

# RESEARCH BRIEF

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## Family Involvement in School-Based Health Promotion: Bringing Nutrition Information Home

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*Abstract.* Family–school collaboration related to children's physical development has become increasingly important as childhood obesity rates continue to rise. The present study described the development and implementation of a literacy-based, family component of a school-based health education program and investigated its viability, acceptability, and effectiveness. Interactive children's books were the mechanism by which students, parents, and teachers received consistent messages at home and school regarding nutrition information. The home–school intervention served to bridge home and school cultures in an urban population. Preliminary process evaluation results indicated that the interactive children's books were feasible to implement in the school context. Parents, children, and teachers had positive perceptions of the books. Parents who received the books demonstrated increased knowledge of “5 a Day,” which highlights the importance of eating fruits and vegetables. Although not statistically significant, after the first and second years of intervention, parents in the experimental group reported that their children were eating 0.54 and 0.36 additional servings of fruit and vegetables per day compared with children in the control group. The program did not seem to influence the availability and accessibility of fruits and vegetables at home.

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To date, much of the focus of family-school collaboration in the educational literature is related to promoting children's academic and social development (e.g., Christenson, 2004). Home-school collaboration focused on promoting children's physical health has received less attention, yet may be just as important. The present study addresses this gap by focusing on home-school collaboration related to the promotion of healthy eating, an important topic for families and schools given that proper nutrition is important for cognitive and physical development (Nutrition-Cognition National Advisory Committee, 1998). This topic is relevant for school psychologists (Harrison, Cummings, Dawson, Short, Gorin, & Palomares, 2004; Ysseldyke et al., 2006), who can play important roles in the design, implementation, and evaluation of school-based health promotion programs (Power, DuPaul, Shapiro, & Kazak, 2003).

Given the current obesity epidemic (U.S. Department of Health and Human Services, 2001), it is now more important than ever for families and schools to collaborate in obesity prevention. Both home and school settings influence children's eating and physical activity, so consistent messages across these settings are important. This is particularly relevant for young children who rely on their caregivers and school to procure and prepare their food.

Because of the importance of children's healthy eating and the suitability of the school environment for nutrition education, many school-based nutrition education programs have been developed and evaluated. School-based programs frequently include family components. The authors conducted a systematic review of 58 school-based, nutrition education programs implemented in preschools and elementary schools.<sup>1</sup> Thirty-eight programs (65.5%) mentioned the inclusion of a family component. Of the 38 programs that mentioned a family component, 8 (21.1%) included activities that were based at school or in the community only (e.g., family activity nights), 20 (52.6%) described activities that were based at home only (e.g., newsletters; homework), 8 (21.1%) described family activ-

ities that were based both at school and at home, and 2 (5.2%) were unclear. That many school-based nutrition programs send information home is important because parents frequently find it difficult to attend school events. Engaging, time-efficient, enjoyable activities that can be completed at home can meet the needs of large numbers of families. Two published studies incorporated home-based activities assigned for homework at the elementary school level. Gordon and Haynes (1982) developed a series of parent pamphlets that outlined information students learned in school over a 3-week period. Luepker, Perry, Murray, and Mullis (1988) designed family games and a 5-week correspondence course that was sent home in packets. Luepker et al. reported an 86% participation rate by families. These types of approaches are desirable to reach the maximum number of families. Although both approaches were evaluated in controlled studies, neither study reported the degree to which activities were implemented in the homes or parent- and child-reported acceptability. Information regarding the degree to which home-based activities are completed and found to be acceptable is important when considering issues of program feasibility and sustainability.

This article describes the development, implementation, and process evaluation of the family component of a school-based nutrition program that also used an interactive, home-based approach to family-school involvement. The family component involved a literacy-based approach with shared book reading. It was intended that parents would read the books to their children. Books were designed to provide multiple opportunities for children to respond through active engagement (Greenwood, Delquadri, & Hall, 1984). They reinforced messages that students learned at school in an engaging, interactive format and communicated consistent, informative messages to parents. Book activities provided a context for children and parents to have a conversation about the health information. Assigning the books as homework may have increased the likelihood they would be read. Another advantage of this approach was that it was an efficient way to promote shared book

reading within the comfort of the families' own home. This study is innovative in that it represents the first time interactive, shared book reading, assigned as homework and used to communicate school-based nutrition information with families, has been evaluated. The main purpose of this article was to describe the development, implementation, and preliminary evaluation of this approach. The following research questions were addressed:

1. Did the children complete the activities in the books with the assistance of family members? In this study, the completed activities served as permanent products documenting that children read the books with an adult.
2. Was this type of home-school transmission of health information acceptable to parents, children, and teachers?
3. Did parents learn the "5 a Day" message (i.e., the importance of eating at least five servings of fruits and vegetables [F&V] per day), and report changes in their children's F&V consumption and the availability/accessibility of F&V at home?

## Method

### Participants and Setting

The study took place in four elementary schools in a large, urban, public school district. The schools represented a sample of convenience as the first author's university already had a relationship with them. Two schools were randomly assigned to receive the Fruit and Vegetable Promotion Program (F&VPP), a school-based, multiyear, multi-component program designed to increase children's F&V consumption (Blom-Hoffman, 2008), and two were randomly assigned to serve as comparison schools. All schools were already participating in a physical activity promotion program called Athletes in Service. Schools in the experimental group received the F&VPP plus Athletes in Service. Schools in the control group received Athletes in Service only. A total of 297 parents provided written consent for their kindergarten or first-

grade child to participate in the evaluation (56% participation rate). Demographic information is displayed in Table 1. Participating school staff included kindergarten, first, and second grade, computer and art teachers ( $n = 24$ ). Most teachers had been teaching for 10 or more years (80%), and almost all were women (95%).

### Materials

**Interactive children's books.** Five interactive children's books were developed over a 2-year period with a partnership between the first author, public health professionals, and parents. The books were designed to communicate a simple health message that the students already learned at school, contained a variety of activities designed for children to complete with adult assistance, and were written on a third- through seventh-grade reading level. A brief questionnaire was included at the end of each book for parents and children. The books were available in English, Spanish, and Vietnamese, the primary languages spoken by the families. See Table 2 for titles and descriptions.

**Teacher acceptability.** Teachers completed a modified version of the Intervention Rating Profile (Martens & Witt, 1982) to report acceptability of the F&VPP in the spring of 2006 and 2007. The questionnaire was modified so items were directly related to the F&VPP. For this study, the primary item of interest was: "The children's health books are an acceptable way to encourage students to eat more fruits and vegetables during school lunch." Teachers used a 6-point Likert-type scale to rate this item.

**Parent questionnaire.** Parents were interviewed by phone in their native language by a native speaker, who used a structured questionnaire in the summer 2005 (pretreatment), summer 2006 (post-Year 1) after the first three books were distributed, and summer 2007 (post-Year 2) after all books were distributed. Parents provided demographic information, knowledge of the 5 a Day message, information regarding F&V availability (i.e.,

**Table 1**  
**Participant Demographic Characteristics**

Variable	Group	
	Experimental ( <i>N</i> = 149)	Control ( <i>N</i> = 148)
Gender (% male; <i>N</i> = 297)	51%	50.7%
Age (in years) at baseline ( <i>N</i> = 297)	6.22	6.21
Student weight status at baseline ( <i>N</i> = 293) <sup>a</sup>		
Overweight	17.6%	19.3%
Obese	22.3%	26.2%
Percentage of students receiving free or reduced price lunch ( <i>N</i> = 192) <sup>b</sup>	93.9%	88.3%
Parent-reported child race and ethnicity ( <i>N</i> = 190) <sup>b</sup>		
African American	29.3%	36.3%
Asian	24.2%	0%
Hispanic	41.4%	50.5%
White	3%	4.4%
Other	2%	8.8%
English only spoken at home ( <i>N</i> = 196) <sup>b</sup>	29.7%	51.6%
Maternal education ( <i>N</i> = 191) <sup>b</sup>		
High school degree or less	60.8%	72.3%
More than high school	39.2%	27.7%
Paternal education ( <i>N</i> = 175) <sup>b</sup>		
High school degree or less	79.8%	82.6%
More than high school	20.2%	17.4%

<sup>a</sup>Children removed their shoes and sweaters before being measured. Weight was measured to 0.1 kg (Seca digital electronic scale, Creative Health Products, Plymouth, Michigan). Standing height was measured to 0.1 cm with a portable stadiometer (Shorr Productions, Olney, Maryland). Weight status of children determined using gender-specific Centers for Disease Control and Prevention growth reference charts (Ogden et al., 2002). Overweight  $\geq$ 85th percentile and <95th percentile; obese  $\geq$ 95th percentile.

<sup>b</sup>Parents provided demographic information as part of a structured phone interview conducted in Summer 2005. Almost all phone interviews were conducted in the parents' native language by a native speaker. A total of 196 parents (66%) were able to be reached for the first phone interview.

the degree to which foods are present) and accessibility (i.e., the extent to which foods are prepared, presented, or maintained in a way that makes them easy to eat) in the home (F&V Availability/Accessibility Scale; Hearn et al., 1998), and the number of F&V servings their child eats per day.

### Procedure

The books were developed over a 2-year period in an iterative process with feedback from parents and public health professionals. A parent focus group was held to review the first three books. Feedback included shortening the books' length, adding more game-like

activities, and making the books narrative in structure. The final book was co-developed by a community coalition of public health professionals, and was illustrated by children because culturally relevant clip art was unavailable. All books followed the same format. Each included a short letter to parents, activities requiring adult assistance, a simple health message, and a brief questionnaire at the end of the book for parents and children. Books were translated into Spanish and Vietnamese by native speakers working at a professional translation company. Participant recruitment procedures are described in detail elsewhere (Blom-Hoffman, Leff, Franko, Weinstein,

**Table 2**  
**Titles and Descriptions of the Interactive Children’s Books**

		Title			
		<i>Smart Shopping &amp; Great Goals</i>	<i>Color Your Plate</i>	<i>—’s Physical Activity Book</i>	<i>Delicious Drinks</i>
Key Message(s)	5 a Day goal; different ways to reach the goal.	5 a Day; self-monitoring F&V eating behaviors.	Eating a variety of F&V in different colors.	Being physically active every day; minimizing sedentary activity.	Promoting non-sugar sweetened beverages.
Flesch-Kincaid grade level <sup>a</sup>	5.2	4.6	7.8	5.4	3.9
Illustrations Activities	Clip art Drawing Coloring	Clip art Drawing Coloring Self-monitoring Shopping List	Clip art Drawing Coloring Self-monitoring	Clip art Drawing Circling Coloring	Children’s artwork Drawing Circling Coloring

Note. F&V = fruit and vegetables.

<sup>a</sup>The Flesch-Kincaid grade level was calculated using Microsoft’s Word Readability Statistics (<http://unf.edu/~ccavanau/readabilitystats.pdf>).

Beakley, & Power, in press). The study was approved by the Institutional Review Board at Northeastern University and the school district's research office. Although signed consent was required for study participation, all students in the target grades received the books. Students received the books over a 16-month period (Winter 2006 to Spring 2007). Teachers sent them home as homework in an envelope, and asked parents to return them within a week. When families spoke either Vietnamese or Spanish at home, teachers provided the book in both English and the native language. Research assistants collected the books from teachers to review the completed activities and the parent and child questionnaire responses. Because participation in the F&VPP was voluntary, no negative consequences were imposed if students did not return the books. Only those students whose parents provided written permission to participate in the study were included in the data analyses. All books were returned to students.

## Results

The first research question was to understand the extent to which the books would be returned and completed. As shown in Table 3, 77% of students returned the first book; subsequent books were returned at a lower rate (range = 43%–59%). Table 3 shows that the majority of activities were completed (range = 51%–85%), indicating that children read the books with an adult.

The second question asked if parents, children, and teachers would find the books acceptable. Table 3 shows their perceptions. When asked how much they enjoyed reading the book together with their child, parents responses across the books on the 3-point scale ranged from 2.84 to 2.91 (1 = *not at all acceptable*, 2 = *a little acceptable*, and 3 = *a lot/very acceptable*). When asked how much they enjoyed reading each book, children's responses across the books ranged from 2.86 to 2.90. When asked how much they learned from each book, parents' responses across the books ranged from 2.82 to 2.91, and children's responses across the books ranged from 2.89

to 2.91. The final two books also asked parents to report behavioral intentions to make changes suggested in the book. As shown in Table 3, parents' responses indicated they were considering or were very likely to make changes after reading the book. Teachers also believed the books were an acceptable way to encourage students to develop the target behaviors (Year 1  $M = 5.36$ ;  $SD = 0.93$ ; Year 2  $M = 5.29$ ;  $SD = 0.91$ ; on a 6-point scale anchored by 1 = *strongly disagree* and 6 = *strongly agree*).

The final question asked if parents would learn the 5 a Day message and report changes in children's consumption and home availability/accessibility of F&V. Eighty parents (27% of the sample) participated in all three phone interviews: Summer 2005 (pretreatment), Summer 2006 (post-Year 1), and Summer 2007 (post-Year 2). As shown in Table 4, parents in the experimental group were more likely to know about the 5 a Day message at the second and third time points compared with pretreatment (Time 1–2:  $\chi^2_{\text{Yates}} [1, n = 37] = 3.91, p < .05$ ; Time 1–3:  $\chi^2_{\text{Yates}} [1, n = 37] = 13.88, p < .001$ ) and compared with parents of children who did not receive the books (Time 2:  $\chi^2_{\text{Yates}} [n = 80] = 3.98, p < .05$ ; Time 3:  $\chi^2_{\text{Yates}} [1, n = 80] = 12.81, p < 0.001$ ). As shown in Table 4, there were no significant differences with regard to parent-reported child F&V consumption ( $F[2, 77] = 2.02, p = \text{ns}$ ), parent-reported F&V availability at home ( $F[2, 77] = 0.86, p = \text{ns}$ ), and parent-reported F&V accessibility in the home ( $F[2, 77] = 0.68, p = \text{ns}$ ).

## Discussion

The interactive children's books were feasible to implement in the school context. Many books were returned, and of those books the majority of activities were completed. Parent and child questionnaires indicated the books were perceived as beneficial and enjoyable. Teachers also reported that the books were acceptable; however, teacher acceptability of the books was limited in that it was assessed from a single item that was part of a broad acceptability questionnaire reported

**Table 3**  
**Titles, Descriptions, and Parent and Child Perceptions of the Children's Books**

	Title				
	————'s 5 a Day Book	Smart Shopping & Great Goals	Color Your Plate	————'s Physical Activity Book	Delicious Drinks
Percentage Returned <sup>a</sup>	77%	59%	47%	53%	43%
Percentage Activities completed <sup>b</sup>	79%–85%	71%–83%	74%	51%–71%	67%–83%
Parent acceptability <sup>c</sup>					
Book was enjoyable	2.89 (0.35)	2.89 (0.36)	2.91 (0.29)	2.86 (0.35)	2.84 (0.42)
Book was informative	2.84 (0.40)	2.82 (0.47)	2.87 (0.34)	2.84 (0.42)	2.91 (0.29)
Likely to make behavioral changes <sup>d,e</sup>	NA	NA	NA	2.73 (0.45)	2.35 (1.23)
Child acceptability <sup>c</sup>					
Book was enjoyable	2.89 (0.35)	2.88 (0.32)	2.87 (0.40)	2.90 (0.31)	2.86 (0.35)
Book was informative	2.89 (0.32)	NA	2.91 (0.29)	2.86 (0.35)	2.91 (0.29)

<sup>a</sup>Although all children in the classrooms received and were asked to return the books, this percentage refers only to children whose parents provided written permission for their children to participate in the outcome evaluation.

<sup>b</sup>Because each book contained several activities, the ranges refer to the percent of activities completed within each book.

<sup>c</sup>Mean (SD) parent- and child-rated acceptability. The following 3-point scale was used: 1 = *not at all*; 2 = *a little*; 3 = *a lot*.

<sup>d</sup>These items were only asked at the end of ———'s *Physical Activity Book and Delicious Drinks*. The items asked parents how likely they were to help their child (a) be more physically active after reading the book and (b) make healthy drink choices after reading the book. Response items included: 1 = *not likely at all*; 2 = *may be*; 3 = *very likely*; or *my child is already physically active for at least 1 hour/day or we already make healthy drink choices*.

<sup>e</sup>NA = not asked.

**Table 4**  
**Parental Awareness of the 5 a Day Message, Report of Children's F&V Eating Behaviors, and Availability/Accessibility of Fruits and Vegetables at Home by Group**

Variable	Pretreatment		Post-Year 1		Post-Year 2		Group × Time Interaction
	Experimental	Control	Experimental	Control	Experimental	Control	
Parent 5 a Day Knowledge (percentage correct)	10.8%	7.0%	32.4%*	11.6%*	54.1%**	14.0%**	
F&V servings children eat each day; <i>M (SD)</i>	2.46 (.99)	2.44 (1.10)	2.89 (.97)	2.35 (1.20)	2.76 (.90)	2.40 (1.10)	ns
F&V home availability <sup>a</sup> <i>M (SD)</i>	17.51 (3.85)	17.76 (5.22)	18.78 (4.04)	19.67 (5.33)	19.00 (3.84)	18.90 (5.26)	ns
F&V home accessibility <sup>b</sup> <i>M (SD)</i>	2.65 (.58)	2.58 (.63)	2.81 (.46)	2.60 (.48)	2.76 (.56)	2.54 (.53)	ns

*Note.* F&V = fruit and vegetables; ns = not significant; *n* = 80 (Experimental *n* = 37; Control *n* = 43).

<sup>a</sup>Parents were asked if they had 48 different types of fruits or vegetables in the home in the past 7 days. The foods could have been in fresh, frozen, or canned forms. This questionnaire was based on the Fruit and Vegetable Availability/Accessibility Scale (Hearn *et al.*, 1998). It was modified to include additional fruits and vegetables common in Central and South American, and Vietnamese diets.

<sup>b</sup>Parents used the following scale to respond to seven F&V accessibility items on a modified version of the Fruit and Vegetable Availability/Accessibility Scale: 1 = *Never*; 2 = *Once in a While*; 3 = *Most of the Time*; 4 = *All of the Time*.

\*Experimental > Control, *p* < .05

\*\*Experimental > Control, *p* < .001

elsewhere (Blom-Hoffman, 2008). Parents in the experimental group were significantly more likely to demonstrate awareness of the 5 a Day message relative to pretreatment and relative to parents in the comparison group.

Parents estimated the number of F&V servings their children ate per day. Although the group by time interaction did not reach statistical significance, an examination of the mean changes in child consumption showed the changes were in the expected direction. Whereas control group children's F&V consumption remained stable across all three time periods, F&V consumption of children in the experimental group increased. Parents in the experimental group reported a 0.43 serving per day increase between pretreatment and post-Year 1 and a 0.30 serving per day increase between pretreatment and post-Year 2. Also, after Years 1 and 2 of program implementation, parents in the experimental group reported that their children were eating 0.54 and 0.36 more servings of F&V per day compared with children in the control group. Although not statistically significant, the magnitude of these changes is consistent with those reported in the school-based F&V promotion literature (Howerton, Bell, Dodd, Berrigan, Stozenberg-Solomon, & Nebeling, 2007; Knai, Pomerleau, Lock, & McKee, 2006). A power analysis (using an alpha level of .05 and an effect size of .5 based on data from this study) indicated that we only had 54% power for the group by time interaction; to have 80% power to test the group by time interaction with a repeated-measures analysis of variance, we would have needed 70 participants per group. In addition, it is important to interpret our preliminary findings regarding child F&V consumption with caution because of the parent report methodology used, which did not include training on portion size estimation. However, parent reports of small changes in children's F&V consumption are consistent with our research team's own direct assessment of children's eating behaviors in the school cafeteria (Blom-Hoffman, Franko, Power, Stallings, Dai, & Thompson, 2007).

The books were read by a large group of parents and were disseminated in an efficient

manner. Costs associated with the books included time spent writing and formatting the book, translating, and printing. Once completed, very few resources were spent disseminating the books. Each book cost approximately \$3.38, including translation and printing expenses. Relative to other modes of family involvement in school-based initiatives, the books enabled large numbers of families to participate and served to provide consistent health messages between home and school environments. In contrast, other forms of family involvement in school-based nutrition education initiatives have considerable limitations. In-school events often require sufficient resources to organize and host, and sometimes are met with extremely poor parent attendance. Newsletters cost little to develop and disseminate, but it is unclear how many parents actually read and discuss them with their children. The interactive books assigned as homework address these limitations by engaging families around health information.

This study suggests that the use of interactive books has promise as a mechanism of conveying knowledge. The program did not change home F&V availability/accessibility. This finding is consistent with other health education research (e.g., Blom-Hoffman & DuPaul, 2003) indicating the provision of knowledge is not sufficient for behavior change. To improve F&V availability and accessibility, particularly in under-resourced communities, major environmental changes are likely required (e.g., supermarket availability; food pricing).

There were a number of limitations in this preliminary study that should be addressed in future research. First, this study compared a group of parents who received a multilevel program that included the family component described in this study to a control group. Therefore, it is unclear if the parent knowledge change resulted from the books alone or the books in combination with knowledge that the children brought home from school. Future research efforts can explore the individual and combined effects of the F&VPP components. Second, book return rates declined across time. Classwide ap-

proaches (e.g., interdependent group contingencies) can be established to increase the number of books returned. Third, because of practical reasons, schools as opposed to participants were assigned to study condition; therefore, children and parents were nested within schools. Fourth, three books in this study promoted the 5 a Day message. In 2007, 5 a Day was replaced by Fruits and Veggies—More Matters (Produce for Better Health Foundation, 2007), a campaign promoting individualized recommendations based on gender, age, and physical activity level, and communicated in cups instead of servings (<http://www.fruitsandveggiesmatter.gov/>). As such, these books should be revised to reflect the new message. Fifth, children's F&V consumption was assessed via parent report. Future research should use more rigorous dietary assessment methods (e.g., 24-hour recalls; Lytle et al., 1993). Finally, the selection of anchor points for the parent and child acceptability measures may have had an influence on ratings. Respondents may have been reluctant to use the lowest anchor point (i.e., "never"; S. McConaughy, personal communication, January 22, 2008). Nevertheless, the majority of parents and children reported liking the books "a lot," and learning "a lot" from them, suggesting that the level of acceptability was at least moderately high. Finding ways to create effective, acceptable, feasible mechanisms to promote home-school collaboration related to healthy eating is important. This pilot study illustrates one such effort.

### Footnotes

<sup>1</sup>The systematic review of school-based, elementary-level nutrition education articles was conducted in the summer 2007 and included articles identified through PubMed and PsychInfo. A complete list of article citations and descriptions of the types of family activities included in the programs can be obtained from the first author.

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Liam Dunn, MA, is a graduate student in the School Psychology program at Northeastern University. His research interests include bullying and victimization prevention, resiliency in students of low socioeconomic status, and school-based nutrition interventions that promote healthy eating in children.

Stephen S. Leff, PhD, is an Associate Professor of Clinical Psychology in Pediatrics at the University of Pennsylvania School of Medicine and a Psychologist at The Children's Hospital of Philadelphia. He directs two National Institute of Mental Health funded intervention programs: the Friend to Friend Program, a group intervention program for inner-city relationally aggressive girls, and the Preventing Relational Aggression in Schools Everyday Program, a classroom-based relational aggression intervention. His publications and research interests include aggression prevention in the urban school and community settings, bully-proofing school playgrounds, gender differences in the expression of aggression, and partnership-based approaches to measurement and intervention development.

Thomas J. Power, PhD is Professor of School Psychology in Pediatrics and Education at University of Pennsylvania and Director of the Center for Management of ADHD and Community Schools Program at The Children's Hospital of Philadelphia. His research focuses on developing multisystemic interventions for children with ADHD and developing community-based prevention and early intervention initiatives.

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