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Actively Involving Middle School Students in the Implementation of a Pilot of a Behavioral Economics–Based Lunchroom Intervention in Rural Schools

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Abstract

School-based interventions can play an important role in improving childhood and adolescent nutrition and preventing obesity. Schools offer a unique opportunity to implement policy, systems, and environmental interventions targeting healthy eating behaviors. An intervention was piloted in six middle schools featuring behavioral economics–based changes to the lunchroom, communication training, and communicate cues for food service staff. The pilot study employed a multicomponent evaluation with students and food service directors and staff including a lunchroom assessment, online surveys, production records, and interviews. Five schools increased their scores on the lunchroom assessment tool, and four schools increased the number of servings produced of healthy food items. Interviews with food service directors indicated the interventions was feasible and well received. School-based policy, systems, and environmental interventions targeting healthy eating behaviors may play a role in preventing obesity in children and adolescents.

Keywords

rural schools; school lunch; behavioral economics; PSE interventions

Being overweight or obese during childhood and adolescence increases the likelihood of being obese as an adult and developing chronic diseases earlier (Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014). Therefore, reducing the prevalence of childhood obesity is critical in halting the obesity epidemic, and there is evidence that school-based programming may be effective in improving dietary intake and preventing childhood obesity (Black, D'Onise, McDermott, Vally, O'Dea, 2017; Wang et al., 2015). Plate waste studies and interventions using plate waste as an outcome measure have indicated that both selection and consumption of healthy foods, such as fruit, vegetables, and low-fat white milk, are potential targets for interventions in the school lunchroom (Goto, Waite, Wolff, Chan, & Giovanni, 2013;

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Greene, Gabrielyan, Just, & Wansink, 2017; Shanks, Banna, & Serrano, 2017; Smith & Cunningham-Sabo, 2014). Researchers have increasingly used policy, system, and environmental (PSE) approaches to increase healthy behaviors, such as engaging in physical activity or eating healthier (Bunnell et al., 2012; Leineweber, Mathews, & Harrington, 2017). School policies around healthy eating are effective in improving dietary intake (Nanney, MacLehose, Kubik, Davey, Coombes, & Nelson, 2014). Schools also provide a unique venue for implementing PSE interventions targeting healthy eating, as they provide meals to a large number of children and have modifiable policies, systems, and environments related to food service (Frerichs et al., 2015; Story, Kaphingst, & French, 2006).

PSE interventions targeting nutrition behaviors should be designed with a theoretical or conceptual framework guiding their development and implementation (Brug, Oenema, & Ferreira, 2005). A number of interventions have used behavioral economics as a guiding framework in the lunchroom to improve students' healthy eating practices. Behavioral economics is the study and application of how psychological, cultural, and environmental factors can be used to understand decisions (Thaler, 2016). Table 1 shows examples of how behavioral economics can be applied to the school lunchroom. Interventions informed by behavioral economics have been moderately effective in increasing healthy food choices made by students and the consumption of healthy foods (Adams, Bruening, Ohri-Vachaspati, & Hurley, 2016; Broers, De Breucker, Van den Broucke, & Luminet, 2017; Goto et al., 2013; Greene et al., 2017; Liu, Wisdom, Roberto, Liu, & Ubel, 2014). Strategies that have been successful include nudging (Broers et al., 2017), altering the accessibility or availability of certain food items (Goto et al., 2013; Greene et al., 2017), using environmental cues such as signage (Liu et al., 2014), and using verbal prompts targeting specific items (Kleef, Broek, & Trijp, 2015; Schwartz, 2007). School food service staff also have a large impact on the student body's school lunch consumption, food choices, and satisfaction, suggesting their utility in lunchroom interventions (Castillo & Lofton, 2012; Kjosen, Moore, & Cullen, 2015).

Rural settings provide unique challenges to supporting healthy eating. Rural schools have reduced access to fresh fruits and vegetables, which is especially problematic for school efforts to improve student nutrition, as students living in rural areas are more likely to be obese than their urban counterparts (Davis, Bennett, Befort, & Nollen, 2011; Johnson & Johnson, 2015; Larson, Story, & Nelson, 2009). Higher prevalence of obesity among rural students coupled with reduced access to fresh fruits and vegetables among schools suggests a need for interventions in rural schools to increase the availability, accessibility, and consumption of fruits and vegetables. Despite this need, rural schools are limited in the resources, time, and trainings to implement obesity prevention strategies in school food service (Cornish, Askelson, & Golembiewski, 2015, 2016).

Previous interventions often used intervention staff external to the school or minimally involved students and school staff in the decision making and implementation process regarding changes to the lunchroom (Adams et al., 2016; Goto et al., 2013; Greene et al., 2017). Interventions targeting youth, whether using a PSE approaches or not, are more likely to be successful if the target population is included in the planning and implementation of the intervention (Greene, 2013). For example, the results of a previous lunchroom

intervention found that involving students in developing vegetable promotion materials and posting them in the lunchroom increased consumption of vegetables compared to using promotional materials alone (Gustafson, Abbey, & Heelan, 2017). Overall, PSE interventions targeting nutrition behaviors in the lunchroom should have a theoretical or conceptual framework, be acceptable and feasible to the intervention target, and involve the target population throughout the intervention process.

The purpose of this article is to describe the implementation and results of a pilot of a lunchroom intervention. The following research questions were addressed: (1) Was the intervention feasible and acceptable to food service directors? (2) Was the lunchroom environment improved through the intervention? and (3) Did food production change following the intervention activities?

METHOD

Intervention

The intervention was designed to promote healthy eating habits in middle school students. The goals of the intervention were to improve the lunchroom environment based on the principles of behavioral economics to promote healthy food choices and empower food service staff with the knowledge, skills, and ability to communicate with students about making healthy choices in the lunchroom. This pilot study was approved by the University of Iowa Institutional Review Board.

Iowa Department of Education Team Nutrition and researchers with the University of Iowa invited all schools that served middle school age students to apply to participate in the intervention. The team selected schools based on the level of interest by the food service director to make lunchroom changes, the school identifying a group of students to participate in the intervention and the willingness of the food service director to set aside time to train food service staff. This resulted in a total of six schools agreeing to participate in the intervention. Most of the schools were located in rural areas ($n = 5$) and represented various school sizes (Table 2).

Schools were provided clear expectations for participation in the intervention throughout the entire school year. These expectations included communicating regularly with the research team, organizing a student group to assist in the planning and implementation of changes to the lunchroom, participating in onsite visits, implementing changes based on lunchroom assessments and student group feedback, encouraging communication between food service staff and students through staff training, coordinating meetings between students and staff, and participating in all components of the evaluation.

The intervention consisted of a lunchroom assessment conducted by students, meetings between student groups and school food service staff, providing visual cues at the lunch line to prompt food service staff to communicate with students, and webinars for food service staff.

There were two purposes for the completion of the assessment tool. First, schools used these results to identify what changes they needed to make to improve their lunchrooms. Second, the results of the tool provided data on the school lunchroom for the research team. The tool focused on five target areas (milk, fruit, vegetables, lunchroom atmosphere, and lunchroom staff) where schools could make changes that nudge students toward making healthier food choices. The five targeted areas were purposively selected based on the available evidence and because schools could feasibly implement small low- or no-cost changes (Blanchette & Brug, 2005; Bridge, Granquist, Hoffer, & Schwartz, 2010; Bucher, Siegrist, & van der Horst, 2014; Hakim & Meissen, 2013; Hanks, Just, Smith, & Wansink, 2012; Jansen, Mulkens, & Jansen, 2010; Martins, Rodrigues, Cunha, & Rocha, 2013; Vartanian, Kernan, & Wansink, 2016).

To conduct the lunchroom assessment, the research team visited each school to train students on the principles of behavioral economics. This helped students understand how small, low-cost changes to their lunchroom could affect lunchroom behaviors. They were also trained on how to complete the assessment tool by walking through the process in a group setting.

Following the training, students completed the assessment tool during the lunch period. Students indicated on the tool if they identified the item on the assessment as never, sometimes, or always being true about their lunchroom. For example, students were asked to say whether their school always, sometimes, or never had “Whole fruits are displayed in colorful bins or bowls” and if “The school lunch staff smiles and says hello to you in the lunch line” always, sometimes, or never. The students also took pictures of their lunchroom showing both strengths and deficits in each targeted area. After the students completed the lunchroom assessment, they met with food service staff and completed a “getting to know you” exercise.

The research team provided each school with a report reviewing their assessment tool results with suggestions for areas to target for changes. The research team identified several areas for improvements that were the same across all schools, including providing more fruit options in the lunch line and near the register, adding more signage encouraging healthy eating and white milk consumption, moving milk to the front of milk coolers, adding fun and creative names on menus, and posting menus in the lunchroom and other visible places throughout the school.

Food service directors and staff shared the report with students. Together, they identified the changes they wanted to make and worked on a plan to make those changes. The research team offered schools the option of a second visit during this time to discuss the intended changes with the student groups. Only two schools had second visits. Food service directors were given small subgrants that they used to fund the lunchroom changes they made.

Changes implemented by the schools included adding bowls, bins, and stand-alone carts for whole fruit to the lunch line; using fun, exciting names developed by the student group for menu items; adding signage to promote fruits, vegetables, and milk; adding menu boards to the lunchroom; making tabletop signs featuring the menu and fruit and vegetable facts;

rearranging milk coolers to feature white milk over chocolate milk; providing precut fruit as an option; and changing how students move through the lunch line to improve food service.

The research team encouraged food service directors to meet with students independently of the research team and to include other food service staff in these meetings. The research team provided two activities, a menu planning activity and a guide to have the student group develop and conduct a survey about school lunch with their peers, for food service directors to complete with student groups and food service staff.

The research team provided the food service director with clings for their lunch line as a means to help provide cues to food service staff. The clings were designed to be placed in the kitchen, on the kitchen side of the serving line, so that they were only visible to food service staff. The messages on the clings prompted food service staff to communicate with the students in a positive manner. Examples of the messages include “Today, I can suggest they try the vegetable” and “Today, I can remember change doesn’t happen overnight.” The research team developed the clings based on results from focus groups performed with food service staff during the development of the intervention.

Throughout the school year, the research team provided three webinars for food service staff to promote communication and engagement with their students. The first webinar lasted approximately 15 minutes, the second 20 minutes, and the third 15 minutes. The first of the webinars provided information about the intervention as well as the importance of nutrition for adolescents. The remaining two webinars included communication strategies food service staff could use during everyday interactions with students and the role of food service staff in promoting healthy eating and combating obesity.

At the end of the school year, the research team met with the student group for a final time. During this visit, students completed the post assessment using the same tool used in the preassessment. Students also took pictures of the changes to the lunchroom.

Evaluation

This intervention featured a multicomponent evaluation with data collection from students, parents, and food service directors. Data collections include online surveys, production records, and in-depth interviews.

Surveys.—Online pre- and postsurveys assessed students’, parents’, and food service staff’s perceptions of the lunchroom in order to establish is perceptions of the lunchroom had changed due to the intervention. Survey results are not described in this article.

Lunchroom Assessment.—The assessment tool, described above, was also used in the evaluation. Scores were assigned to each item on the assessment tool: 0 = *never*, 1 = *sometimes*, and 2 = *always.* The items were collapsed across the topic areas. For the collapsed categories milk had a range of minimum and maximum scores of 0 to 6; vegetables 0 to 6; fruit 0 to 12; atmosphere 0 to 12; interaction 0 to 6. The research team compared average scores in the fall to average scores in the spring to assess the areas in

which schools improved their scores. The fall and spring assessments took place approximately 4 months apart.

Production Records.—The research team asked food service directors to complete food production records reporting vegetable, fruit, and milk production for 1 week in the fall and 1 week in the spring. The number of servings for each vegetable, fruit, and milk initially prepared and the number of servings left over were calculated. The food service director completed production records approximately 4 months apart.

Interviews With Food Service Directors.—A researcher who had no previous interaction with students or staff at the participating schools conducted semistructured telephone interviews to assess the experiences and perceptions of food service directors (n = 6). Interviews lasted between 15 and 30 minutes and probed for perceptions of the intervention, whether they thought the intervention was successful, what the outcomes were, and what their preferred training methods were. Interviews were recorded and transcribed. A social scientist not involved in the intervention or data collection reviewed and coded all transcripts.

RESULTS

Lunchroom Assessment and Production Records

Five of the six schools increased their average score on the assessment tool comparing pre- and postimplementation of the lunchroom changes (Table 3). Scores on the assessment tool ranged from 9 to 19 in the fall and 13 to 28 in the spring. The scores are for the areas and not the individual items on the assessment tool.

Five schools provided production data that could be analyzed (Table 4). Two schools increased servings of fruit and three schools increased servings of total servings of vegetables and total servings of milk. One school increased servings of dark green vegetables, two schools increased servings of starchy, and other vegetables, and four schools increased servings of beans and peas and red/orange vegetables. Two schools increased servings on 1% white milk, two schools increased servings of skim white milk, and four schools increased servings of skim chocolate milk.

Interviews With Food Service Director

Perceptions of the Intervention.—All participants described the intervention as successful. One food service director, discussing how rearranging the milk encouraged students to select milk, said “[we] redesigned the milk cooler situation so now kids have better access to the milk, so they’re taking more milk.” Another food service director remarked that the addition of fruit baskets improved student satisfaction, stating, “I think that the kids really enjoyed fruit baskets that I bought […] that they could grab fresh fruit out of every day.” Food service directors specifically mentioned positive outcomes of focusing on milk placement, fresh fruit presentation, and signage.

Student Involvement.—All six participants noted improved communication and relationships with students as one of the best outcomes of the intervention. Food service

directors highlighted this by stating, “I really liked working with the students. […] I enjoyed the interaction that our staff had with the students” and “The best part of it that worked was the student involvement.” Several mentioned the value of the feedback that students provided and how much they enjoyed personally interacting with the students. They felt that the students were interested in participating in the intervention and enthusiastic about learning about how they get their food.

One important theme that emerged was that directors believed the intervention served to humanize the school workers. A food service director related this saying, “The kids met my staff, my staff met the kids, they’re on a first-name basis” and “I think they know now that the lunch ladies aren’t mean, and they’re not out to get them.”

Another important theme related to student involvement was that directors expressed a belief that by building interpersonal relationships between students and staff, students felt more empowered to communicate with food service staff. Discussing how communication had improved, a food service director said, “It opened those lines of communication and introduced them to each other and made the kids feel a lot more comfortable with letting us know what they want.” Directors talked not only about the value of the feedback that students provided but that students also now sought out the staff to share ideas, insights, and opinions about their lunch experiences. A food service director expressed this succinctly when she stated, “We have ambassadors in our students now.” Several participants mentioned their plans to continue these interactions in some form in the future.

Challenges.—Each interviewee mentioned time and scheduling as the most salient challenge related to participating in this intervention. One food service director remarked, “It’s hard to come up with a time where everybody can meet together.” Because staff interaction was a major component of the project, balancing food service staff’s other duties and participation was a concern raised: “It was a huge challenge to be able to get the staff involved.” Given the preference for in-person training and the interviewees’ belief that one of the main positive outcomes was improved interpersonal communication between staff and students, this is a particularly important challenge to address.

DISCUSSION

The intervention improved the school lunchroom in five evidence-based areas that promote healthy food choices, as demonstrated by the changes that students chose to make in the lunchroom, increases in production of healthy food items, and interviews with food service directors. Addressing childhood obesity is imperative in reducing the burden of chronic disease caused by obesity (Kelsey et al., 2014). Dietary behaviors established in childhood and adolescence can make choosing healthier options a habit lasting into adulthood (Larson, Laska, Story, & Neumark-Sztainer, 2012). Researchers should explore and promote interventions in schools, especially PSE interventions, as a strategy to promote healthy eating, reduce childhood obesity, and lessen the burden of obesity and obesity-related comorbidities (Black et al., 2017; Wang et al., 2015).

Researchers can use behavioral economics as a theoretical framework to guide interventions seeking to change healthy eating behaviors that often come in the form of decisions selecting one food over another (Thaler, 2016). While there are a number of determinants of fruit and vegetable consumption (Blanchette & Brug, 2005), behavioral economics can readily address a number of theses, such as availability and accessibility, in the school lunchroom. Schools also offer a unique opportunity to use behavioral economics to influence the development of dietary behaviors, as they control many aspects of the food environment (Story et al., 2006).

It is important to implement interventions that are feasible and acceptable to the target population. The strategies used in this intervention are both low cost and were described as feasible, which has important implications for both the short-term implementation and the potential sustainability. Because rural schools have less time and resources (Cornish et al., 2015, 2016), it is unlikely that expensive or time-consuming interventions would be implemented or sustained. Using strategies that are both feasible and acceptable has greater potential to decrease observed rural disparities without overburdening school food professionals (Davis et al., 2011; Johnson & Johnson, 2015; Larson et al., 2009).

As indicated by the interviews with food service directors, actively involving the students and staff in the interventions served to increase communication between the groups and was a major benefit. As suggested by the theory of active involvement, involving adolescents and allowing self-reflection through building knowledge and skills around increasing healthy eating can induce cognitive changes that can lead to behavior change, such as making healthy choices in the lunchroom (Greene, 2013). School food service staff can reinforce the behavior changes brought on by active participation, especially if they are trained to effectively communicate with students around healthy eating.

Actively involving students has further benefits in identifying and implementing behavioral economics-based changes for the lunchroom. Because of the unique insights and perceptions provided by the involvement of students, this method of active involvement may be more effective than relying on school staff or outside researchers as the implementers. Beyond interventions in the lunchroom, researchers should encourage schools to actively involve students in all school wellness activity planning, decision making, and implementation.

Limitations

The scope of the intervention did not allow us to measure consumption. Future interventions targeting communication and behavioral economics–based changes should incorporate a measure of consumption, such as a plate waste study or dietary recall in order to better understand the impact of these interventions. Additionally, the assessment tool is a checklist primarily used to identify changes that could be made in the lunchroom rather than a validated and reliable tool. Because of this, we did not attempt to draw strong conclusions from the assessment tool results but instead based our conclusions on the changes implemented, production records, and the interviews with food service directors. Furthermore, we were also unable to measure staff and student communication. Future evaluations will include methods of collect communication information. The number of schools in the sample was limited, which could prevent generalizability. Finally, we were not

able to have a control group for this pilot study, which would have addressed limitations related to validity.

Implications for Practice

School-based interventions have the potential to combat childhood and adult obesity by promoting and establishing healthy food choices. Schools have a unique opportunity to address a major public health problem facing this country, but interventions must be appropriate and feasible if they are to be widely implemented and sustained. Students should be actively involved in all school-based interventions. Interventions that actively involve students while using the principles of behavioral economics and encouraging communication between students and food service staff have the potential to reduce rural disparities in obesity and encourage healthy dietary habits among students.

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TABLE 1

Examples of Behavioral Economics Concepts Applied to the School Lunchroom

Behavioral Economics Concept	Lunchroom Change Example
Default choice	• Healthier entrée is served unless other option is requested • White milk placed before chocolate milk in coolers • Healthier entrée placed first on service line
Accessibility	• Whole fruit placed on multiple points on all service lines • Salad bar/prepackages salads in high traffic area • Students must use cash to purchase a la carte items
Availability	• Two kinds of fruit and vegetables available • Hot and cold vegetables offered • Salad bar/prepackages salads available to all students • Variety of whole fruit offered
Taste expectations	• Cut, raw vegetables paired with dip • Spices/seasoning available for vegetables
Acceptability	• Sliced or cut whole fruit offered • Whole fruit offered

TABLE 2

Characteristics of Schools Participating in the Intervention

School Number	Grades Served by School	Enrollment	Percentage Eligible for Free and Reduced-Price Lunch	Urban/Rural
1	6-8	515	22.46	Rural
2	6-8	360	38.75	Rural
3	K-12	441	25.53	Rural
4	7-8	341	18.45	Rural
5	6-8	1140	23.40	Urban
6	5-8	529	42.34	Rural

TABLE 3

Mean Score of the Lunchroom Assessment Tools Completed by Student Groups in Fall and Spring

School Number	Fall Means	Spring Means
1	Total:16.33	Total: 25.80
	Milk: 1.33	Milk: 3.00
	Fruit: 3.33	Fruit: 8.00
	Vegetable: 2.00	Vegetable: 3.40
	Atmosphere: 5.67	Atmosphere: 7.50
	Interaction: 4.00	Interaction: 4.00
2	Total:15.0	Total: 18.25
	Milk: 1.00	Milk: 1.50
	Fruit: 4.50	Fruit: 5.50
	Vegetable: 1.75	Vegetable: 4.00
	Atmosphere: 5.00	Atmosphere: 5.25
	Interaction: 2.75	Interaction: 2.00
3	Total:16.67	Total: 16.00
	Milk: 3.00	Milk: 2.75
	Fruit: 3.75	Fruit: 4.00
	Vegetable: 2.25	Vegetable: 2.50
	Atmosphere: 5.42	Atmosphere: 4.25
	Interaction: 2.25	Interaction: 2.50
4	Total:14.67	Total: 16.50
	Milk: 2.00	Milk: 1.25
	Fruit: 3.33	Fruit: 4.25
	Vegetable: 3.00	Vegetable: 3.25
	Atmosphere: 3.67	Atmosphere: 6.25
	Interaction: 2.67	Interaction: 1.50
5	Total:10.25	Total: 18.00
	Milk: 1.00	Milk: 3.00
	Fruit: 2.25	Fruit: 6.00
	Vegetable: 2.00	Vegetable: 1.75

School Number	Fall Means	Spring Means
6	Atmosphere: 4.00	Atmosphere: 5.25
	Interaction: 1.00	Interaction: 2.00
	Total:11.00	Total: 18.50
	Milk: 1.33	Milk: 2.75
	Fruit: 1.67	Fruit: 4.00
	Vegetable: 2.67	Vegetable: 2.50
	Atmosphere: 3.67	Atmosphere: 6.25
	Interaction: 1.67	Interaction: 3.00

TABLE 4

Increase in Production of Meal Components for Schools With Production Record Data

	School Number				
Meal Components	**1**	**2**	**3**	**5**	**6**
Dark green vegetables				+	
Red and orange vegetables	+	+		+	+
Beans/peas	+	+		+	+
Starchy vegetables	+	+			
Other vegetables	+				+
Total vegetables	+	+		+	
Total fruit		+			
1% white				+	+
Skim white				+	+
Skim chocolate			+	+	+
Total milk				+	+

Note. A plus sign indicates an increase in production in spring compared with fall.