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A pilot study to expand the school breakfast program in one middle school

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ABSTRACT

School Breakfast Program (SBP) eaters weigh less and have healthier diets than nonSBP eaters. However, SBP is underused nationally, especially among low income youth. To explore the feasibility of expanding access to the SBP to improve participation among sixth grade students in one middle school in Minneapolis, Minnesota. A grab-n-go SBP menu, hallway delivery service and in-classroom eating strategies were implemented and evaluated with a cohort of sixth grade students (n=239) for 6weeks during spring 2010. Process measures were collected from students and teachers and through direct observations. The school district provided objective SBP participation data at baseline and post intervention. Students were very satisfied with eating in the classrooms (64%). Teachers (n=10) rated eating in the classroom as not messy, not disruptive and student behavior as excellent or good (100%). There was a significant increase in SBP participation from 0.74days per week to 1.21days per week (p<0.0001). Improvements were more pronounced among students eligible for free and reduced priced school meals. A school environment that supports convenient SBP menu and serving and eating locations was feasible and increased SBP participation in this suburban middle school.

KEYWORDS

School breakfast program, School nutrition, School aged children, Obesity prevention

Implications

Practice: Federal and industry resources are available to guide expanding school breakfast programs.

Policy: State leadership opportunities exist around preparing schools for proposed rule standards (i.e., trainings, food buying consortiums and regulatory support). State policy opportunities to support local school efforts to improve SBP participation include providing reimbursement incentives for schools meeting proposed rule standards.

Research: Small pilot studies are appropriate first steps to begin building an evidence base around improving school breakfast environments.

INTRODUCTION

Regular breakfast consumption has been shown to be positively associated with better academic performance and nutrition profiles and negatively associated with excess weight [1–3]; however, about one in four U.S. secondary students do not eat any breakfast. Skipping breakfast among youth increases with age and is more common among lower income children [4–6]. Minority children sometimes, but not always, have higher rates of skipping breakfast compared with their White peers [7–9].

The School Breakfast Program (SBP) started as a pilot project in 1966, and was made permanent in 1975. The third School Nutrition Dietary Assessment Study (2004–2005) (SNDA-III) data indicates that for every one breakfast per week increase in usual SBP participation, body mass index (BMI) declined by 0.15 points (P<0.05) [1]. Gleason et al. report that "a student who ate a school breakfast every day would be expected to have a BMI that was 0.75 lower than that of a student who never ate school breakfast, if all else is equal. This translates to about 4 lb for a 5 ft tall child" [1]. SBP participants are more likely than nonSBP participants to consume low-fat milk and 100% fruit juice and are less likely to consume other beverages [10].

Despite the benefits of eating school breakfast, SBP participation remains very low and is considered underused [11]. Less than half of low income children who are eligible to participate in the SBP at a free or reduced rate do so [12]. The SNDA-III showed that during the 2004–2005 school year only 17.1% of students overall participated in the SBP (23.1% among elementary, 15.3% among middle and 10.1% among high school students) [13]. Students reported reasons for not eating breakfast that included not having enough time in the morning, not hungry or not feeling like eating in the morning, or would rather sleep [14–17]. The Food Research and Action Coalition 2008 annual report on school meals identify and document barriers specific to SBP participation such as long

commutes, the stigma associated with eating school meals, that students would rather socialize than eat and lack of school faculty support for eating breakfast [18]. Federal and industry sources identify strategies to expand school breakfast programs such as alternative service and eating locations (i.e., hallway and classroom) and universal free breakfast, although the traditional option of eating in the cafeteria is chosen by 91.3% of schools [19–22].

Experts agree that improving the school food environment through policies and practices are effective ways to improve youth dietary patterns and address childhood obesity [23]. However, the influence of school policies and practices on school breakfast participation is not well documented in the research literature. The goals of this study were to explore the feasibility of offering a healthy grab-n-go menu, hallway delivery service, and eating in the classroom to improve SBP participation among a diverse group of sixth graders in one middle school in Minneapolis, Minnesota.

METHODS

The pilot school

The pilot school had an active school wellness committee and enthusiastic principal support for improving SBP participation. During school year 2008–2009, the pilot school had an enrollment of 1,300 students in grades six through eight and 34% of students were eligible for free or reduced priced school meals but only 11% of students participated in the SBP. SBP participation for the pilot school is lower than the state (25%) and national averages (15%). The SBP was offered in the cafeteria from 8:05 to 8:22 am (class begins at 8:30) and students were not allowed to take food outside of the cafeteria. Cost of breakfast was $1.35 for full paid students and free for those eligible for free or reduced priced school lunch.

Study design

A cohort study design was used to evaluate the impact of a 6-week expanded SBP intervention upon student participation.

Expanded school breakfast program

The school wellness committee was the decision body for this study and consisted of the assistant principal, school food service supervisor, two district-level food service assistant directors, school nurse, physical education specialist, building supervisor and two teachers. The committee identified a number of areas to evaluate: teacher concerns about in-classroom eating (i.e., messiness, disruptiveness and poor student behavior), building supervisor concerns about extra trash and spills, student acceptance of healthy grab-n-go menu items (i.e., whole grain cereals and fat-free milk) and food service concerns about the logistics of transporting food outside of the cafeteria and maintaining the integrity of program accountability (i.e., accurate records).

For 6 weeks beginning in March 2010 all sixth grade students had the daily option of getting breakfast from a hallway cart and taking it back to their homerooms to eat. The cafeteria remained open as usual and the cafeteria menu and price remained the same throughout the study period. The committee chose sixth graders because they had the last lunch period at 12:45 pm and sixth grade teachers were already used to providing a snack at third hour because of this late lunch time. The 6-week intervention time frame was identified as sufficient time to assess feasibility and acceptability before schoolwide expansion could be considered.

Measurement

Process and impact measures were collected from students, teachers and food service personnel using self-report, direct observation and objectively measured methods. The University of Minnesota Institutional Review Board approved this study. A letter from the Assistant Principal and the Principal Investigator detailing the study was sent out to all parents. Trained researchers obtained child assent at the time of data collection.

Student surveys

At 6 weeks post intervention, students were asked to rate their satisfaction with in-classroom eating (very satisfied to very unsatisfied), belief that eating breakfast helps them focus in classes (strongly agree to strongly disagree), preference for hot breakfast foods and how often they saved school breakfast foods for later (almost always/always to rarely/never). A process survey was given to a subsample of students at week three of the SBP intervention. Students in four homerooms were asked to evaluate their preference for the grab-n-go breakfast menu items (horrible, okay, good, great). All surveys were administered during the 20-min homeroom period by trained researchers. The student survey items have been used in previous school-based research studies [24–27].

Student body mass index (BMI)

Weight and height measurements were taken at baseline only by the school physical education specialist in kilograms and centimeters in a private setting with students dressed in light clothing, using standard procedures and equipments. Weight was measured on a SECA 882 digital scale and recorded to the nearest 0.1 kg. The scales were calibrated with a 5 kg weight at the beginning of each testing day. Student heights were measured using a portable stadiometer and recorded to the nearest one decimal place.

School breakfast program participation

Data on SBP participation and free or reduced priced meal eligibility were provided at two time points from the school's electronic records; 25 school days for a baseline assessment (February 8th to March 12th 2010) and the 24 school days during the intervention (March 15th to April 23rd 2010). The average weekly SBP participation over each period was calculated.

Teacher reports

At 6 weeks post intervention, teachers were asked to rate overall class behavior, disruptiveness and messiness during the in-classroom eating intervention period. Using a 5-item Likert scale, teachers were asked to indicate how much they agree (strongly agree to strongly disagree) with the statements: "Breakfast foods were messy" and "Eating breakfast in the classroom was disruptive". They were asked to rate overall classroom behavior (Excellent, good, fair, poor). A definitions rubric was provided. In addition, teachers were asked to state how likely (very likely to very unlikely) they were to continue to support students eating breakfast in the classroom.

Researcher observations

Throughout the 6-week intervention, trained researchers conducted observational assessments of food waste in garbage cans, spills and trash from breakfast foods, breakfast service time, the number of students waiting in line after the "5 min warning bell", those students needing "late breakfast passes" and the number of students eating in the hallway. The average number of counts, events and students were calculated.

Food service time study

Throughout the 6-week intervention, a food service time study was conducted by trained researchers who observed time required by food service personnel to deliver the expanded program. Trained researchers collected information assessing the time spent by food service personnel to prepare food, load carts, travel to and from the destination, deliver breakfast and unload and clean carts. The average time spent in minutes was calculated.

Data management and analysis

All data were field edited during data collection and double entered by trained research staff. Descriptive statistics of the student characteristics variables were computed for the study sample. Frequencies and proportions were calculated for categorical variables, and means and standard deviations were calculated for continuous variables. Using the Center for Disease Control software available online, student gender and age were matched to body mass index (BMI) percentiles and characterized as underweight, defined as BMI percentile <5%, normal weight, defined as BMI percentile between 5% and 85%, overweight, defined as BMI percentile between 85% and 95%, and obese, defined as BMI percentile ≥95%. BMI percentiles were computed from objectively measured weights and heights and self-reports when objective data were not available. Process results were summarized and presented with descriptive statistics.

Breakfast participation was reported as the average number of times of breakfast consumption per week. A general linear mixed model was used for the analysis of the intervention effect on school breakfast participation. Models included fixed effects for free/reduced eligibility, time, and their interaction. Least squares means and standard error for each group at each time point, and p-values were computed. Statistical analysis was performed with SAS 9.1.3 (SAS Institute Inc., Cary, NC) statistical software. A p-value <0.05 was considered statistically significant.

RESULTS

Menu planning

A grab-n-go menu guided by the 2009 Institute of Medicine's recommendations for school breakfast was developed [28]. A 5-day evaluation of the menu offered identified meeting the saturated fat, trans fat, meat/cheese/yogurt and fat-free milk recommendations and nearly meeting them for calories (obtained: 439 kcal, goal: 450–600 kcal), milligrams of sodium (obtained: 550 mg, goal <500 mg) and whole grain ounce equivalents (obtained: 8.4, goal: 9–10). Fruit cup recommendations were not met during the evaluation period (obtained 2.75, goal: 5). Details about menu development and analysis are available from the authors.

Student characteristics

The student survey response rate was 83.9%. The mean age of students was 11.7±0.4 years and 68% were White. Thirty-six percent of students were eligible for free or reduced priced meals. Table 1 describes the multiethnic composition of the student participants and other health and school characteristics.

Assessing feasibility through process evaluation

Table 2 describes the results of the process evaluation. The majority of students were very satisfied with eating in the classroom (64%) and with the taste of the healthy breakfast menu items. Teacher assessments of eating in the classrooms showed teachers always rated breakfast foods as not being messy (100%), rated the in-classroom eating process as not disruptive (100%) and rated overall student behavior as excellent or good (100%). Fifty-one objective observations of classroom garbage cans revealed very minimal food waste. In compliance with the

Table 1 | Self-report characteristics of 6th grade student participants

Student characteristics	Students (N=219)
Age (years), mean (SD)	11.71 (0.49)
% Female	123 (56.16%)
Ethnicity	
% White	147 (68.06%)
% African American	18 (8.33%)
% Hispanic	9 (4.17%)
% Asian	12 (5.56%)
% Other	29 (13.43%)
School grades	
% Mostly A's, about half A's and B's	135 (61.64%)
% Mostly B's, about half B's and C's	68 (31.05%)
% Mostly C's, about half C's and half D's	14 (6.39%)
% Mostly D's or below D	1 (0.46%)
% Receives free or reduced meals	86 (36.4%)
Weight status	
% Underweight	9 (7.44%)
% Normal	87 (71.90%)
% Overweight	19 (15.7%)
% Obese	6 (4.96%)
Breakfast consumption at home (days/week), mean (SD)	4.86 (2.67)
Breakfast eaten with other family members (days/week), mean (SD)	2.06 (2.51)
Perception of health status	
% Poor	6 (2.74%)
% Fair	28 (12.79%)
% Good/excellent	184 (84.02%)
Average daily hours of sleep, mean (SD)	8.76 (1.41)

school policy, no students were seen eating in the hallways during the observation period. Researchers observed one spill and one wrapper in the hall. Discussion with the building supervisor confirmed no concerns with garbage waste or spills or food kept in the lockers. The time spent by food service to prepare, serve breakfast in the hallway, and clean up averaged 46 min. District Child Nutrition Programs identified that 50 additional student breakfasts were required to pay for an additional 1 h of food service personnel labor. On a daily average, 13 students were seen in the hallway breakfast line after the "5 min homeroom warning bell" with an average of one a day needing a late pass.

School breakfast program participation rates

There was a significant increase in SBP participation among sixth grade students from 0.74 days per week at baseline to 1.21 days per week at 6 weeks of hallway breakfast delivery ($p<0.0001$). Significant improvements were seen for both boys and girls. Student SBP participation differed between paid and reduced or free meal eligibility. There was a significant increase of 0.63 days per week for free and reduced versus 0.29 days per week for full paid students ($p=0.0083$). See Table 3

Study strengths and limitations

This feasibility study has several strengths. This study is the result of a successful school and researcher partnership, was driven by the local school's wellness committee and offers a practical application of environmental level change. Engaging participatory research methods increases the likelihood of sustainability [29]. The use of district objective SBP participation offers measurement strength. Still, this exploratory research has acknowledged weaknesses. Implementation and evaluations were limited to a 6-week snapshot of sixth grade students and expansion to the entire middle school over a longer period may yield different results. Although the lessons learned are likely applicable to other schools, variations between schools (i.e., grade level, location, student socioeconomic status makeup and administrative support) may limit generalizability of the results.

DISCUSSION

Improving the school breakfast program menu as part of the overall school food environment has not been studied extensively. Providing a convenient and healthy SBP menu was feasible and acceptable to the pilot school sixth grade students. A 1-week evaluation of the grab-n-go menu identified good compliance with national nutrition recommendations. The recommendation to double fruit from the current requirement of 2.5 cups to 5.0 cups was most challenging. This finding is important because the USDA issued a proposed rule on January 2011 to update the school meal patterns and nutrition

Table 2 | Feasibility evaluated by students, teachers and direct observations

Process evaluation results	
Student survey	*N* (%)
% very satisfied/satisfied with eating breakfast in homeroom	49 (64.5)
% strongly agrees/agree that breakfast helps focus in classes	146 (78.1)
% almost always/often prefers hot breakfast options	20 (43.5)
% almost always/often saves school breakfast food for later	17 (15.2)
% great/good	
Oatmeal bar	23 (69.7)
String cheese	30 (75)
Whole grain cereal	28 (70)
Yogurt	23 (63.9)
Whole grain muffin	34 (87.3)
Fresh fruit	23 (71.9)
100% juice	38 (86.4)
Low-fat milk	33 (76.7)
Teacher survey	10 teachers
% strongly disagree/disagree that breakfast foods were messy	100
% strongly disagree/disagree that process was disruptive	100
% excellent/good student behavior while serving/eating	100
Researcher observations	
Classroom	51 observations
Garbage waste Total# (daily average) range	23 (0.45) 0–3
Milk, bars	19 (0.37) 0–3
Yogurt, muffin, cereal, cheese	27 (0.53) 0–2
Juice, fruit	
Hallway	26 observations
Duration of breakfast service (minutes), *mean (SD) range*	17 (2.8)12–22
Average # of students in line after warning bell, *mean (SD) range*	13.04 (6.48) 0–24
Average # of students needing a late pass, *mean (SD)*	0.92 (1.19)
Average # students eating in the hall, *mean (SD)*	0.04 (0.19)
Hallway spills/trash, *mean (SD)*	0.12 (0.32)
Food service time study	9 observations
Average minutes to prepare/load food, *mean (SD)*	21.11 (2.20)
Average minutes to travel to and from destination, *mean (SD)*	3.60 (0.31)
Average minutes to serve breakfast, *mean (SD)*	18.11 (3.06)
Average minutes to unload/clean carts, *mean (SD)*	3.21 (0.86)

standards to match the 2005 Dietary Guidelines for Americans [30, 31]. The proposed ruling for the SBP doubles the amount of fruit servings and increases the amount of whole grain servings to half of those served and limits milk to fat-free (unflavored or flavored) and unflavored low-fat milk [30].

Pilot study process evaluation results suggest that expanding the SBP pick up location to the hallway and allowing in-classroom eating after school starts was acceptable to a wide range of stakeholders. School administration support for serving breakfast in the hallway has been identified as the top challenge in offering breakfast in the hallway [22]. Teacher buy-in and acceptance has been identified as the number one challenge and key to success to offering in-classroom eating [22]. A more thorough

Table 3 | Impact of hallway delivery of school breakfast program on 6th grade student participation

School breakfast participation Average days per week	Time points			
	Baseline Feb 8–Mar 12 (24 school days) N/LS mean/SE	6-Week intervention Mar 15–Apr 23 (25 school days) N/LS mean/SE	Difference (days)	*p*-values
All students	247/0.74/0.08	255/1.21/0.09	0.47	‹0.0001
Free and reduced	88/1.16/0.13	93/1.79/0.15	0.63	‹0.0001
Full paid	157/0.33/0.10	161/0.62/0.11	0.29	0.0002
Boy	90/0.95/0.13	91/1.26/0.16	0.41	0.0022
Girl	114/0.38/0.11	117/0.84/0.14	0.46	‹0.0001

examination of the food service labor costs associated with expanded programs is needed.

Pilot study results identified significant increases in SBP participation by an average of 0.70 days per week. A national study reported that an increase of a single day in usual SBP participation was associated with a decline of 0.15 in BMI [1]. For the pilot middle school, SBP participation was more pronounced among low income sixth graders and is an especially relevant finding given the disparities observed in obesity rates among low income youth [32]. Interestingly, these middle school students reported eating breakfast at home nearly 5 days per week. In one study of Minnesota adolescents (n=677; mean age 17.2± 0.59 years) (2003–2004) youth self-report eating breakfast with family members on average 4.1 days per week [33].

A number of areas for future work arose from this small feasibility study: what is the impact of improving SBP participation upon overall student diet and weight outcomes? One observational study among fourth grade students reports a significant increase in calories when breakfast was eaten in the classroom compared to students who ate breakfast in the cafeteria [34]. Another evaluation related to student diet quality revealed exposure to a universal free breakfast program resulted in no improvement in overall diet quality [35]; what is the cost of a grab-n-go menu that adheres to the IOM recommendations for school breakfast programs? The commissioned IOM report identifies that the cost is likely to increase by up to 20% for schools who offer breakfast menus consistent with the recommended standards [28]. Finally, feasibility within various school settings and other environment changes (i.e., high schools, eating in the hallway and marketing the program) warrant further study with a larger sample and more rigorous design and evaluation. Collectively, these inquiries can build the evidence for SBP policies and practices that positively contribute to improving the whole school food environment and make a unique contribution to the efforts to slow rising childhood obesity rates.

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