



Community-identified strategies to increase physical activity during elementary school recess on an American Indian reservation: A pilot study

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ABSTRACT

The aim of this study was to determine the effect of an 8-week recess intervention on physical activity levels in children attending elementary school on an American Indian reservation during fall 2013.

Physical activity was measured with direct observation in three zones on the playground. Lines were painted on existing pavement in zone 1. Zone 2 had permanent playground equipment and was unchanged. Zone 3 contained fields where bi-weekly facilitators led activities and provided equipment. Pre- to post-changes during recess in sedentary, moderate physical activity, moderate-to-vigorous, and vigorous physical activities were compared within zones.

Females physical activity increased in Zone 1 (moderate: 100% increase; moderate-to-vigorous: 83%; vigorous: 74%, $p < 0.01$ for all) and Zone 3 (moderate: 54% increase, $p < 0.01$; moderate-to-vigorous: 48%, $p < 0.01$; vigorous: 40%, $p < 0.05$). Male sedentary activity decreased in Zone 2 (161%, $p < 0.01$). Physical activity changes in Zone 3 were not dependent upon the presence of a facilitator.

Simple and low-cost strategies were effective at increasing recess physical activity in females. The findings also suggest that providing children games that are led by a facilitator is not necessary to increase physical activity as long as proper equipment is provided.

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Diabetes in American Indian (AI) children has emerged as a major public health concern. From 1990 to 1998 (Acton et al., 2002), diabetes increased 71% in AIs with 3.5 years being the youngest diagnosed age (Dabelea et al., 1998). Obesity is one of the predominate risk factors for the development of diabetes (Dabelea et al., 1998; U.S. Department of Health and Human Services, 1996; Hannon et al., 2005) and studies show a rise in national obesity prevalence (Ogden et al., 2006). On the Northern Plains, 40% of AI children are overweight (Zephier et al., 2006) and 34% obese (Noonan et al., 2010), respectively. Studies report an association between sedentary activity and obesity (Gahagan et al., 2003; Wareham et al., 2005), both contributors to the diabetes epidemic (U.S. Department of Health and Human Services, 1996; Gahagan et al., 2003; Gahagan, 2003; Moore, 2010). Studies yield that children are

more sedentary than ever before (Council on Sports Medicine and Fitness and Council on School Health, 2006), but little is known about physical activity (PA) behaviors in AI children. Collectively, these data underscore the need for daily PA in AI children.

School recess can provide nearly half the minutes necessary to meet the daily PA goal of 60 minutes (Strong et al., 2005). Over the course of a school day, children spend the most amount of active time at recess (Robert Wood Johnson Foundation). That recess presents an opportunity to increase child PA, recess interventions are an ideal approach to help children achieve the recommended PA guidelines (Strong et al., 2005).

School recess interventions have utilized a variety of simple and low-cost strategies to increase child PA. Defining activity zones for daily recess activities showed a 13.1% and 9.6% increase in moderate and vigorous PA for all children (Huberty et al., 2011). Painting game lines on the playground resulted in 13.6% and 4.5% more moderate and vigorous PA for both genders (Stratton and Mullan, 2005). Others provided equipment and activity cards that instruct children how to play games that yielded a significant increase in moderate and vigorous PA (Verstraete et al., 2006). These studies were done in Wales (Stratton

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and Mullan, 2005), Belgium (Verstraete et al., 2006), and the Midwest US (Huberty et al., 2011) in non-Indian children. No recess interventions have been implemented to evaluate if similar PA improvements would occur in children living on an AI reservation.

Children provided equipment, supervision, and organized PA engage in more moderate-to-vigorous PA compared to other contextual conditions (Saint-Maurice et al., 2011). Howe et al. (2012) offered structured recess led by trained staff and report a reduction in sedentary activity and an increase in moderate-to-vigorous PA in children over the course of 9 weeks. Others provide multiple activities on the playground coupled with teacher encouragement and once-a-week teacher participation and report a significant increase in the proportion of children that engage in moderate-to-vigorous PA (Janssen et al., 2013). These studies suggest that providing equipment with facilitator-led activities may increase child PA. No studies have examined how PA levels are affected when equipment is provided, but activities are only facilitated bi-weekly for multiple weeks.

The purpose of this study was two-fold: 1) to determine changes in child PA from baseline to intervention in three different activity zones and 2) to determine differences in child PA during facilitator- and non-facilitator-led activities when equipment is provided.

Methods

Community-based participatory research approach

This study was conducted October–December 2013 (weather did not have an impact on the study as temperatures ranged from 54 °F to 18 °F (mean temperature 36.3 °F) with 0.00 inches of precipitation) with an AI tribal community in Northwestern Montana. The small reservation community has a population of less than 1000 persons (The United States Census Bureau, 2010). The elementary school (3rd–6th grade) offers one recess period per day in the afternoon for 10 minutes and follows a 4-day school week (Monday–Thursday). The study employed a community-based participatory research (Israel et al., 1998) approach that actively engaged community members in all aspects of the process. During the formative phase, 4th, 5th, and 6th grade children and adult community members identified strategies that were implemented in the recess intervention. All 3rd, 4th, 5th, and 6th grade elementary school children (approximately 150) had recess at the same time and were eligible to participate in the recess activities. Letters were sent home to parents/guardians notifying them of the recess intervention. Any parents/guardians that did not want their

child to participate in the intervention were instructed to contact the investigator—no one opted out via passive consent.

Institutional review board (IRB) approval for this study was obtained from The Rocky Mountain Tribal IRB in Billings, Montana. Additional approvals were obtained from the school board, principal, superintendent, and tribal council.

Procedure

Prior to any interventions, baseline (pre-test) PA was collected during recess for 1 week on all 3rd, 4th, 5th, and 6th grade children playing in the activity zones (described below). A camera was stationed at each zone to videotape the 10 minute recess period every afternoon. Video cameras (in the exact same location and field of view throughout the study) recorded the three zones approximately 2 minutes prior and approximately 1 minute after the bell(s) that marked the start and end of recess. The field of view of the three cameras did not cover the entire playground, thus the counts represent a sample of all children. The children were free to move between the three zones.

The Friday following baseline measures, four-square, nine-square, and hopscotch lines were painted on the concrete in Zone 1. No changes were made to Zone 2 where permanent playground equipment was located. The playground equipment consisted of slides, swings, ladders, monkey bars, and various climbing structures. Zone 3 was an open field appropriate for games such as football, soccer, and other sports. This area was used for facilitated activities every other week. Appropriate balls and equipment were available during every recess in Zone 3.

The recess intervention began in week 2. Data were collected for all children playing in the activity zones. In Zones 1 and 2, no facilitation was provided other than the painted lines on the pavement. In Zone 3, a facilitator led the first week of recess activities focusing on the same activity for the entire week. The following week, the facilitator was absent—a boundary for the prior week’s activity was defined with cones, and the equipment necessary to play the game was provided (e.g., if the facilitator played football the prior week, a football was provided the week of his absence). This bi-weekly configuration of facilitator/no facilitator continued throughout the 8 week intervention. The four activities that were offered for 2 weeks at a time were football, soccer, basketball, and ultimate frisbee (Fig. 1).

Observation instrument

The System for Observing Play and Leisure Activity in Youth (SOPLAY) was used to calculate child PA. This direct observation

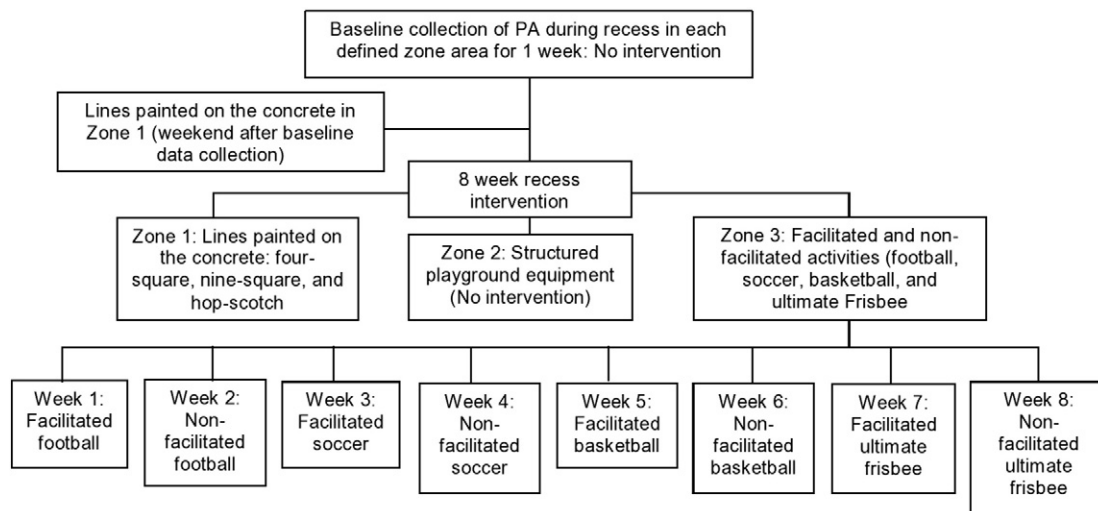


Fig. 1. Flow diagram depicting the study design and procedure.

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