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Abstract

The Balanced Energy Physical Activity Toolkit, or the BEPA-Toolkit, supports physical activity (PA) programming via Extension in elementary schools. In a pilot study, we evaluated the effectiveness of the BEPA-Toolkit as used by teachers through Supplemental Nutrition Assistance Program Education partnerships. We surveyed teachers (*n* = 57) regarding their use of the kit and examined associations between teacher use of the kit and objectively measured PA of students (*n* = 1,103). Over 80% of responders reported that the BEPA-Toolkit provided additional opportunities for PA, and children regularly exposed to the kit were more active than those having less exposure to it. The BEPA-Toolkit may support PA opportunities in underresourced school settings.

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Introduction

Noteworthy progress has been made over the last decade in curtailing childhood obesity rates (Ogden, Carroll, Fryar, & Flegal, 2015; Ogden, Carroll, Kit, & Flegal, 2014). The positive change may reflect a shift away from efforts targeting individual child-level behavior and toward an emphasis on changing environments to support children's ability to engage in obesity-preventing behaviors (Institute of Medicine, 2012). School and family home settings likely have the greatest potential to influence child obesity, with the strongest evidence for effective

prevention programs attributable to school-based efforts (Wang et al., 2013).

A somewhat overlooked mechanism for school-based obesity prevention is the Cooperative Extension System. Extension has far-reaching links to school-based settings through several signature programs that emphasize health and nutrition education. The potential impact of Extension on obesity prevention efforts was highlighted in a joint publication from the American College of Sports Medicine, the Academy of Nutrition and Dietetics, and the U.S. Department of Agriculture (USDA). The publication cited training of Extension faculty in energy-balance programming as critical to improving the health of the public (Manore et al., 2014). Others have suggested that Extension professionals can "play an integral role" in promoting health among constituents through physical activity (PA) promotion (Gallaway & Hongu, 2015, "Conclusion"). Programs such as 4-H and Supplemental Nutrition Assistance Program Education (SNAP-Ed) have strong reputations and provide delivery systems for evidence-based obesity prevention programming with well-documented outcomes.

This article describes a pilot project that evaluated the potential for scaling up an Extension-developed, Extension-supported school-based obesity prevention resource to help educators provide more PA time for children in elementary school settings. The Balanced Energy Physical Activity Toolkit, or the BEPA-Toolkit, was designed to help SNAP-Ed nutrition educators integrate PA into their nutrition education lessons. The BEPA-Toolkit comprises a set of portable play items and activity cards that involve active games intertwined with nutrition and PA messaging for a variety of elementary school settings (classroom, recess, transitions). There is also a website with activity videos to support educators when preparation time is short. To date, the BEPA-Toolkit has been used predominantly by SNAP-Ed personnel in direct education efforts. However, to meet the emerging effort to expand SNAP-Ed's reach through strategies that influence policy, systems, and environments, Oregon Extension faculty adapted the BEPA-Toolkit implementation model to include extended education. Specifically, we created a BEPA-Toolkit train-the-teacher program that includes teacher trainings, wellness policy templates and resources, and provision of BEPA-Toolkits to schools or classrooms to keep and use on-site. This approach enhances environmental supports, promotes policy change, and adds value to direct education efforts through expanded education. The purpose of our research was to collect preliminary data regarding teachers' perceptions of BEPA-Toolkit implementation and examine the effectiveness of the implementation. Specifically, we evaluated the relationship between teachers' use of the BEPA-Toolkit and children's moderate to vigorous PA (MVPA) behaviors at school.

Methods

Our cross-sectional pilot study was nested within a larger USDA-funded study examining rural childhood obesity. All schools (n = 6) are located in rural Oregon communities (defined as having a population of less than 10,000) in three counties (two schools per county). At least 50% of enrolled students at all schools were eligible for free or reduced-price school meals. BEPA-Toolkits were distributed to the six participating elementary schools between December 2013 and February 2014. Eight months after the BEPA-Toolkit distribution and training (fall 2014), we collected self-report data from teachers about their use of the BEPA-Toolkit and their perceptions of its effectiveness in providing more opportunities for children to participate in school-day PA and we objectively measured children's PA behaviors during the school day.

BEPA-Toolkit Intervention Design

To determine the most effective implementation model for a train-the-teacher approach, we tested two implementation designs: Model 1 and Model 2. Three schools (one school in each county) were randomized to

each condition (Model 1 or Model 2). In Model 1 (low support), schools were provisioned with one BEPA-Toolkit per *grade* (kindergarten through grade 6, maximum of seven BEPA Toolkits per school) and a commitment of support from Extension educators (e.g., Extension faculty/staff were available to answer questions and conduct BEPA-Toolkit trainings). In Model 2 (high support), schools received one kit for each *classroom* (kindergarten through grade 6), on-site professional development training on implementing PA breaks using the BEPA-Toolkit, and, as with Model 1, a commitment of support from Extension educators (e.g., Extension faculty/staff were available to answer questions and conduct additional BEPA-Toolkit trainings). The initial on-site BEPA-Toolkit training used in the Model 2 approach was 1 hr and included a scripted presentation, hands-on activities, and handouts to support teacher continuing education on classroom PA breaks and school-based PA wellness policies. Although kindergarten teachers received BEPA-Toolkits, they were not included in the pilot study due to variation in full-day versus half-day kindergarten across the study sample. In practice, four schools received the Model 2 implementation, and two schools received Model 1. This situation occurred because one school in the Model 1 group was small and had only one classroom per grade, thus resulting in all teachers getting a BEPA-Toolkit.

Teachers' Use of the BEPA-Toolkit and Perceptions of Its Effectiveness

We created a brief self-report survey to gather data about teachers' use of the BEPA-Toolkit. The survey included questions addressing training and access, BEPA-Toolkit use, and perceptions of BEPA-Toolkit effects on children's PA behaviors. Teachers' access to the BEPA-Toolkit was established through the survey item "What is your access to the BEPA-Toolkit?" Response options were "I don't have access to the BEPA-Toolkit," "we have a toolkit available at our school," and "I have a toolkit in my classroom." The survey item addressing BEPA-Toolkit use asked how often teachers used the BEPA-Toolkit and included five response options: "never," "<1 time/month," "1–3 times/month," "1–4 times/week," and "almost every day." Teacher perceptions of BEPA-Toolkit effectiveness were measured through the single dichotomous item "Does the BEPA-Toolkit provide extra physical activity opportunities that children otherwise would not have?" Response options were "Yes" and "No." The survey was intentionally brief and simple to minimize teacher burden.

PA Assessment

PA was measured on four consecutive school days during the hours children attended school in fall 2014. PA assessment coincided with distribution of the BEPA-Toolkit teacher survey. We used Walk4Life MVP pedometers (Walk4Life Inc., Oswego, IL) to collect PA data. Classroom teachers were trained to help children put on and take off the pedometers and to log noncompliance, daily wear time (minutes per day), and school attendance. Children wore the pedometers for the entire school day, putting them on when they got to their classrooms in the morning and removing them before leaving at the end of the school day. Each child wore the pedometer on his or her right hip, attached by an elastic belt. The MVP pedometer is a validated device that records all activity and can differentiate PA minutes at or above a specified step rate (Beets et al., 2011). The devices enabled us to measure time spent in total PA (TPA) (light, moderate, and vigorous activity) and time spent in MVPA. MVPA included all activity involving a step rate equal to or greater than 120 steps per minute. Due to variations across schools regarding full-day versus half-day kindergarten programs, PA data were collected on children in grades 1–6 only.

Data Analysis

Stepwise multiple linear regression models were used to associate teacher access to and use of the BEPA-Toolkit with child MVPA levels. The following variables were included in the model: type of access (no access, school access, classroom access), teacher self-reported use of the BEPA-Toolkit, and teacher participation in BEPA-Toolkit training. All models were adjusted for child sex, grade, pedometer wear time average, child body mass index (BMI) status, child weekly attendance, and school.

Results

The survey was distributed to 75 classroom teachers (grades 1–6) from the six participating elementary schools in rural Oregon communities. Of those teachers, 57 completed the survey, resulting in a 76% response rate and a reasonable representation of teachers across grades. Among teachers responding to the survey, 9% reported that they did not have access to a BEPA-Toolkit, 25% reported having a BEPA-Toolkit at the school but not in the classroom, and 66% reported having a BEPA-Toolkit in the classroom. Data related to BEPA-Toolkit use reflected how often teachers implemented BEPA-Toolkit activities after receiving the kit. Of those responding to the survey, 45.6% reported that they never used the BEPA-Toolkit, 14% indicated that they used it less than once a month, 28% reported using it one to three times per month, 10.5% reported using it one to four times per week, and 1.7% reported using it nearly every day. For the purposes of examining the association between BEPA-Toolkit use and child school-day PA, the five response categories for use of the kit were collapsed into three categories: never use, sometimes use (less than one time per month, one to three times per month), and regularly use (one to four times per week, almost every day).

The final sample of children included 1,103 students enrolled in classrooms of the 57 teachers who returned the BEPA-Toolkit survey. There were equivalent distributions of children across grades 1–3 and grades 4–6 (Table 1). Forty-four percent of children (*n* = 487) were in classrooms of teachers who reported that they never used the BEPA-Toolkit; 44% (*n* = 483) were in classrooms of teachers who reported that they sometimes used the BEPA-Toolkit; and 12% (*n* = 133) were in classrooms of teachers who reported that they regularly used the BEPA-Toolkit. Table 1 shows the distribution of children across grades, mean ages, average steps per day, average TPA minutes per day, and average MVPA minutes per day.

Table 1.

Sample Descriptive Statistics Characterized by Teachers' Use of the BEPA-Toolkit

	Never use (26 teachers)		Sometimes use (24 teachers)		Regularly use (7 teachers)	
Variable	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Grades 1–3						
Number (total = 549)	86	80	136	134	60	53
Mean age (years)	7.3	7.2	7.7	7.5	7.7	7.5
Average steps per day	4,801	4,097	4,813	4,429	5,246	4,546
Average TPA[a] (min/day)	46.2	42.9	50.3	48.2	55.2	47.6
Average MVPA[b] (min/day)	20.6	19.5	21.6	19.4	20.5	20.7
Grades 4–6						

Number (total = 554)	174	147	115	98	10	10
Mean age (years)	10.5	10.4	10.2	10.2	11.6	11.8
Average steps per day	4,920	3,829	4,815	3,667	6,384	4,772
Average TPA (min/day)	51.1	39.6	52.5	40.6	65.1	49.8
Average MVPA (min/day)	16.8	13.4	19.7	14.7	19.9	17.2

aTPA = Total physical activity (includes minutes of light, moderate, and vigorous activity). bMVPA = moderate and vigorous physical activity.

Stratifying BEPA-Toolkit use by type of access (classroom vs. school), we found that 56.7% of teachers who had a BEPA-Toolkit in the classroom reported using it one to three times per month or more. On the other hand, among teachers who did not have a kit in the classroom, 78% never used it, 16% implemented the activities less than one time per month, and 5% used it one to three times per month. These findings suggest that proximity and the ease of implementation afforded by having the resource in the classroom influenced use of the BEPA-Toolkit. When teachers were asked whether they perceived that using the BEPA-Toolkit provided children opportunities for PA that they otherwise would not have had, 82.5% of teachers responded yes. This perception is supported by the objectively measured PA data.

To understand how teachers' use of the BEPA-Toolkit related to children's MVPA at school, we conducted regression analyses examining category of BEPA-Toolkit use and amount of MVPA accrued by children in respective classrooms. We controlled for sex, grade, average daily pedometer wear time, BMI category (healthy, overweight, obese), number of days in attendance during the data collection period (1, 2, 3, or 4 days), and school. The model is significant—adjusted R^2 = .122, $F(19, 1083) = 9.02$, $p < .001$—indicating a relationship between BEPA-Toolkit use and children's PA. In addition, results indicate that the boys were more active than the girls ($p < .001$); that the children in grade 1 were more active than the children in grade 2 ($p = .003$), grade 3 ($p = .028$), and grades 4–6 ($p < .001$); and that obese children were less active than children with healthful weights ($p = .007$) (Table 2). Using "school" as a proxy for BEPA-Toolkit access and BEPA-Toolkit training, we observed no associations between access and training and child MVPA levels. After we accounted for all these factors and the variable wear time, results showed that children in classrooms of teachers who sometimes used and regularly used the BEPA-Toolkit were more active than children in classrooms of teachers who never used the BEPA-Toolkit (Table 2).

Table 2.

Results of Regression Analyses of BEPA-Toolkit Use and MVPA

Variable	**Coef.**	***P>|t|***
Use (never useda)		
Sometimes used	**1.3**	**.035**
Regularly used	**2.3**	**.027**
Sex (malea)	2.6	**.000**

Grade (grade 1[a])		
2	−2.7	**.003**
3	−2.1	**.028**
4	−5.4	**.000**
5	−6.4	**.000**
6	−5.1	**.000**
Pedometer wear time	0.05	.000
BMI category (healthy[a])		
Overweight (>85th percentile to <95th percentile)	−1.3	.074
Obese (>95th percentile)	−1.7	.007
Week attendance (1 day[a])		
2 days	0.1	.9
3 days	−1.5	.9
4 days	−0.7	.9
School (1[a])		
2	−0.9	.3
3	−1.1	.2
4	1.6	.08
5	2.1	.07
6	1.4	.3
Constant	2.04	.753

Note. MVPA = moderate and vigorous physical activity. BMI = body mass index. Bold text denotes statistically significant results.
[a]Reference category for comparisons.

Discussion

An Extension-supported school-based approach to obesity prevention involving use of the Extension-developed BEPA-Toolkit may help teachers provide more PA opportunities for children during the school day. Greater opportunities are likely afforded by the train-the-teacher approach, which provides a significant increase in the number of PA supports available on-site at schools that receive BEPA-Toolkits and training. When teachers can access a BEPA-Toolkit at the school, as opposed to having to rely on Extension to deliver programming, they

have more opportunities to use the kit, and, by default, they provide more opportunities for children to be active during the school day. Further, the activities included in the BEPA-Toolkit are embedded with health messages, enhancing Extension's direct education efforts via multiple additional exposures to nutrition and PA messaging in addition to providing more opportunities for children to practice being physically active.

Of greater importance is that children seem to accrue more health-promoting MVPA during the school day when teachers use the BEPA-Toolkit. We found that children in classrooms of teachers who use the BEPA-Toolkit performed more MVPA than children in classrooms of teachers who did not use it. Though the measured differences in MVPA between groups were small (~1–3 min/day more MVPA among children in classrooms of "users"), in previous work, members of our research group found that a 3-min difference in MVPA over the school day was associated with lower BMI levels among rural elementary-school-aged children (Gunter, Abi Nader, & John, 2015). That study also showed that Oregon rural elementary school children exhibit low levels of PA at school (<60 min/day of TPA and <20 min/day of MVPA) (Gunter et al., 2015). Thus, we contend that any resource that supports more PA, and particularly more health-promoting MVPA, may be beneficial.

There are, however, limitations to our study that must be considered. Of primary concern is that we are unable to attribute the measured PA time directly to observed use of the BEPA-Toolkit. Rather, we are associating teachers' typical use of the BEPA-Toolkit with a single week of PA assessment. Nonetheless, this measured variable is associated with reported use and is corroborated by teachers' perceptions that using the kit translated to their students' being more active. Although there is more work to do in verifying the effectiveness of using the BEPA-Toolkit as a strategy for obesity prevention, preliminary data are promising.

Resources such as the BEPA-Toolkit may be particularly useful for schools serving low-income populations. Schools served by Extension, particularly via SNAP-Ed, are often located in underresourced school districts where funding for regular physical education (PE) programming is limited (Pasad & Lewis, 2006). Thus, the potential value of a resource such as the BEPA-Toolkit may spread beyond an Extension obesity prevention program. The fact that low-income children are more likely to see recess and PE cut from their school days due to pressures to reduce academic disparities (Milteer et al., 2012) is in direct conflict with research suggesting that mandatory PE and classroom activity breaks are strategies that not only provide the largest contributions to increases in children's MVPA levels (Bassett et al., 2013) but also positively influence academic achievement (Centers for Disease Control and Prevention, 2010). Among schools providing PE, few meet the nationally recommended minimum of 150 min/week at the elementary level (National Association for Sport and Physical Education and American Heart Association, 2012); even when schools have robust PE programs, it is rare that children spend the recommended 50% of PE class time in MVPA (UCLA Center to Eliminate Health Disparities and Samuels and Associates, 2007). Thus, any opportunity to add more structured activity may be welcome, particularly if it does not require a PE specialist. Here, too, is a place where Extension can be a strong partner for change.

In Oregon, Extension professionals involved with the Family and Community Health and SNAP-Ed programs are marketing the BEPA-Toolkit as a resource for helping schools meet the minimum 150 min/week of structured PA necessary to comply with PE programming requirements. At the elementary level, structured PA time led by a licensed classroom teacher may be counted toward PE minutes and does not require a PE specialist. This circumstance translates into an opportunity for Extension to act as a viable partner by training teachers to effectively use the BEPA-Toolkit, increase PA opportunities, lead structured PA time, improve PA behaviors, and meet state-mandated PE requirements. This ecological approach is emergent within Extension (Fitzgerald & Spaccarotella, 2009), and the BEPA-Toolkit resource and concomitant train-the-teacher implementation model adds another option to the proverbial toolbox Extension professionals can adopt.

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