

Feasibility, Acceptability, and Effectiveness of a Playground Intervention to Decrease Bullying Behavior While Increasing Physical Activity in Elementary School Children

Carlene A. Mayfield, MPH,¹ Stephanie Child, MPH,¹ R. Glenn Weaver, PhD, MEd,² Nicole Zarrett, PhD, MS³
Michael W. Beets, PhD, MPH, MEd,² Justin B. Moore, PhD, MS, FACSM^{1,4}

¹Department of Health Promotion, Education, & Behavior, Arnold School of Public Health

²Department of Exercise Science, Arnold School of Public Health

³Department of Psychology, College of Arts & Sciences

⁴Office of Practice and Community Engagement, Arnold School of Public Health
University of South Carolina



Background

The school environment represents an important opportunity for promoting prosocial behavior and physical activity (PA) in youth. The benefits of PA for youth, including physiological development, psychological well-being, and prevention of chronic disease, are well documented. One of the few opportunities for children to accumulate moderate-to-vigorous PA (MVPA) provided to children during the school day is recess. Various factors influence the amount of MVPA children accumulate during recess including both individual factors (e.g., age and sex), and environmental factors (e.g., playground size, equipment, markings, and recess structure). The recess environment also plays an important role in the facilitation or prevention of bullying behavior by promoting group play and reducing social isolation.

Purpose

Peaceful Playgrounds (P2) is an empirically supported program developed by educators to help schools increase PA, reduce injury, and reduce bullying on school playgrounds. While preliminary evaluation results suggest that P2 may be effective in these areas, these evaluations have lacked scientific rigor and examination of potential moderators of these effects. Therefore, the objective of the current study was to test the acceptability, feasibility, and effectiveness of the P2 program to increase MVPA and reduce bullying in elementary school children.

Figure 1. Markings at an Intervention School



Participants and Setting

A longitudinal, cluster-randomized design was used to assess four elementary school playgrounds including two intervention schools (I1 and I2) and two control schools (C1 and C2). The P2 program included physical environmental changes such as marked blacktop surfaces on playgrounds and provision of equipment to use with the playground markings (i.e., balls, ropes). Additionally, the physical education teachers received instruction regarding how to teach students during physical education classes on how to play games and use problem-solving skills (e.g. rock, paper, scissors) to resolve disputes both on and off the playground. Teachers and recess supervisors at the two intervention schools also received a one-hour training session on the utility of the games and how to incorporate them into recess.

Figure 2. Markings at an Intervention School



Method

MVPA and associated behaviors of students were assessed by direct observation using both the System for Observing Play and Leisure Activity in Youth (SOPLAY) and the System for Observing Children's Activity and Relationships during Play (SOCARP). The SOCARP tool was used to assess group size, activity type, and prosocial or bullying behaviors during recess periods.

Analyses

Statistical analysis was completed using Stata 12.0. For this study the vigorous activity category of the SOPLAY instrument was considered MVPA. Youth activity levels were expressed as the percentage of children engaged in sedentary behavior or MVPA in each SOPLAY scan [(children sedentary, walking, or vigorous/total children in scan)*100]. Social behaviors were expressed as the percentage of scans a behavior was observed if an interaction occurred. A total of 3588 SOCARP scans (representing 1196 child recess days) and 1766 SOPLAY scans were completed. Data were analyzed using mixed-effects regression models controlling for scans nested within days nested within schools to estimate the interaction of measurement period and treatment condition on children's activity levels and interactions.

Results

One intervention school (I2) had large and statistically significant increases in the percentage of boys (+15.5%) and girls (+20.5%) engaged in MVPA. This school also had a reduction in the percentage of girls observed in sedentary behaviors (-10.9%) but showed no statistically significant change in the percentage of boys. The other intervention school (I1), showed no statistically significant changes in boys or girls MVPA or sedentary behaviors, but boys MVPA trended in the desired direction (+5.1% increase). One control school (C1) saw a +11.5% increase in the percentage of boys engaged in MVPA and a -11.3% decrease in the percentage of boys sedentary, but no statistically significant changes in girls MVPA or sedentary behaviors. The other control school (C2) showed an +11.4% increase in the percentage of boys sedentary.

Table 1. Changes in girls and boys sedentary and MVPA and child interactions over time

School	Girls				Boys											
	Spring 2013	Spring 2014	Δ	95% CI	Spring 2013	Spring 2014	Δ	95% CI								
1 ^a	Percent Sedentary		9.0	(-5.2, 23.2)	Percent MVPA		-0.8	(-8.3, 6.7)	Percent Sedentary		1.1	(-5.9, 8.1)	Percent MVPA		5.1	(-0.3, 10.4)
	55.5	64.5			12.5	11.7			51.7	52.8			16.9	21.9		
2 ^a	Percent Sedentary		-10.9	(-21.7, -0.1)	Percent MVPA		15.5	(6.3, 24.8)	Percent Sedentary		-4.3	(-17.1, 8.5)	Percent MVPA		20.5	(9.5, 31.4)
	57.7	46.8			1.9	17.5			32.5	28.2			19.0	39.4		
3	Percent Sedentary		-7.2	(-15.6, 1.2)	Percent MVPA		4.3	(-2.2, 10.9)	Percent Sedentary		-11.3	(-18.4, -4.3)	Percent MVPA		11.5	(4.6, 18.4)
	47.1	39.9			24.0	28.3			33.4	22.0			33.2	44.7		
4	Percent Sedentary		-4.2	(-13.8, 5.4)	Percent MVPA		4.5	(-0.9, 9.9)	Percent Sedentary		11.4	(2.0, 20.8)	Percent MVPA		1.0	(-5.4, 7.3)
	59.5	55.3			14.1	18.6			42.6	54.0			13.4	14.4		
1	Prosocial Behaviors				Antisocial Behaviors											
	Verbal Supports		Physical Supports		Verbal Conflicts		Physical Conflicts									
1 ^a	37.7	29.4	-8.4	(-32.9, 16.2)	23.1	10.7	-12.4	(-28.5, 3.6)	24.7	43.0	18.2	(-13.2, 49.7)	18.6	8.1	-10.5	(-23.2, 2.1)
	63.4	46.8	-16.5	(-48.7, 15.6)	13.8	17.9	4.1	(-11.7, 19.8)	20.7	0.0	-20.7	(-29.4, -12.0)	9.5	1.5	-8.0	(-20.8, 4.9)
3	34.0	68.8	34.7	(2.1, 67.4)	19.0	13.4	-5.6	(-36.9, 25.7)	28.6	9.2	-19.3	(-38.9, 0.3)	14.7	1.1	-13.6	(-19.8, -7.5)
	35.0	25.1	-9.9	(-35.9, 16.0)	47.9	30.5	-17.4	(-44.5, 9.6)	5.6	7.1	1.6	(-10.4, 13.5)	11.1	21.4	10.3	(-7.4, 28.1)

Discussion

The present results suggest that a commercially available recess program can be effective in increasing MVPA if fully implemented. However, results demonstrate the complexity of intervention implementation. Furthermore, the results highlight the need for increased rigor within the measurement of treatment fidelity. While the P2 program showed significant but modest results in one intervention school, increased MVPA in one of the control schools indicates a possible secular trend in youth PA. However, follow-up interviews in the current study suggested that the control school that exhibited increased MVPA among the observed students may have implemented an equally effective recess program of their own. This presents an important lesson for researchers to consider when designing and conducting program evaluations. Specifically, careful implementation monitoring in both intervention and control schools is important.

Acknowledgements

Support for this research was provided by the University of South Carolina, Office of the Vice President for Academic Affairs and Provost's Social Sciences Grants Program. Additionally, Peaceful Playgrounds Inc. made an unrestricted donation of the four Peaceful Playgrounds programs and associated trainings.

