



Promoting gross motor skills and physical activity in childcare: A translational randomized controlled trial



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ARTICLE INFO

Article history:

Received 23 February 2015

Received in revised form 8 October 2015

Accepted 29 October 2015

Available online 5 November 2015

Keywords:

Intervention
Preschool
Physical activity
Translational trial
Gross motor skills

ABSTRACT

Objectives: Educator-led programs for physical activity and motor skill development show potential but few have been implemented and evaluated using a randomized controlled design. Furthermore, few educator-led programs have evaluated both gross motor skills and physical activity. Therefore, the aim of this study was to evaluate a gross motor skill and physical activity program for preschool children which was facilitated solely by childcare educators.

Design: A six-month 2-arm randomized controlled trial was implemented between April and September 2012 in four early childhood centers in Tasmania, Australia.

Methods: Educators participated in ongoing professional development sessions and children participated in structured physical activity lessons and unstructured physical activity sessions.

Results: In total, 150 children were recruited from four centers which were randomized to intervention or wait-list control group. Six early childhood educators from the intervention centers were trained to deliver the intervention. Gross motor skills were assessed using the Test of Gross Motor Development (2nd edition) and physical activity was measured objectively using GT3X+ Actigraph accelerometers. No statistically significant differences were identified. However, small to medium effect sizes, in favor of the intervention group, were evident for four of the five gross motor skills and the total gross motor skill score and small to medium effect sizes were reported for all physical activity outcomes.

Conclusions: This study highlights the potential of educator-led physical activity interventions and supports the need for further translational trials within the early childhood sector.

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1. Introduction

The preschool developmental period (which broadly encompasses 3–5 years of age) is a critical time in the establishment of physical activity.¹ However, internationally, many preschool children are not engaging in sufficient physical activity nor showing adequate mastery of gross motor skills.^{2–4} These sub-optimal levels of physical activity and motor skill proficiency are concerning given that low levels of physical activity and poor motor skill proficiency are directly related to adverse health outcomes.^{5,6}

The childcare environment has been suggested as an optimal setting for the promotion of physical activity because most 3–5 year old children attend preschools,⁷ the development of gross

motor skills is seen as a core element of preschool curricula⁸ and these settings generally have the resources and infrastructure to implement such programs.⁹ Systematic reviews have found, however, that interventions to promote gross motor skills and physical activity in childcare settings have been relatively scarce, and have generally had only modest effects.^{10,11} Additionally, most early childhood physical activity interventions have been implemented by research or external staff, or researchers and educators, which greatly reduces their external validity and potential for long-term sustainability.¹²

Educator-led programs are programs that are entirely facilitated by early childhood educators (or childcare staff), that is, they are not co-facilitated by researchers or other professionals. Such programs show potential but few have been implemented and evaluated using a randomized controlled design.¹² Furthermore, few educator-led programs have evaluated both gross motor skills and physical activity. Therefore, the aim of this study was to evaluate

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the implementation of a gross motor skills and physical activity program (*Jump Start*) when facilitated solely by childcare educators within their own center. We hypothesized that over a 6-month period children in the preschools randomized to the educator-led physical activity program would show a trend toward a greater increase in their gross motor skills and time spent in preschool-based physical activity compared with children randomized to the control group.

2. Methods

The design, implementation and reporting of this study conforms with the Consolidated Standards of Reporting Trials (CONSORT) guidelines for randomized trials.¹³ This was a 6-month, 2-arm parallel group pilot randomized controlled trial (RCT) comparing a teacher (educator)-led early childhood physical activity program (*Jump Start*) with usual care (control). Four early childhood centers were purposively selected. Centers were chosen based on similarities in size, resources, equipment and the socio-economic regions from which they drew their children (parental yearly income, education level and language spoken at home). To confirm similarity between the centers, Center Directors completed a questionnaire which included questions about resources, educator experience and training, availability of portable and fixed equipment, and additional professional development opportunities for educators. The similarity of the socio-economic regions were determined by the over-arching umbrella organization. Children aged between 3 and 5 years and their educators were invited to participate in the study. There were no exclusion criteria. Parents or guardians provided informed written consent for their child to participate and educators provided informed written consent. Early childhood centers were randomized, following baseline measurements, using a computer-based random number-producing algorithm to either the intervention group or wait-list control group. To ensure concealment, the random sequence was generated by one researcher (ADO), who assigned centers to their groups and informed another member of the research team (RAJ) of group allocation. The study was approved by the University of Wollongong Human Ethics Research Committee.

The treatment intervention (*Jump Start*) was designed in response to formative research,⁹ a proof-of-concept feasibility study and a pilot randomized controlled trial.¹⁴ *Jump Start* has previously been described.¹⁴ *Jump Start* is a gross motor skill development physical activity program, which is underpinned by Social Cognitive Theory (SCT)¹⁵ and comprises professional development for educators and structured and unstructured activities for children. Each of the personal, behavioral and environmental factors of SCT were addressed throughout the intervention. The personal factors were addressed by offering the educators an opportunity to reflect on the importance of early mastery of gross motor skills and the associated health and developmental benefits. The behavioral factors were addressed through the provision of developmental appropriate activities that encouraged mastery of the behavioral skills. Educators were provided with strategies for self-monitoring of implementation and strategies for overcoming barriers. Environmental factors were addressed at a social level by incorporating processes of modifying existing schedules and using educators to model and reinforce positive attitude toward the targeted behaviors, and at a physical level, by including strategies to increase access to and availability of resources that promoted the targeted behaviors.

In this study, the professional development workshops were facilitated by the study Project Manager (an early childhood educator, trained in *Jump Start* by RAJ) and were delivered after hours at the Head Office of the overarching organization in Hobart,

Tasmania, Australia. Educators participated in 2 × 90 min professional development workshops. The content comprised, in part, general information about gross motor skills, the importance of early mastery of gross motor skills and an overview of *Jump Start*. To increase the competence and confidence of educators, the professional development sessions incorporated a hands-on practice time for the educators. During this extended period (60 min), educators were given the opportunity to practice facilitating the components of the structured sessions. This practice time was also used to discuss perceived barriers and how they could be potentially overcome in their respective centers. Where possible, the professional development sessions were contextualized to the educators, their children and their centers. The first workshop was held the week prior to the start of the intervention and the second was held half way through the intervention.

Educators facilitated the 20-min physical activity structured lessons and the unstructured sessions three times a week in their centers. Each structured lesson focused on one gross motor skill: children were encouraged to explore the different movement concepts related to that skill (e.g., running fast or slow) and practice the skill through a series of fun activities and games. The unstructured sessions provided an additional opportunity for children to practice the skills learnt in the structured lessons.¹⁴ Implementation days differed between centers (i.e. intervention center 1 facilitated the program on Monday, Tuesday and Thursday and intervention center 2 facilitated the program on Monday, Wednesday and Friday). The Project Manager visited the centers weekly to collect the process evaluation sheets and to offer a 'listening ear' to the educators as they implemented the intervention. To enhance translation of the program, additional supporting material including program manuals, workshop booklets and video footage of the physical activity sessions were developed and used in this study. To highlight the translational nature of this study, the differences between this study and the preceding studies are detailed in the supplementary table.

The control group continued with their usual program, which included the centers' usual designated time outside for free play. The control group participated in *Jump Start* between September 2012 and December 2012 (wait-list control).

Measures were taken at baseline (prior to randomization; April 2012) and at follow-up (September 2012) on both the intervention and control participants. Trained independent assessors, blinded to group allocation, conducted all measures. The primary outcomes were gross motor skills and objectively measured physical activity.

Gross motor skills were assessed using the Test of Gross Motor Development (2nd edition), which has established validity for use with young children.¹⁶ Following a visual demonstration by a trained assessor, children performed each skill (run, jump, catch, kick and hop) twice. Children's skill performances were video recorded and later analyzed by a trained assessor, blind to group allocation, to allow greater measurement scrutiny. Each skill was scored "1" if the individual components of each skill were present and "0" if they were not. Scores for each child were calculated by totaling the correctly performed components for each of two trials for each skill. Each skill comprises 3–5 components, thus if a skill comprises 3 components the score range is 0–6 (e.g. catch), 4 components (e.g. run, jump kick) the score range is 0–8 and 5 components (e.g. hop), the score range is 0–10. To give a total score, individual scores were summed and standardized. Each trial was standardized out of 5, so that each skill had an equal weighting in the total score. The maximum total score was 50.

Physical activity was measured objectively using GT3X+ Actigraph accelerometers (Actigraph, Fort Walton Beach, Florida, USA). Each child wore an accelerometer on their right hip for two days while attending childcare (i.e. accelerometers were fitted when

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