2 diabetes) as well as to restricted emotional, intellectual and social development (Hart 2002).

The importance of active, outdoor play

Play is a critical, but sometimes undervalued, aspect of childhood. Decades of research has documented that play has a crucial role in development (Isenberg 2002) and learning (Golinkoff, Hirsh-Pasek, and Singer 2006). In particular, play is the way in which children experience, discover and learn about themselves and the world. Because it is 'not for real', play provides a context in which negative consequences are minimised. Play involves problem-solving and taking risks; a great deal of learning occurs in trial and error play situations.

Much of play is social. Thus, play promotes learning about such vital skills such as turn-taking, sharing, negotiation, and leadership. Play also enables children to experience and express a range of emotions including conflict and even hostility (Guldberg 2001). The reciprocal interactions that occur in some types of play (e.g. role-taking, pretend) enable children to begin to understand others' points of view.

Despite the widely held view that intellectual activities are the best means for developing cognitive abilities, current evidence indicates high-quality play experiences also contribute in important ways to learning and development (Bergen 2002; Golinkoff, Hirsh-Pasek, and Singer 2006). Indeed, Bergen argued that, if children do not engage in high-quality play, their capacities in areas such as metacognition, problem-solving, social cognition, literacy, mathematics, and science, are likely to be diminished. Similarly, Pellegrini and Holmes (2006) showed that play at recess is predictive of school achievement and performance on cognitive tasks, particularly when play involves peers.

Changing adults' perceptions about the risks associated with active play seems to be a necessary and important strategy for reversing the diminution of play opportunities within school grounds. Unless we shift adults' perceptions, a generation of children will be faced with the long-term consequences of decreased play. These consequences certainly will outweigh the short-term 'gains' of fewer bruises or grazes.

Surplus safety: risk assessment gone awry

Humans seem to want to shift responsibility for adverse circumstances outside of themselves. Parents are 'only human' and some apportion blame for accidents involving

their children – no matter how minor – to local councils, teaching staff or sports instructors. Blame-seeking parents, in turn, seem to have created an unfortunate phenomenon: 'risk assessment gone awry'. The driving force behind out-of-control risk assessment seems to be to avoid law suits, rather than to ensure children's safety. Ironically, the 'surplus safety' (Buchanan 1999) produced often results in potentially damaging consequences to children's development (Children's Play Council 2002). In seeking to protect children from all possible harm, surplus safety is working to eliminate the benefits associated with exciting, challenging and stimulating play.

An alternative perspective on the current pre-occupation with removing all risk from play spaces is that minor injuries (i.e. grazes, sprains, and bruises) are a universal part of growing up. Taking moderated risks, which sometimes yield minor injuries, is essential to healthy development across a number of domains. Furthermore, when children sustain (or witness) minor injuries, they gain direct experience of the consequences of actions and choices (Children's Play Council 2002).

If children perceive a school ground to be insufficiently challenging or boring, they may compensate by engaging in activities that increase excitement and, inadvertently, their exposure to serious risk (Stephenson 2003). This compensation might take various forms: using play equipment in unintended and dangerous ways, bullying, or risk taking in truly dangerous places (Walsh 1993).

Providing active play challenges for children in school grounds

School grounds can provide challenging activities for children with inherently moderated risk levels, thus averting the need for compensatory behaviours. Past strategies have typically involved major changes to school grounds (e.g. school ground 'greening'). Previous research (Bell and Dyment 2006; Moore and Wong 1997) has identified significant benefits to children's active play of naturalising playgrounds with trees, hills, and ponds. However, even minor changes in the materials available to children, or to school policies concerning play activities, might lead to similar increases in activity levels, creativity and social interaction among the children.

The current study investigated the possibility of using a simple, inexpensive intervention within school grounds to promote active, social, and creative play among children in a primary school in Sydney, Australia. Rather than completely changing the school ground through a greening project, the intervention is based on a single, simple strategy – the addition of a range of 'loose' parts for children to play with within their school ground. Loose parts characteristically have no single defined function – for example, car tyres or hay-bales, empty containers, and cardboard boxes. Their lack of immediate purpose stimulates children's imaginations to use materials in new and inventive ways.

The aims of this project are to:

- increase children's physical activity through an intervention in which loose parts were made available in a school playground; and
- examine teachers' perceptions in regard to the benefits and consequences of changing the level of 'risk' in the school ground.

Methodology

The study was conducted following ethics approval from the University of Sydney and the regional education office to whom the school reported. Written consent from

parents and teachers was obtained as well as verbal consent from child participants. We used a mixed methodology to assess the effectiveness of the intervention, which included a quantitative measure of physical activity and thematic analysis of teachers' perceptions of the intervention.

Participants

Twelve children aged between five and seven who attended a mainstream primary school in western Sydney, Australia participated in the quantitative phase of the research. Seven of the children were boys. The children represented a range of physical and social abilities. All children in Kindergarten and Year 1 were invited to participate in the data collection via letters sent home to families. We enrolled the first children whose families responded.

Except when wet weather forced indoor play, children spent recess and lunchtimes on the junior playground. At any one time, there were approximately 150 Kindergarten, Year 1 and Year 2 children on the junior playground.

Nine female teachers who taught at the same school took part in the qualitative phase. Potential participants were identified and approached by the school principal, who was asked to approach teachers whom she believed would be broadly representative of the opinions held by the 30 staff at the school. All nine teachers were included in the duty roster for the junior playground, although two of them taught classes of older children (eight years and over). Teachers varied in their ages and years of experience teaching; the latter ranged from 1 to 25 years.

Procedures for changing the school playground

The intervention consisted of the introduction of 'loose parts', or 'scrounge materials', made available on the school playground for a term and a half (11 weeks of school time) during winter. We selected materials that were not conventionally considered to be play things for children, materials such as: car and bicycle tyres, hay-bales wrapped in plastic, cardboard boxes of different sizes, plastic barrels and water containers, lengths of tubing, pieces of fabric, sacks stuffed with foam, crates, wooden planks, garbage bin lids, strips of foam, and a swivel chair on casters. We regularly changed materials during the study period, with the addition of new materials and removal of materials that were broken or were identified by teachers as being of concern with regard to safety. These included plastic items that produced splinters and wooden planks which, though no incidents were reported, were of concern to teachers regarding their potential to be used as weapons.

The playground itself was typical for a Sydney school. It was approximately 60m^2 of bitumen, bordered by large trees at intervals of approximately 5m, with benches between the trees. Beyond the trees on one side of the playground was a stretch of grass 70×20m on a shallow downward incline. Children were allowed to play on the grass in groups of two or three classes per recess or lunchtime, provided the grass was not wet from rain, in which case it was considered out of bounds.

Each play time, children were given access to a 'ball bag'. The ball bag was a sack in which there was a selection of balls and skipping ropes.

Fixed play equipment consisting of a climbing frame with ladders, monkey bars and walkways was located in one corner of the bitumen area. In compliance with Australian/New Zealand safety standards (Standards Australia and Standards New

Zealand 1996), soft surfacing comprised of sand covered by fabric was provided under the play equipment and to a distance of 2.5m beyond.

Also in compliance with Australian/New Zealand safety standards (Standards Australia and Standards New Zealand 1996), any loose parts selected for use in our study, which had the potential to be stacked to a height of more than 500mm (e.g. hay-bales), were required to remain on the soft surface around the fixed play equipment. All other loose parts provided by the researchers in the present study were permitted to be taken by the children anywhere on the playground.

Children were on the playground for 25 minutes at morning recess and 55 minutes at lunch; the lunchtime period included about 30 minutes of uninterrupted play. To our knowledge, there were no bans on specific types of play such as rough and tumble or superhero play. Two teachers were on playground duty at any given time, and there was a change-over in duty half way through lunchtime. The principal briefed the teachers at a staff meeting prior to the project beginning, telling them only that the research was aimed at encouraging children to become more active; she asked them not to intervene in the play unless children's safety was at risk.

The research took place in two inter-related and overlapping phases, a quantitative phase and a qualitative phase. Each was associated with a separate project aim. Children's activity levels were the subject of the quantitative phase. Teachers' perceptions of the playground alterations on the children's activity and on their role as playground supervisors were the subject of the qualitative phase. To gather qualitative data, we conducted semi-structured interviews mid-way through the project. However, as this was a pilot study, no attempt was made to determine the effect of the qualitative interviewing on the children's activity levels during the second half of the project.

Quantitative phase: children's physical activity

The quantitative phase of the project focused on measurement of physical activity in 12 children using Actigraph accelerometers (Manufacturing Technology Inc. [MTI], Actigraph Model GT1M) prior to and following the playground intervention. Actigraphs have been widely used and validated as an objective measure of children's physical activity (Trost, McIver, and Pate 2005). Children and parents understood the purpose of the Actigraphs before a device was placed on a child. In the current study, Actigraphs were fixed to adjustable elastic belts around children's waists and positioned in the small of children's backs. To reduce the likelihood that data might be skewed by children intentionally changing their activities as a result of being asked to wear an Actigraph, the devices were worn by children throughout the morning and early afternoon at school but programmed only to collect data during lunchtime. Actigraphs were programmed to record 'counts' at the standard setting of 60-second intervals, which were then downloaded to a Microsoft Excel spreadsheet.

Qualitative phase: teachers' perceptions

The qualitative phase of the research examined teachers' perceptions of the play materials on the playground – in particular, their impact on play and, indirectly, on the teachers while they were on playground duty. Semi-structured interviews were conducted with different formulations of the same questions asked to all interviewees and points of interest followed up on an individual basis as these arose.

The last author interviewed each of the nine teacher participants after the loose part materials had been on the playground for six weeks. Seven interviews were carried out with individual teachers; an eighth interview was carried out with two teachers together. Interviews ran for between 15 and 30 minutes and were all conducted in a quiet room at the school and audio-recorded. To reduce the impact of bias during data collection, prior to carrying out interviews the interviewer reviewed methods of face-to-face interviewing (Patton 2002) and received feedback from the first author regarding her interviewing technique and her use and monitoring of probes.

Interviews usually started with a question about participants' general impressions of the play materials provided on the playground. Further questions related to teachers' perceptions of changes in levels of children's activity, social and creative play, and safety. Questions around safety focused on teachers' perceptions of risk associated with the materials. Finally, teachers were asked whether they had ideas for improving the selection of materials on offer to children.

Findings

Children's physical activity

Following the introduction of the loose parts play materials, children's physical activity was greater than that before the intervention. A mean was taken from the 31 data points (representing 31 minutes) recorded during the middle of lunchtime for each child. Data points towards the beginning and end of lunchtime were discarded due to the risk that these might have been affected by the children eating lunch or going to the toilet. A comparison between before and after average counts revealed that these were significantly higher following the intervention than before. The mean counts increased from 1028 (*SD*=770) to 1612 (*SD*= 491; Wilcoxon signed rank test (one-tailed) p=0.014; *es* = 0.9 *SD*).

Teachers' perceptions

Constant comparative analysis (Glaser and Strauss 1967) was used to analyse the thematic content of the interview data. To improve the credibility of our interpretations of the data, the interviewer and first and second authors shared in the process of developing and organising themes. Data were analysed in two stages: first, interviews were analysed individually to identify key themes; second, themes were successively compared, compiled and reorganised across interviews. This process was undertaken first by one author and then a second, with the three authors meeting afterwards to review interpretations. Disagreements regarding categorisation were resolved through discussion before arriving at a final interpretation of the data.

Two pervasive common themes emerged from our analysis. One theme concerned a description of the kinds of play observed and the benefits that were derived from the play. We titled this theme 'Flavours and favours of play' to capture the interaction between the activities themselves and their perceived benefits/consequences for the children.

A second theme concerned teachers' perceptions of elevated risk on the playground and concomitant anxieties that stemmed from the intervention. We titled this theme 'Risk: real or imagined?' to emphasise the fact that while no injuries occurred, the teachers nevertheless worried more.

Flavours and favours of play

Teachers' descriptions of children's activities, and the benefits associated with these, fell into three interrelated categories: active play, creative play, and social play. An underlying sub-theme in this category concerned teachers' emphasis on the engaged and enjoyable qualities of children's play with the materials.

With the exception of one teacher, who stated there had been no change in children's activity, informants reported that access to materials on the playground generated more physically active play. Increases in activity were perceived not only in the form of greater aerobic exercise (e.g. running, jumping) but also in the opportunities presented for resistive exercise (e.g. lifting, pushing and pulling of large, heavy objects like hay-bales). One teacher observed that children who had previously tended to prefer sedentary activities were now more active as a result of the materials. Another teacher explained the increase in activity via reference to her perception that children's play 'had more of a purpose' following introduction of the materials.

There was unanimous agreement that children's play became more creative as a result of the intervention. Moreover, play was perceived to have become progressively more creative as exposure to the materials increased over time. Children were reported to have made inventive use of the materials' potential for construction (e.g. building a 'pyramid'); exploration of mechanical properties (e.g. rolling balls down planks); combining with their own toys and with pre-existing equipment and 'ball bag' items; creating spontaneous rule-based games (e.g. who was allowed to climb on a built structure); creating friendly competitive games (e.g. tyre-rolling contests); testing physical prowess (e.g. 'balancing' on tyres or walking along planks); and creating highly imaginative play (e.g. sitting in tyres 'pretending [to be] on some Caribbean cruise'). One teacher directly attributed the increase in creative play to the opportunities opened up by the materials' lack of fixed purpose – 'They didn't seem to know what to do with [the materials] at first**.** [They were] sort of just there, and they had to make up what [they were] so that they would know to do with it… So it did, I believe, fill in their creativity'.

Teachers also made several explicit or implicit references to relationships between creativity and developments in use of the materials. Teachers reported that children were more likely to discuss the content of their play as a result of the play having become more imaginative and complex. 'There's actual talking, imaginative games going on about whether they're being pirates or whatever they are. There is actually a story behind what they're doing'.

Further, most teachers reported gains in social play. For example, children who did not usually play together (e.g. children in different age groups) were more likely to do so given the availability of the materials. Teachers also observed that children became more co-operative in play (e.g. stacking hay-bales or organising materials into a group obstacle course). Three teachers commented that incidents of aggressive behaviour on the playground had become less frequent since the materials had become available. One of these reported a belief that playground duty had been more 'settled' since the introduction of the materials. However, social gains were not universally reported for all children, particularly early on. One teacher reported that children sometimes became engaged with materials to the exclusion of interest in other children; another reported that children would sometimes actively defend materials against use by others. The latter problem was solved by adding more materials to the playground.

In short, children's play was considered to be more active, creative, and social, at least in part due to the motivating nature of the materials. All teachers agreed the children enjoyed playing with the materials. An illustration of children's heightened engagement concerned an occasion in which it had been difficult to interrupt their play for a sports carnival. Teachers referred to children 'having a great time', 'loving' the materials, and some materials, such as wooden planks, being 'really, really popular'. One important consequence of children's motivation to play with the materials was reported to be an increased resilience: so engaged were they in play that children who fell over were more likely to pick themselves up and continue playing rather than cry as they might previously have done.

Risk: real or imagined

Teachers' discussion of risk on the playground fell into three categories: perceived risk of injury and teachers' related anxiety engendered by the presence of the materials; ways of managing risks; and a more general discussion relating to teachers' duty of care.

Widespread, though not unanimous, perception existed among teachers that risks to children's safety had been elevated as a result of the introduction of materials to the playground. Risk was seen to have increased because: children were frenetically attracted to the materials, especially at the beginning of the study; the materials were perceived to provide opportunities for 'risky' behaviour (e.g. the wooden planks could be used in play fights as 'swords'); and the need to keep a close eye on 'hot spots' (in particular, the use of hay-bales around the fixed equipment) detracted from teachers' capacity to observe elsewhere on the playground. The degree to which anxiety about increased risk was based on direct observational evidence varied. Some concerns arose directly from observations of children engaging in 'risky' behaviours with specific materials (e.g. making tunnels with hay-bales and crawling through). But, at other times, anxiety about children's safety seemed more to form part of a climate of general uneasiness. Two teachers came closest to describing the genesis of this uneasiness – 'I suppose at times I was noticing [risk] because it was there and it was so different. I don't know whether there was more risk or whether I was just noticing it more' and 'I suppose because it seems like grown-up equipment with little pieces of wood and tyres and everything, you're a little more tentative to start with'. Given that the incidence of injuries did not increase during the study period, it seems fair to say that concerns arose more from perceptions of what *might* have happened rather than from what had actually been observed. One teacher summed up her concerns by saying, 'something *could* happen to somebody – I think that's a teacher's natural instinct to be worried that something *could* happen'.

Teachers described a number of ways in which risks on the playground were managed. Sometimes, teachers intervened to ask children to desist a particular activity, to reduce the number of children crowded in a small area, or to remove materials that they perceived had become dangerous through wear and tear. Some teachers reported that they used incidents of 'risky' behaviour as opportunities to raise children's awareness of the consequences of their actions and to encourage them to reflect on how they could make their play safer. One teacher said she had helped children to generalise from a school rule about not hitting to include not hitting with objects as 'an extension of their hand'. There was also acknowledgment that the children had mediated risks spontaneously – for example, paying attention to the safety of the child

behind them in a board-walking game, or building sturdier cubby houses with the hay-bales after previous attempts had collapsed. Teachers also gave insights into their own internal processes regarding risk assessment and management, for example, 'I weighed up the pros and cons of this, thinking of all the possibilities that could go wrong; and trying to have in my mind a plan of action if something like that did go wrong'. Sometimes it seemed that teachers were managing their own anxieties rather than the risk itself – for example, 'the majority of the time, while I was nervous, I'd still sort of let them go through whatever'.

Duty of care weighed heavily on nearly all of the teachers – a responsibility explicated by one informant as, 'we're here for the safety of the children… and that's paramount in our eyes. And it's paramount in society's eyes. So we have to be careful with the children that we're entrusted with'. Many of the teachers perceived themselves to be vulnerable to litigation in the event of children's injury; avoiding situations where they might be held responsible for such an injury emerged as a priority. Interestingly, for the three informants who talked at length about duty of care, there was an important difference between the perceptions of others (i.e. parents, society at large) regarding their accountability and their own perceptions about what should justly constitute a breach of duty of care. Parents in particular were perceived to have the potential to lay blame unreasonably in the event that their child was injured. One teacher recounted an incident at another school when a parent had tried to blame her for an insect flying into the classroom and lodging in a child's eye. This teacher reported that fear of litigation made her more restrictive of the activities of school-children in her care than she was of her own children at home. Another teacher summed up her perceptions of both the vulnerability and unfairness associated with duty of care in practice by saying, 'We're the only occupation really where you can lose your livelihood over a perceived thing rather than something that actually happened, where complaints can be made against us and we then have to prove that we didn't do it'.

As described in 'Flavours and favours of play', teachers generally agreed that play with the materials bestowed a range of benefits to children. However, such benefits were always balanced against an analysis of the potential risks involved. One teacher described her predicament as follows: 'While we don't want to intervene in children's play, because we know how important it is, there still is that legal thing hanging over our heads that says, "Well, when is a good time to intervene? When is not?"' The same teacher gave a detailed account of the decision process she engaged in to determine whether to intervene in an exemplary situation in which a child had been seen swinging a skipping rope around her head:

> …so therefore you have to anticipate that there's going to be a cause and effect there. There's going to be a definite; someone's going to get hit. Now how badly it's going to happen is anyone's guess. But the fact of the matter is if you see that happening, you then have to say okay, chances are 95% that there's going to be worst case scenario. There's going to be a 95% chance that a child is going to get hit; another kid's going to cop it. So that's where duty of care starts to come in.

This teacher described her reservations about the materials in terms of her perception that they made it harder for her to decide when to intervene.

The three teachers who commented at length about duty of care saw it as symptomatic of a larger culture of blame that had emerged in society within their lifetimes. These informants were keen to talk about the implications of such a culture for children and for society at large. All three agreed that a perceived low tolerance of risks

in society was responsible for limiting children's exposure to valuable learning experiences. One teacher perceived that fear of risk had generalised to a reluctance on the part of children to make mistakes of any kind – unfortunate, at a time in life and in circumstances when mistakes should carry few consequences and offer optimal learning potential. Another informant suggested that children were becoming less able to accept responsibility for their own actions, and alluded to serious consequences for law and order when children grew up.

In general, teachers perceived themselves to be supportive of the intervention, although support was often qualified by an emphasis on perceptions of increased risk. However, it remains possible that if there were teachers who were more adversely disposed to the project, they did not agree to be interviewed.

Discussion

The children participating in this study showed significant increases in physical activity as measured by accelerometry. However, Actigraphs are designed to monitor changes in speed of movement. Given that the activities involved significant pushing, pulling, squatting, and lifting, we suspect that the increases in their activity levels may be even greater than those documented through the accelerometers.

In addition to increases in activity level, the teachers unanimously reported other positive changes in the children's play following the introduction of loose parts materials to the playground. Teachers also remarked on changes in their own behaviours toward intervening in situations perceived as risky. Nonetheless, the teacher interviews revealed enduring concerns about safety indicative of a 'surplus safety' framework. These comments suggested that simply adding loose parts to the playground is unlikely to be enough to result in the long-term changes desired. Teachers referred to both internal and external factors that may need to be addressed for more enduring change to occur. Such change may require interventions at both the system and the school level that explicitly target risk reframing and promote the value of play.

Although there were no increases in injury rates during the period of this project, teachers did not perceive the playground to be as safe as previously. They questioned their duty of care and expressed fears related to litigation and other negative repercussions. A very significant shift in beliefs about the benefits of play will be required if changes to internal perceptions are to occur. Teachers also require more support from education authorities and parents before long-term modifications to playground activities are likely to be fully accepted. It appears essential to decouple play and surplus safety if the full benefits of play are to be realised.

We anticipated that introduction of less-structured materials in the playground environment would lead to changes in all areas of play. While the purpose of this study was to increase physical activity, we were particularly interested in the by-products of increased activity. For example, our research potentially has implications for a problem that has gained greater attention in the past decade – weight management in childhood. Thus far, school-based health-promotion efforts related to weight management have focused on increasing health and physical education, changing food choices, and promoting means for travelling to and from school. The contribution of children's activities during recess has gone largely unrecognised. Our research suggests that minor changes to playgrounds may have the potential to contribute to weight management by increasing physical activity in primary-school children.

Physical activity also has been found to promote positive mood and emotional well-being (Lotan, Merrick, and Carmeli 2005); better social skills are associated with less bullying (Fox and Boulton 2005); and creative playfulness correlates with coping skills (Hess and Bundy 2003). Teachers in this study alluded to changes in each of these.

Further, teachers reported concomitant reductions in aggressive behaviours. This is consistent with Stephenson's (2003) appraisal of physical risk taking, and suggests that children perceived the changes in the playground to offer more challenges and therefore were less inclined to compensate by engaging in other risky activities. Nonetheless, further research is needed to examine the nature and extent of the relationship between aggression and playground materials, whether the relationship is found across contexts and whether it is related to changes in level of playground challenge.

The intervention's most important quality is its potential for generating a self-sustaining cycle of active play and associated benefits. Children play simply because they want to – not for any other expected gain. It therefore seems likely that children who learn how much fun loose parts are at school will attempt to replicate this experience elsewhere, thus potentially increasing the gains exponentially. The potential for increases in active play at school to transfer beyond the school playground should be tested in future research.

Summary, conclusions and implications

Twelve children, aged five to seven, and nine primary school teachers participated in a mixed-method study involving the placement of loose parts with no defined purpose on the playground. The materials were monitored and updated as necessary over an 11-week school period. The children became significantly more active and the teachers perceived the children to be more social, more resilient and more creative. Injuries did not increase. While the teachers worried about safety, they were aware that their fears arose more from concerns about litigation or other negative consequences than from the likelihood of a child being seriously injured. Even so, for the gains to be maintained, explicit vehicles for addressing risk reframing and recognising the value of play are likely to be necessary at both system and school levels.

The major implication of this research for practice is that the findings indicate that this simple, low-cost intervention could be carried out at any school. While we recognise the value of more expensive school ground greening projects, if replicated in properly controlled studies, these findings may have widespread implications for benefiting school children's mental as well as physical health, particularly in schools where high-cost interventions are not feasible

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