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RESEARCH ARTICLE

Association of Teacher-Level Factors With Implementation of Classroom-Based Physical Activity Breaks

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ABSTRACT

BACKGROUND: Classroom-based physical activity (CBPA) breaks are a common strategy to increase elementary school children's physical activity (PA) levels. There is limited research examining how teacher-level factors impact teacher implementation of CBPA breaks. In this study, we assessed the relationship of teacher-level factors with teacher use of a CBPA resource.

METHODS: We randomized 6 elementary schools in rural Oregon into control (N = 3) or intervention (N = 3) conditions. Each teacher at intervention schools received the CBPA resource. Teachers at control schools received 1 CBPA-Toolkit per grade level to share, and received no training. We surveyed teachers on their use of the toolkit, implementation support and self-efficacy, and value for PA. Logistic regression was used to examine the odds of toolkit use by teacher-level factors.

RESULTS: Among survey respondents (N = 83), 57% were self-identified toolkit users and 48% attended a training. Training participation and teacher implementation self-efficacy were associated with greater odds of using the toolkit (odds ratio, OR = 7.76 [95% confidence interval, CI = 1.39-43.19] and OR = 5.54 [95% CI = 1.24-23.87], respectively).

CONCLUSION: CBPA tools supported with training aimed at developing teachers' implementation self-efficacy increased the likelihood of teachers employing CBPA tools.

Keywords: physical activity; classroom-based physical activity.

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In the United States, low physical activity (PA) levels in children aged (6-11 years) are currently one of public health's most concerning health indicators.¹ Just 42% of children meet the PA guidelines of 60 minutes a day of moderate-to-vigorous PA (MVPA),^{2,3} and evidence suggests that fewer rural children meet these guidelines as compared to non-rural children.⁴⁻⁶

Efforts to address low PA levels have been most successful when implemented at schools.^{2,7-9} Using

Comprehensive School Physical Activity Programs (CSPAP) has the largest potential for impacting children's PA levels.^{7,10} For instance, combining CSPAP components (before and after school programming, physical education [PE], PA during academic classes, family and community involvement, and school staff engagement) were found to increase the odds of children meeting the PA guidelines 3-fold.¹⁰ Ideally, schools would implement all components of CSPAP, but in practice schools often lack the necessary

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funding and staffing resources to implement multiple PA promotion strategies.¹¹⁻¹³ Evidence indicates that rural schools are less resourced than their non-rural counterparts.¹⁴⁻¹⁶ For example, rural schools provide fewer opportunities for PA and are less likely to offer PE compared to nonrural schools.¹⁵ Therefore, interventions aiming to promote PA at rural schools cannot expect to use every CSPAP component and must consider the challenges associated with resource allocation.¹²

Among components of CSPAP, evidence supports that mandatory PE and CBPA breaks provide the largest contributions to increases in daily MVPA levels (23 and 19 minutes, respectively).¹⁷ In addition, CBPA breaks are considered the most cost-effective alternative that schools with fewer resources can adopt and implement as a PA promotion strategy.^{12,18,19} Furthermore, evidence suggests that teachers endorse the use of CBPA breaks to overcome the challenges and barriers of PA promotion at schools.²⁰ Teachers have used CBPA breaks throughout the day to increase PA in the following ways: (1) during transitions (ie, the time between academic sessions); (2) as brain breaks (ie, breaks taken during academic lessons to relax the brain); (3) integrated with academic lessons (ie, PA break provided to support academic instruction); and (4) as purposeful active time (ie, scheduled PA break to support accumulation of PA). CBPA breaks have been associated with increased PA levels, improved health outcomes, and maintained or improved academic performance.^{12,20-35}

To maintain the positive effects of CBPA breaks on children's outcomes, sustainable implementation must be a priority. Teachers are responsible for implementing CBPA breaks and their perceptions and beliefs about their roles in PA promotion predict the success or failure of these PA breaks.³⁶ Thus, it is important to have their full support for interventions that use CBPA breaks.^{36,37} In addition, interventions implemented in practice may not be implemented as intended in research settings.³⁸ For example, teachers may adopt a CBPA program, but make adjustments to the program that could reduce its effectiveness.³⁶ Given these considerations, it is critical to understand which teacher-level factors are associated with teachers' use of CBPA breaks.

A number of investigations have included teacher-level factors that relate to teachers' implementation of CBPA breaks.³⁶ Results from these studies revealed 7 distinct factors: (1) resource availability;²³ (2) implementation self-efficacy;^{23,26,39} (3) appropriate training;^{23,26,39} (4) years of teaching experience;⁴⁰ (5) academic and scheduling constraints;^{23,39,41-44} (6) supportive school environments;^{39,43,45,46} and (7) perceived value for PA.^{41,45} However, these teacher-level factors were derived from investigations that lacked external validity due to small sample sizes,^{26,40-43,47} or

had nongeneralizable samples (eg, sample investigated were not in-service teachers, but instead were pre-service teachers).^{43,48,49} Furthermore, none of these studies investigated the collective association of the 7 factors with teachers' implementation of CBPA breaks. This is relevant in that associative models may reveal, for example, that teachers' access to resources has a strong positive relationship with use of CBPA breaks, while teachers' perceived value for PA may not have a strong association with the outcome. Equally important to note, despite the challenges experienced by rural and nonrural schools, none of the published studies reported their results separately for these 2 settings. Understanding the association of teacher-level factors with teacher's implementation of CBPA breaks in rural schools is essential to effectively tailor CBPA training for teachers.

Our purpose was to investigate the collective relationship of teacher-level factors with the implementation of the Balanced Energy, Physical Activity Toolkit (BEPA-Toolkit). We hypothesized that after adjusting for covariates, the following teacher-level factors will increase the odds of BEPA-Toolkit use: (1) access to a BEPA-Toolkit; (2) self-efficacy in implementing the BEPA-Toolkit; (3) participation in professional development; (4) teacher's perceived value for PA; and (5) supportive school environment.

METHODS

Participants

Participants were teachers from 6 rural elementary schools in Oregon. Overall, 88 teachers who taught in K-6 and special education were invited to participate. All teachers received a copy of the BEPA-Toolkit survey. By responding to the survey, teachers provided their consent. Of those teachers, 83 returned fully or partially completed surveys for a response rate of 94.3%.

Instrumentation

BEPA-Toolkit. The BEPA-Toolkit was developed by researchers from Oregon State University (OSU) to assist teachers in leading PA breaks across the school day.⁵⁰ The BEPA-Toolkit includes 61 activity cards, a music and dance DVD, and a variety of portable play items. Each activity card in the BEPA-Toolkit is paired with a nutrition message based on the 2010 dietary guidelines for Americans.⁵¹ Information presented on activity cards includes: (1) best setting for implementing activity (indoor or outdoor), suggested grade level, and expected duration; (2) preparation and equipment needed for activity; (3) activity instructions with suggestions for discussions; and (4) nutrition and PA messages.⁵⁰

BEPA-Toolkit survey. The BEPA-Toolkit survey was specifically created and adapted from other surveys to address the questions of this investigation. The survey contained 26 items divided into 5 sections: (1) years of teaching experience; (2) BEPA-Toolkit questions ($N = 10$); (3) questions regarding the perceived importance of PA ($N = 2$); (4) questions related to teacher's self-efficacy to implement the BEPA-Toolkit ($N = 4$); and (5) questions about perceived school supports for the implementation of CBPA breaks ($N = 9$). The support questions were adapted from previously published work.⁴⁶ All other questions were developed by the authors based on relevant literature.^{26,39,52} Survey questions were reviewed by experts in survey measurement including an expert in exercise psychology. Surveys were then cognitively tested by a convenience sample of early childhood educators who were familiar with the BEPA-Toolkit and had used it on numerous occasions. We made changes to the instrument based on feedback from cognitive testing to better capture the concepts we intended to measure. For example, one item originally read "How important is it to you to encourage elementary school children to become more physically active?" and this item was changed to "How important is it to you that your students become more physically active?" Survey questions were scored 1 to 4 or 1 to 5, with the largest numbers being the more positive answer.

Procedure

This study was nested in a multiyear, multilevel, childhood obesity project titled Generating Rural Options for Weight Healthy Kids and Communities (GROW HKC).⁵³ Within GROW HKC's efforts, 6 elementary schools were randomized into control ($N = 3$) or intervention ($N = 3$) conditions.⁵⁴ In winter 2014 and 2015, GROW HKC distributed the BEPA-Toolkit to every teacher at intervention schools, while control schools received 1 BEPA-Toolkit per grade level. In addition, teachers in intervention schools received in-person training by BEPA-Toolkit trainers on how to implement the Toolkit as a CBPA break, while control schools did not receive training. With this distribution and training scheme, GROW HKC researchers intended to learn if different levels of support impacted adoption of the BEPA-Toolkit. Intervention school teachers were trained to use the BEPA-Toolkit in 1 or 2 sessions based on school schedules. Training duration ranged from 60 to 90 minutes, though the training content was similar across all schools. The same training script was provided to all trainers. The script and accompanying presentation were divided into 3 parts: (1) information about PA at school; (2) teachers' roles in promoting PA at school; and (3) implementing CBPA breaks. In addition, teachers received informational materials to

increase their awareness and understanding around PA promotion for children. Informational materials included an infographic depicting PA status of Oregon children, factsheets and research briefs about relevant school-based PA promotion strategies and related outcomes, and school wellness policy templates that would support the provision of CBPA breaks.

The cross-sectional data collection for this study occurred in fall 2015. Researchers visited each school for 1 week to conduct multiple assessments including the BEPA-Toolkit survey. Each teacher received a hard copy of the survey and was subsequently prompted with up to 3 reminders to complete the survey. On the last day of the site visit, teachers who still had not turned in their survey were invited to complete the survey one last time electronically. At the end of data collection, all teachers received classroom PA promotion materials—specifically a DVD containing Brain Breaks—in appreciation for their participation.

Data Analysis

Descriptive statistics. We used frequency distributions to describe sample data on access to BEPA-Toolkit, participation in BEPA-Toolkit training, and use of the BEPA-Toolkit. In addition, the following teacher-level factors were characterized with summary statistics (means, standard deviations, and range): 2 PA importance variables, 4 self-efficacy variables, and 9 school support variables.

Proportion comparisons. Pearson's chi-square test was used to investigate if BEPA-Toolkit-specific questions (eg, access, training, etc) varied significantly by grade level or teaching experience. To ensure adequate sample sizes in each level of these teacher-level factors, we created a binary variable for grade level (K-3 and grades 4-6). In addition, to compare variables of interest by teaching experience, we transformed teaching experience into a 4-level categorical variable (0-5, 6-10, 11-15, and 16 or more years). Pearson's chi-square tabulation was limited to the following teacher-level factors: participation in a training, access to BEPA-Toolkit, and BEPA-Toolkit use. Exploratory factor analysis was conducted with the 15 variables representing teacher-level factors to regroup individual items into fewer clusters. A factor loading of at least 0.3 was used to eliminate items that did not fit into the scale.⁵⁵ Clusters of teacher-level factors were generated as average scores of single items. Internal consistency of clusters with at least 3 variables was evaluated with Cronbach's alpha.

Associative model. We used a logistic regression model to associate the aggregated teacher-level factors in addition to teacher training, access to the BEPA-Toolkit, and teaching experience with use of the BEPA-Toolkit. To conduct the logistic regression analysis, we transformed the categorical variable for frequency

of BEPA-Toolkit use to a binary-dependent variable (used vs never used). Teacher-level factors that served as independent variables in the model were self-efficacy, classroom environment, school policies, perceived PA value, and years of teaching experience. All data management and analysis processes were completed in Stata IC/14.1 (StataCorp. 2015. Stata Statistical Software: Release 14. StataCorp LP, College Station, TX).

RESULTS

Study Sample

The final sample included 39 teachers from control schools and 44 teachers from intervention schools. The mean years of teaching experience was 13.1 ± 10.8 , ranging from teachers in their first year of teaching to those that have been teaching for 38 years. Among all teachers, 48.2% reported receiving BEPA-Toolkit training. Although they received no direct training, 38.4% ($N = 15$) of teachers at control schools reported receiving BEPA-Toolkit training. However, the BEPA-Toolkit does include written instructions for implementers. Among intervention school teachers, 43.1% ($N = 19$) reported not receiving BEPA-Toolkit training. Although BEPA-Toolkit trainings were provided, teacher unavailability for the scheduled trainings, trainings occurring before teachers were hired, and other unreported reasons explained teachers' nonparticipation. Among survey respondents, 60.5% reported having access to a BEPA-Toolkit in their classroom, 30.8% reported having access to a BEPA-Toolkit at their school, and 8.6% reported having no access. Finally, 42.7% of teachers reported never using the BEPA-Toolkit, 32.9% reported using the BEPA-Toolkit less than once per month, 15.8% reported using the BEPA-Toolkit 1 to 3 times per month, 7.3% reported using the BEPA-Toolkit 1 to 4 times per week, and 1.2% reported using the BEPA-Toolkit nearly every day. Table 1 shows summary statistics for teachers' response on the 15 items representing teacher-level factors.

Proportion Comparisons

One third (32.5%) of participating teachers had less than 5 years of teaching experience, 19.3% had 6 to 10 years of teaching experience, 14.5% had 10 to 15 years of teaching experience, and 33.7% had more than 16 years of teaching experience. Differences in proportions for participation in training, access to BEPA-Toolkit, and usage of BEPA-Toolkit were not statistically significant by grade level. In post hoc analysis, bivariate association between grade level and BEPA-Toolkit was negative (-0.04) and statistically insignificant ($p = .71$). As such, we excluded grade level from any subsequent analysis.

Similarly, proportions for participation in BEPA-Toolkit training and BEPA-Toolkit use did not vary significantly by years of teaching experience. However, proportions for access to the BEPA-Toolkit varied significantly ($p < .01$) by years of teaching experience. For example, the largest proportion (36.7%) of teachers reporting having access to a BEPA-Toolkit in their classroom had fewer than 5 years of teaching experience, while 14.3% of teachers who reported having access to a BEPA-Toolkit in their classroom had 10 to 15 years of teaching experience.

Factor Analysis

The factor analysis revealed a 4-factor solution and 1 item (*The materials I have in the BEPA-Toolkit are enough to provide physical activity opportunities for my students*) was dropped from further analysis because its loadings were below 0.3 on all factors.⁵⁵ Four clusters of items measuring similar concepts were created: (1) importance of PA (for students and teachers); (2) self-efficacy (confidence in PA knowledge, ability, demonstration, and management); (3) classroom environment (classroom obstacles, space, modifiability, student behavior, and other PA materials); and (4) school policies (support from the administration, academic expectations, and scheduling constraints). Cronbach's alpha ranged from acceptable to excellent and was calculated for clusters of at least 3 variables. The alpha of the self-efficacy items was of good level (0.84) and the alphas of items measuring school policies and classroom environment were of acceptable levels (0.68 and 0.76, respectively).

Associative Model

Table 2 shows the results of the logistic regression. Among all teacher-level factors, participating in a workshop and self-efficacy had the largest positive associations with using the BEPA-Toolkit. Controlling for all other variables in the model, the odds ratio (OR) of using the BEPA-Toolkit was $OR = 7.76$ (95% confidence interval, $CI = 1.39-43.19$) for teachers who reported participating in a training and $OR = 5.44$ (95% $CI = 1.24-23.87$) for teachers who identified as having higher self-efficacy. Additionally, school policies were associated with $OR = 0.07$ (95% $CI = 0.01-0.47$) times the odds of using the BEPA-Toolkit. The associations for all other teacher-level factors were not statistically significant (Table 2). However, adjusting for the group condition revealed a statistically significant association for intervention schools.

DISCUSSION

Enabling students' PA through CBPA breaks is dependent on teachers' thoughts and behaviors.³⁶

Table 1. Summary Statistics for Physical Activity (PA) Importance, Self-Efficacy, and Support Variables

Variables	Mean	SD
Teacher perceived PA importance		
1. How important is it to you that your students become more physically active?	3.5	0.6
2. How important is it to you that you be physically active?	3.5	0.7
Teacher self-efficacy		
3. How confident are you in your knowledge of the BEPA-Toolkit activities?	1.9	0.8
4. How confident are you in your ability to guide your students through BEPA-Toolkits activities?	2.1	0.8
5. How confident are you in your ability to demonstrate BEPA-Toolkit activities to your students?	2.1	0.8
6. How confident are you in your ability to manage students' behavior during physical activity time?	2.9	0.8
Supportive conditions for PA implementation		
7. Overall, my school administration poses a barrier to providing physical activity opportunities for my students. ¹	3.5	0.7
8. There are too many physical obstacles in my classroom for me to provide physical activity opportunities for my students. ¹	2.6	0.8
9. Academic expectations make it hard for me to provide physical activity opportunities for my students. ¹	2.1	0.8
Supportive conditions for PA implementation		
10. I do not have enough space in my classroom to provide physical activity opportunities for my students. ¹	2.5	0.8
11. Excluding the BEPA-Toolkit, I have enough materials to provide physical activity opportunities for my students.	2.4	0.7
12. My student's behavior make it easy for me to provide them with physical activity opportunities.	2.6	0.7
13. My classroom environment can be easily modified to provide physical activity opportunities.	2.6	0.6
14. The school schedule allows me to provide physical activity opportunities for my students.	2.4	0.7
15. The materials I have in the BEPA-Toolkit are enough to provide physical activity opportunities for my students.	2.7	0.7

All variables were scored on a 4-point scale. PA importance variables ranged from "Not Important at all" to "Very Important." Self-efficacy variables ranged from "Not Confident at all" to "Very Confident." Support variables ranged from "Strongly Disagreeing" to "Strongly Agreeing." Support statements that are denoted with ¹ were coded so that the most positive answer would have a larger score (Strongly Disagreeing = 4, whereas Strongly Agreeing = 1).

Table 2. Summary of Logistic Regression: Association of Teacher-Level Factors (N = 77) With BEPA-Toolkit

Variables	Odds ratio	95% Confidence interval
No access to BEPA-Toolkit [†]		
BEPA-Toolkit at school	0.33	0.01-11.40
BEPA-Toolkit in classroom	1.38	0.07-25.37
Control [†]		
Intervention	13.93	1.31-147.91
No training [†]		
Training	7.76	1.39-43.19
Implementation self-efficacy	5.44	1.24-23.87
Classroom environment	2.42	0.46-12.67
School policies	0.07	0.01-0.47
PA importance	1.41	0.39-5.00
Number of years of teaching experience	1.00	0.93-1.07
Constant	0.17	0.00-72.71
Chi-square test		50.26
df		9
% BEPA-Toolkit users		56.63

[†]Denotes a reference category; statistically significant results are bolded.

Nonetheless, research investigating which teacher-level factors are associated with implementation of CBPA interventions is lacking. Therefore, we sought to evaluate the collective association of 7 teacher-level factors with teachers' implementation of a CBPA tool. We hypothesized that access to a CBPA tool, self-efficacy, participation in professional development, teacher's perceived value for PA, and a supportive school environment (ie, school policies and classroom environment) would be associated with teacher's implementation of the BEPA-Toolkit. In addition, we accounted for years of teaching

experience as a potential confounder. We found that self-efficacy and participating in training were positively associated with using the BEPA-Toolkit, while school policies were negatively associated with using the BEPA-Toolkit. No other teacher-level factor had a statistically significant association with BEPA-Toolkit use.

We found that teachers who participated in a training and who were more self-efficacious were more likely to use the BEPA-Toolkit. Specifically, teachers who participated in a training had 7.76 times higher odds of using the BEPA-Toolkit than those without training. In addition, teachers who were more self-efficacious in implementing the BEPA-Toolkit had 5.44 times higher odds of using the BEPA-Toolkit. Previous literature suggested that teachers who participate in a training reported higher self-efficacy to use CBPA tools,^{23,26,39} but did not investigate the association of the aforementioned teacher-level factors with implementation of CBPA tools. Our results add to the current literature by providing evidence that participation in a training and higher perceived self-efficacy were positively associated with using CBPA tools. In our sample, 80% of trained teachers reported using the BEPA-Toolkit, whereas 35.7% of non-trained teachers reported using the BEPA-Toolkit. In addition, 83.3% of high self-efficacious teachers used the BEPA-Toolkit, while 49.1% of low self-efficacious teachers utilized the BEPA-Toolkit. Our findings suggest that to be successful, CBPA programs must have a training component that enables and strengthens teachers' self-efficacy for implementing these programs.

Another important result from this study was that school policies (ie, aggregate of academic expectations, administration as barrier, and school schedule) were negatively associated with BEPA-Toolkit implementation. Specifically, teachers who reported less concern with school policies were 92% less likely to use the BEPA-Toolkit. This result is intriguing, especially when the literature presents academic expectations, school schedules, and administrative support as some of the more challenging school-level barriers to overcome for CBPA implementation.^{23,39,43,46,56} Therefore, when teachers report less concern with these barriers, one might expect to observe an increase in the likelihood of CBPA implementation. This result may be explained with several factors. The interpretation of each item represented under school policies may have been flawed. As Table 1 shows, 2 of the items used in the school policies variable were worded with a negative tone. One item read: "Overall, my school administration poses a barrier to providing physical activity opportunities for my students." Disagreeing with the statement that the "school administration poses a barrier" does not imply that the school administration is actively supporting the promotion of physical PA during class time. Previous research found that perceived support from school administrators was related to implementation of new initiatives.⁴⁶ In addition, research found that teachers were not sure if their school administration was supportive or not of CBPA breaks.⁵⁷ As such, it may be that although the administration did not block PA promotion, they were not actively supporting it. Furthermore, in the case of school schedule the item was "The school schedule allows me to provide physical activity opportunities for my students." Whereas the school schedule may have been flexible, it is likely that teachers lacked the time outside the school schedule to prepare and plan for the implementation of CBPA breaks.

Despite constraints that teachers experienced, it may be that they were motivated by other factors to implement the BEPA-Toolkit. Previous research hypothesized that teachers who feel limited in providing PA by school policies may be driven to overcome external constraints by an internal value for their students' PA.^{22,41,45} Based on previous research, we considered that teachers who value PA for themselves might be driven to implement CBPA breaks.^{45,58,59} In this study, we combined teachers' PA values for their students and for themselves into a single variable. We did not find that teacher's perceived value for PA was associated with implementation of CBPA breaks. It may be that the 2 different types of perceptions should have been kept as separate indicators. However, our sample was not sufficiently large to conduct these associations. In addition, it is possible that when combined with other teacher-

level factors a teacher's perceived value for PA is not as critical as other factors for the implementation of CBPA breaks. For example, regardless of their feelings toward PA, teachers may implement CBPA breaks if CBPA breaks were part of the school curriculum or requirements. Longitudinal studies using schools that have different policies on CBPA breaks implementation (ie, require implementation of CBPA breaks, does not support implementation of CBPA breaks, and neutral about CBPA breaks) may be better equipped to assert if a teacher's perceived value for PA modifies their long-term implementation of CBPA breaks.

The literature also provided evidence that teachers may be limited to implement CBPA breaks by classroom environment.^{39,43,45,46,56} We did not find that classroom environment was associated with implementation of the BEPA-Toolkit. In our associative model, classroom environment was an aggregate of student behavior, classroom physical space, and the presence of CBPA tools. In our sample of 77 respondents it was not possible to investigate if individually these items would have yielded different results. Future investigations with a larger sample of teachers would benefit from assessing the individual effect of these indicators on CBPA implementation.

Our findings were inconsistent with a previous research finding that teachers' access to CBPA tools is supportive of CBPA implementation.²³ In our study, despite intentionally providing different types of BEPA-Toolkit access, we did not find that type of access was associated with implementation of the BEPA-Toolkit. In addition, within GROW HKC's BEPA-Toolkit distribution scheme, all teachers should have had access to the BEPA-Toolkit, although some teachers reported not having access to the BEPA-Toolkit. This suggests that other methods may be needed to assure teacher awareness and access to CBPA tools such as provisioning every teacher with a BEPA-Toolkit. Another method to increase awareness can be through a social marketing campaign or the presence of on-site PA facilitators.⁵⁶ One study found that teachers preferred CBPA breaks that were easy to organize and simple to implement.⁴⁷ Our study staff reported that during informal conversations they had with some teachers, teachers mentioned repeating the use of certain activities. This was not part of our formal investigation therefore more information was not collected. Regardless, it is possible that in our study, teachers repeated the use of certain activities because they found them simple and easy to organize.

Limitations

This study is limited by several factors. Most importantly, despite a 94.3% response rate, a sample of 83 participants was insufficient to fully explore

all potentially important questions and made it difficult to conduct stratified analyses. A similar investigation with a larger sample would yield more precise estimates. Moreover, a large proportion of teachers from control schools reported participating in training, while an equally large proportion of teachers from intervention schools reported not participating in training. We know that our control schools did not conduct any formal trainings, but it is possible that teachers from control schools perceived some components of BEPA-Toolkit materials as training. As a result, the association we see for both the workshop and group condition variables may be biased—something that we are unable to assess. Future research should evaluate if different workshop delivery methods are more effective than others. In addition, while we adapted our survey from previously published work and shared it with child educators for cognitive testing, limited resources and lack of time did not allow us to conduct a formal validity assessment. Finally, there may be other factors related to the perceived utility, feasibility, and ease of implementation of the BEPA-Toolkit that we did not measure which may have added to our understanding.

Conclusion

This study was the first of its kind to evaluate the association of multiple teacher-level factors with implementation of a CBPA tool in elementary schools. Given the importance of increasing the implementation of CBPA breaks, future studies with larger samples are warranted to determine the best approach to promote teacher's implementation of CBPA breaks. Despite the limited sample size, this study highlights the need to provide teachers with professional development that increases their self-efficacy as one possible method to promote the implementation of CBPA tools. While other means to promote use of CBPA breaks were not examined, teacher training and increased self-efficacy have the potential to increase CBPA implementation which in turn, could increase students' PA levels.

IMPLICATIONS FOR SCHOOL HEALTH

Elementary schools are faced with multiple barriers in their efforts to support PA.²⁰ Within limited school resources for PA promotion, CBPA interventions have been found to be a cost-effective strategy.^{18,19,28} To benefit from CBPA interventions, elementary schools need information about which factors influence teachers' successful implementation of CBPA breaks. Our study associated multiple teacher-level factors with teachers' implementation of a CBPA tool. Our study findings support taking the following actions:

- Implement school policies that clearly convey the importance of implementing CBPA for all students.
 - Such policies communicate that school administrators value PA and support CBPA promotion.
 - Policies should communicate that teachers' schedules should or must include between 5 and 15 minutes each day to implement CBPA opportunities for students.
- To support expectations of CBPA implementation, school administrators should provide regular professional development training.
 - CBPA trainings should include components focused on improving teachers' self-efficacy through the process of practice and feedback.

Our data support that when teachers are trained and feel confident in providing CBPA opportunities, students benefit by exposure to more PA throughout the day.

Human Subjects Approval Statement

The Institutional Review Board of Oregon State University approved this study.

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