

Impact of Let's Go! 5-2-1-0: A Community-Based, Multisetting Childhood Obesity Prevention Program

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Objective Document the impact of Let's Go!, a multisetting community-based childhood obesity prevention program on participants in 12 communities in Maine. **Methods** The study used repeated random telephone surveys with 800 parents of children to measure awareness of messages and child behaviors. Surveys were conducted in schools, child care programs, and afterschool programs to track changes in policies and environments. **Results** Findings show improvements from 2007 to 2011: Children consuming fruits and vegetables increased from 18%, 95% CI [15, 21], to 26% [23, 30] ($p < .001$); children limiting sugary drinks increased from 63% [59, 67] to 69% [65, 73] ($p = .011$); and parent awareness of the program grew from 10% [7, 12] to 47% [43, 51] ($p < .001$). Participating sites implemented widespread changes to promote healthy behaviors. **Conclusions** A multisetting, community-based intervention with a consistent message can positively impact behaviors that lead to childhood obesity.

Key words health education; health promotion and prevention; obesity; public health.

The obesity epidemic is widely acknowledged as one of the greatest public health challenges in the United States for children (Stroup, Johnson, Hahn, & Proctor, 2009). Over the past 30 years, obesity rates among children and adolescents aged 2–19 increased nearly threefold from 6 to 17% (Fryar, Carroll, & Ogden, 2012). Obesity now affects more than one in six children in the United States. The situation is similar in Maine, with a 2011 youth health surveillance study recording 23% of kindergarten students, and 24% of fifth grade as obese. Adding those students who were also overweight, Maine's study showed 38% of students in kindergarten, and 44% of students in fifth grade were either overweight or obese (Maine Department of Health and Human Services & Maine Department of Education, 2011).

The effects of being overweight are acute among children. Overweight and obese children are much more likely

than their healthy weight peers to become obese adults, (Freedman et al., 2005; Guo et al., 2000; Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008), and they face increased risks for many chronic health and mental health conditions (Bray, 2004; Dietz, 1998; Freedman, Dietz, Srinivasan, & Berenson, 1999; Loth, Mond, Wall, & Neumark-Sztainer, 2011; Must, Jacques, Dallal, Bajema, & Dietz, 1992).

The dramatic rise in obesity over the past three decades occurred at the same time as major environmental, social, and lifestyle changes. These days, Americans consume more fast foods and sugary drinks than ever before; processed foods are low-cost and readily available; and people engage in more sedentary leisure time activities such as viewing television or using electronic devices (Hill, Wyatt, Reed, & Peters, 2003). Overweight is a result of a calorie imbalance, genetics, and health status

that can be impacted by improving diet, increasing physical activity, and reducing sedentary activity (Berkey et al., 2000; Swinburn, Caterson, Seidell, & James, 2004). Like some other chronic health conditions, with focus and effort, obesity and overweight can be reduced and even prevented.

In 2006, concerned about the health and economic impacts of childhood obesity in Maine, the United Way of Greater Portland convened six of the region's largest employers to launch Let's Go!, a community-based approach to improve the underlying health behaviors that have been demonstrated to impact overweight and obesity: Healthy eating and physical activity (American Academy of Pediatrics, 2003; Berkey et al., 2000; Must, Barish, & Bandini, 2009; Swinburn, Caterson, Seidell, & James, 2004). The initial program was operated as a five-year demonstration project in 12 contiguous municipalities, including Portland, Maine's largest city, with plans to spread the work to other parts of the rural state.

The Let's Go! model design had two major components: Deploying a simple consistent message, 5-2-1-0, across multiple community settings to remind families and children how to make healthy choices, and implementing changes to environments as well as policies that support the healthy choices in six settings where families live, learn, work, and play. The mnemonic, 5-2-1-0, represents four recommendations for healthy eating and physical activity each day: "eat five or more servings of fruits and vegetables," "limit of two hours or less of recreational screen time," "engage in one hour or more of physical activity," and "limit sugary drinks; drink more water and low fat milk" (Rogers & Motyka, 2009). The six settings included schools, child care programs, afterschool programs, health care practices, worksites, and community sites. The multisetting approach follows the social ecological model that has guided many public health interventions to promote sustainable behavior change (Stokols, 1996). The model recognizes the complex set of influences on a person's behaviors, such as family customs, local culture, supporting environments, and policies in the places where people spend time such as at school, work, and recreation sites.

The primary goal of this study was to evaluate the Let's Go! program hypothesis that by exposing families and children to a consistent health message in multiple settings, and by changing influential environments to support healthy choices, the awareness, knowledge, and practice of the healthy behaviors will increase. The Centers for Disease Control and Prevention (CDC) implemented a similar comprehensive social marketing campaign to promote the single behavior of physical activity among 9-

13-year-olds by delivering messages through mass media, school and community promotions. The Verb™ campaign, as it was called, demonstrated that by using traditional marketing approaches, a coordinated campaign with a specific message to encourage healthy choices can have a positive impact on awareness and behaviors. During the campaign, youth awareness of the brand increased from 66 to 73%. The study recommendations call for a multiyear commitment to branding and assert that the messages be appealing to audiences to motivate behavior change (Asbury, Wong, Price, & Nolin, 2008; Banspach, 2008). The results of the Verb™ campaign also speculated that a comprehensive campaign may be too resource intensive for local communities to implement on their own (Asbury, Wong, Price, & Nolin, 2008).

A second aim of our study was to assess the strength of the environmental and policy changes implemented in three of the six settings: Elementary schools, child care programs, and afterschool programs. The Let's Go! model is a community-based approach, reaching most community members through its media messages and encouraging its voluntary partners to determine their own priorities for change. Economos et al. (2007) found that an intensive multifaceted approach involving schools, families, the community, and the engagement of medical providers in Somerville, Massachusetts, was effective in slowing the rate of increase of overweight and obese children. The authors report "a decrease in BMI z-score by $-.1005$ ($p = .001$, 95% confidence interval) among study participants compared with children in control communities after controlling for covariates" (Economos et al., 2007, p. 1325). However, the Somerville experiment was conducted in a community with which it had an existing relationship, and its findings cautioned that future interventions would need "to establish a method of collaboration to replicate the intervention" (Economos et al., 2007, p. 1334).

The studies just described provide insight on specific interventions and approaches with individuals in controlled research-based settings. Evidence is lacking on approaches that can be implemented and sustained at the community level. It is clear from the literature that prevention strategies need to involve population-based interventions that target the places where people spend time, and they should be practical to implement and enforce. In this study, we analyze the depth and scope of environmental changes implemented by partners in this community-based project and the contribution to changes in knowledge and adoption of healthy behaviors.

Method

Study Design

The study was designed to document changes in healthy behaviors as well as changes in policies and environments that support the healthy behaviors among participants from 2007 through 2011. Specifically, we measured awareness, knowledge, and healthy behaviors of adults and their children in the 12 municipalities and also tracked the extent of the program implementation at the participating elementary schools, child care programs, and afterschool programs. We did not conduct similar evaluations in the health care, community, or workplace settings owing to limited resources during the demonstration project. The study used a quasi-experimental design that compared measures before, during, and after program implementation (Shadish, Cook, & Campbell, 2002). We did not use a comparison or control community group. A telephone survey conducted with a cross section of area parents, randomly selected at three points in time, assessed child behaviors as well as parent awareness and knowledge of the Let's Go! program and the 5-2-1-0 message. Setting specific measures gauged the implementation of the program strategies at each participating site. Maine Medical Center's Institutional Review Board for the protection of human subjects approved all survey instruments and protocols prior to administration and granted waivers of informed consent.

Participants

The participants in the project included staff, patrons, and their families at the participating sites from the six settings of interest: Child care programs, schools, afterschool programs, community sites, health care practices, and worksites in the 12 communities including and surrounding Portland, Maine, the locus of business for the founding partners. The communities included Cape Elizabeth, Cumberland, Gorham, Falmouth, Freeport, North Yarmouth, Portland, Scarborough, South Portland, Westbrook, Windham, and Yarmouth. These communities account for ~209,000 of the state's 1.3 million residents, with 49,000 children ≤ 19 years of age. Per capita income for the region in 2010 was \$32,395, with 11% of households living below the federal poverty levels; 91% identify as White, 3% as Black or African American, and 3% as Asian (U.S. Census Bureau, 2010). Program media covered the entire population in the region, and all sites within the six priority settings were invited to participate in the program.

At the end of the five years, site involvement in the demonstration project grew from no participation prior to

the project to include 56 of the 70 eligible schools educating 23,000 students, 34 child care programs caring for 1,400 children, 28 of 33 area afterschool sites engaging 1,800 students, 29 of 62 health care practices, seven of the region's largest employers, and community organizations from each of the 12 municipalities.

Let's Go! Program Description

The Let's Go! program consists of two components: A communications campaign and community-based interventions in six settings. A staff of eight public health professionals, five full-time and three part-time, managed the design, implementation, and evaluation of the multi-faceted project. They supported the demonstration project as advisers to the participating sites in the Portland region.

Communications and Messaging Campaign

Throughout the 5-year demonstration project, Let's Go!'s marketing firm executed a comprehensive media campaign to increase awareness of the 5-2-1-0 message among children and their families with advertisements broadcast on television and spread through more targeted local marketing approaches such as on signs wrapped on the outside of City of Portland buses, in short videos aired in movie theaters before the feature presentation, on web-banner advertisements on local news station Web sites, on signs in sports arenas, and through a multi-page program Web site. Television messages promoting the 5-2-1-0 message and the individual healthy lifestyle behaviors ran on the major television-network stations throughout the life of the demonstration project. The broadcast media spots used community members to encourage families and children to eat fruits and vegetables, to get outside and be active together, to drink water, and to prepare healthy meals from low cost options such as frozen and canned vegetables. Local communications included posters and storyboards used in StoryWalks™ for local youth events. In addition, the Let's Go! mascot named Redy, a large red costumed character, made appearances on request at local events to promote healthy lifestyles.

Community-Based Interventions

Concurrent with the media campaign, Let's Go! staff worked with area partners to implement 10 strategies in the six priority settings, with a special focus on schools, child care programs, and afterschool programs. These partners volunteered to act as local champions to facilitate implementation of the program at their own site either in a school, an early child care program, or an afterschool

program. The 10 strategies promoted in local sites were as follows:

1. encourage healthy choices for snacks and celebrations;
2. participate in local, state, or national initiatives that promote physical activity and healthy eating;
3. include community organizations in wellness promotion;
4. involve and educate families in initiatives that promote physical activity and healthy eating;
5. encourage water and low fat milk instead of sugar-sweetened drinks;
6. discourage the use of food as a reward and use physical activity as a reward;
7. incorporate physical activity into the school day;
8. develop a 5-2-1-0-friendly staff wellness program;
9. collaborate with School Nutrition Program; and
10. implement or strengthen a wellness policy that supports the 5-2-1-0 strategies.

The strategies and intervention approaches were adapted to each setting, tailoring toolkits, handouts, and other materials for the specific audience. See Table I.

Schools

Let's Go! staff introduced the program to local schools by first identifying a staff member, called a Let's Go! Champion, who was interested in leading the work, and then providing that person with a toolkit, guidance, and support on how to implement the 10 strategies. Let's Go! recommends that the schools create teams to set local priorities, develop a work plan, and share the implementation tasks. The two 5-2-1-0 Goes to School toolkits, one for the elementary level and another for middle and high school levels, provided schools with guidance on how to create a team, how to conduct assessments of school supports of healthy eating and physical activity, and how to implement activities that support the 5-2-1-0 messages. The toolkits also contained examples of school policies that could support the 5-2-1-0 behaviors. In addition, Let's Go! staff gave the school teams marketing materials, newsletters, and convened an annual symposium for peer-to-peer sharing and networking. Throughout the five years, a limited number of small grants up to \$2,500 were given to schools through a competitive application process.

In addition to the school-based teams, Let's Go! facilitated a workgroup for the school nutrition directors to help them offer healthier options in their school lunch programs. The members of the group worked together to identify their priorities, to share ideas for implementation,

Table I. Let's Go! Program Implementation Components by Setting

Program component	Licensed child care programs	Elementary schools	Afterschool programs	Health care practices	Community sites
Project champions and team members ^a	Owner, A,T,P	A,T,P, SHC, nurses, nutrition directors	A,T,P, aides	Practice managers, medical staff	A,V, site participants
Strategies	9 of 10 ^b	All 10	All 10	N/A ^c	By site
Promotion/outreach materials	Toolkit ^d , posters, handouts	Toolkit ^e , posters, handouts	Toolkit ^f , posters, handouts	Toolkit ^f , posters, handouts	Designed by each site
Let's Go! support ^g	TA, SV, PM, E	TA, SV, PM, S, NDW, W, E	TA, SV, PM, E	TA, PM academic detailing	Monitoring
Number of mini-grants	34 grants	130 grants	0	0	15 grants

Note: ^aA = Administrators; T = Teachers; P = Parents; V = Volunteers; SHC = School Health Coordinators.

^bChild care programs did not implement the strategy to work with school nutrition programs.

^cHealth care practices used 5-2-1-0 healthy habits materials and did not use the 10 strategies that were more appropriate for schools, child care programs, and afterschool programs.

^d2110 Goes to child care toolkit.

^e2110 Goes to school toolkit.

^f2110 Goes after school toolkit.

^gTA = technical assistance; PM = performance monitoring; SV = site visits; S = symposium; NDW = nutrition director workgroup; W = webinar for information sharing; E = evaluation.

and met periodically to discuss their progress on implementing changes.

Child Care Programs

The Let's Go! child care program site-based work replicated the school intervention by identifying local champions, sharing materials and 5-2-1-0 Goes to Child Care toolkits, and providing guidance on the implementation of the strategies to support healthy eating and physical activity. In addition, all materials were adapted for use with infants and children from birth through age two. Like the school effort, Let's Go! granted small amounts of funding to some sites. In addition to the site-based work, program staff worked with state licensing and training agencies to include the 5-2-1-0 message in their curriculum and materials used to train and certify licensed child care programs. Moreover, the United Way of Greater Portland also required child care programs to adopt 5-2-1-0 strategies as program policy as a condition of receiving agency funding.

Afterschool Programs

Similar to the school and child care program site-based work, Let's Go! promoted the 5-2-1-0 messages and the 10 environmental change strategies to increase healthy eating and physical activity in the area afterschool programs. Let's Go! provided the programs with a 5-2-1-0 Goes After School toolkit and technical assistance. The afterschool setting Let's Go! interventions reinforced the 5-2-1-0 message that the children were seeing in their schools.

Health Care Practices

The Let's Go! health care intervention was built on the earlier Maine Youth Overweight Collaborative effort that encouraged providers to reinforce the 5-2-1-0 messages and support healthy choices (Polacsek et al., 2009). Including health care providers added credibility to the demonstration project and helped reinforce the link between the recommended behaviors and maintaining good health. Using the Let's Go! Health Care toolkit, providers were encouraged to take three steps: (1) hang a 5-2-1-0 poster in the waiting room to share the message, (2) weigh and measure patients accurately and compute body mass index and weight status, and (3) hold conversations with patients and families about healthy habits and weight-related issues.

Worksites

When the project began, Let's Go! worked with the seven founding business leaders to introduce the 5-2-1-0 concept to their employees in an effort to support the messages that families were seeing in the community. As the program

grew and the effort concentrated on the places where children could be reached directly, the Let's Go! worksite intervention evolved into a set of resources and tools housed on the program Web site for use by interested employers. Let's Go! furnished local worksite champions with newsletters, posters, and materials developed for the other settings, as requested.

Community Sites

In addition to the media and outreach efforts in the 12 communities, Let's Go! also provided a total of 15 small grants, ranging from \$1,500 to \$10,000 through a competitive application process, to community organizations and municipalities to seed local projects. During the five years, community grantee organizations improved local trails; added way-finding signs for biking, hiking, and skiing trails; increased access to drinking water; sponsored a cultural dance program for children of immigrants; introduced snowshoeing to children; and created an intervention for Sunday school programs. Three child care centers shared the largest grant award to fund new equipment for preparing meals from scratch as well as to increase options for physical activity.

Measures

Awareness, Knowledge, and Behavior Changes

To measure awareness, knowledge, and behaviors related to the 5-2-1-0 message, we conducted telephone interviews with parents in 2007, in 2009 at project mid-course, and in 2011 at the end of the five-year demonstration. Eight hundred parents of children, ages newborn to 18 years, living in the Let's Go! Greater Portland communities were randomly selected for each set of interviews. Each survey wave had a sampling error of 3.5% at the 95% confidence level, and sampling response rates using the AAPOR RR3 calculations were 24% for 2007, 20% for 2009, and 26% for 2011 (AAPOR, 2011).

The questionnaire was tested with 10 respondents before full administration, and none of them raised any problems with the questions. Respondents were screened for current place of residence, having one or more children under the age of 18, living in the household at least 7 months of the year, and not be employed or have any member of their immediate family who is employed in the fields of advertising, market research, or journalism. Interviews in each survey wave lasted 18 min on average.

In 2007, the survey sampling followed a stratified approach to interview a similar number of parents in each of the 12 participating municipalities. In 2009 and 2011, the samples were selected from the pooled 12-town region.

The final datasets used in the analyses were weighted to represent the proportion of households by income levels for each municipality to allow comparison among the three waves.

The survey instrument covered six domains and 89 items in 2007, and 79 items in 2009 and 2011, including parent knowledge of the 5-2-1-0 recommendations, parent behaviors, child behaviors, awareness of and receptivity to program communications, future intentions to change behaviors, and family demographics. We removed questions from 2007 to 2009, to shorten survey length. The behavioral questions were adapted from the U.S. CDC's Youth Risk Behavior Survey (Centers for Disease Control and Prevention [CDC], 2007) and the Behavioral Risk Factor Surveillance Survey (CDC, 2007), and the awareness questions followed standard recall and awareness interrogatories used in measurements of advertising effectiveness (Zielske & Henry, 1980).

Environmental and Policy Supports

Changes in environmental and policy supports were assessed directly with site-based partners. We developed surveys to measure the extent of implementation of the 10 recommended Let's Go! strategies in the three settings with the greatest numbers of participating sites: Elementary schools, child care programs, and afterschool programs. We did not develop comparable surveys for participating community organizations, worksites, or health care practices.

Champions in schools, child care programs, and afterschool programs completed implementation surveys during the months of May and June each year. The survey instrument covered four domains of questions: Team supports, community involvement, implementation of the 10 strategies, and formal policies supporting 5-2-1-0 strategies. The three surveys varied in length: The elementary school survey contained 50 questions; the child care provider survey had 30 questions; and the afterschool program survey included 26 questions. The respondents reported on their site experience with implementation by responding to one of six categories: *Not implemented, in the planning stage, implemented in some classrooms (programs), implemented in most classrooms (programs), implemented school (program) wide, implemented school (program) wide in previous years and continuing to implement.* Respondents were encouraged to review responses with colleagues active in the work for site verification. Response rates among participating sites for the 2010-2011 program year were as follows: Child care setting (94%; $n = 16$); elementary schools (73%; $n = 29$); and afterschool programs (88%; $n = 15$).

Overview of the Analysis

To demonstrate the impact of the Let's Go! intervention, we compared key variables across the three waves of parent surveys. We analyzed changes in parent awareness and knowledge of the program and the 5-2-1-0 message, as well as reports of their child's behaviors. Specifically, we analyzed parent awareness of the Let's Go! media messages, self-reported exposure to the Let's Go! and 5-2-1-0 messages in different settings, parent understanding of each of the numbers in the 5-2-1-0 mnemonic, knowledge of the four 5-2-1-0 health behaviors, and adherence to those recommendations. The comparisons were conducted using the Cochran–Mantel–Haenszel linear-by-linear association chi-squared test to examine differences among the cross-sectional survey data from three points in time. Analysis procedures were performed using SPSS version 20 and SUDAAN version 10.0.1, software designed to handle complex sample designs. In addition, we used the 2011 implementation survey findings from the three settings to assess the extent of the implementation of the 10 Let's Go! strategies at the end of the demonstration project.

Results

Participant Characteristics

In the 2011 parent survey, respondents were 67% female, 50% under the age of 45, 44% college graduates, and 37% with household incomes of <\$50,000. The respondents' children, described in the survey responses, had a mean age of 11.3 years ($SD = 4.7$). The respondents to the first and second survey waves shared similar demographics. The mix of survey respondents was similar to the regional census described earlier in educational attainment level, family income, and age, but had a higher proportion of females represented, 67%, compared with 52% in the population.

Impact of the Multi-Level Intervention on Awareness and Health Behaviors

The analysis of the parent-survey data shows statistically significant increases in the proportion of parents reporting awareness of Let's Go! and the 5-2-1-0 message, knowledge of the four 5-2-1-0 recommendations, and child adherence with two of the 5-2-1-0 healthy behaviors over the five-year program. The survey findings showed improvements in two of the four behaviors: Parent-reported child adherence to eating five or more servings of fruits and vegetables each day and limiting consumption of sugary drinks each day. See Table II. Overall, 31%, 95% CI [25, 36], of parents reported that their child met at least three of the four

Table II. *Changes in Parent Awareness of Program Messaging and in Child's Behaviors*

Measure	Survey 1	Survey 2	Survey 3	χ^2 ^a	p-value
	2007 N = 801%, 95% CI	2009 N = 800%, 95% CI	2011 N = 802%, 95% CI		
Have you ever heard of Let's Go! a health promotion campaign in your area?	10 [7, 12]	45 [41, 50]	47 [43, 51]	13.12	<.001
Have you ever heard a health message using the phrase 5-2-1-0?	14 [11, 16]	43 [39, 47]	55 [51, 59]	36.35	<.001
Correctly identify four healthy behaviors	41 [37, 45]	42 [38, 46]	47 [43, 51]	5.96	.015
Child adherence to eat five fruits and vegetables daily ^b	18 [15, 21]	22 [19, 25]	26 [23, 30]	15.91	<.001
Child adherence to limit recreational screen time to <2 hr ^c	41 [37, 45]	44 [41, 48]	45 [40, 49]	2.35	.125
Child adherence to engage in at least 1 hr of physical activity	61 [57, 65]	62 [58, 66]	60 [55, 64]	.56	.456
Child adherence to limit sugary beverages to <1 per day	63 [59,67]	66 [61, 70]	69 [65, 73]	6.42	.011

Note: CI = Confidence interval. Survey 1 is April–May; Survey 2 is May to July; Survey 3 is April to June.

^aCochran–Mantel–Haenszel χ^2 test.

^bConsumption of five fruits and vegetables does not include consumption of fruit juice.

^cCombined percentage of child's television viewing and other screen time behaviors.

recommendations in 2011. Parents reported favorable impressions to a description of the program in 2011; the majority of parents, 73%, 95% CI [69, 77], reported the program as “very positive” on a 5-point Likert scale; the question was not asked in 2007.

The survey interviewers asked parents whether they had seen or heard the Let's Go! or 5-2-1-0 messages using a prompted list of settings. Among parent respondents in 2011, 59%, 95% CI [53, 65], recalled seeing messages on television, 45%, 95% CI [39, 51], at school, 40%, 95% CI [34, 46], in a doctor's office, 34%, 95% CI [28, 39], in materials sent home from school, and 18%, 95% CI [13, 23], at work. The affirmative response of exposure in each setting was counted for each respondent to create a variable that described the total number of reported exposures to the messaging. Three categories of message exposure in multiple settings were created: “0,” “1–2” settings, and “3 or more” settings. Results indicated a positive association between program and message awareness and message exposure in multiple settings. Moreover, applying the same test for trends, parents with higher message exposures were more likely to identify correctly each of the specific 5-2-1-0 recommendations. See Table III.

Parent intentions to make changes “in the next six months” to support their child's healthy choices showed no significant differences over the three survey waves. In 2011, 41%, 95% CI [37, 45], of parents reported that they were likely to make changes to increase their child's physical activity; 40%, 95% CI [36, 44], reported intentions to make future changes to encourage their child's consumption of fruits and vegetables; and 20%, 95% CI [17, 23],

reported intentions of future changes to encourage limits on their child's sugary drinks.

Implementation of the Let's Go! Strategies by Setting

The site-based implementation survey results show widespread implementation of the 10 Let's Go! strategies in child care programs, elementary schools, and afterschool programs. Most of the sites in the three settings reported implementation of the 5-2-1-0 strategies *in most or all of their classrooms* by 2011. See Table IV. The three most commonly implemented strategies were encouraging healthy choices for snacks, encouraging drinking water, and increasing physical activity during the day. Limiting recreational screen time and strengthening or adopting wellness policies were the least commonly implemented.

Discussion

The findings from this 5-year demonstration project suggest that parent exposure to an evidence-based community-level intervention bolstered by a coordinated messaging campaign was associated with higher levels of parent knowledge and greater prevalence of child health behaviors necessary to prevent childhood obesity in a community. Over the same time period that Let's Go! was promoting the 5-2-1-0 message, parents reported positive reactions, and greater awareness for the specific program and the 5-2-1-0 message. These findings suggest that it is possible for a community to implement a multiyear branding campaign aimed at behavior change that is appealing

Table III. Percentage of Parents Aware of Program Messages by Numbers of Reported Exposures, 2011

Measure	Zero (<i>n</i> = 137), % 95% CI	1-2 (<i>n</i> = 106), % 95% CI	Number of reported settings of exposure		
			≥3 (<i>n</i> = 198), % 95% CI	χ^2 ^a	<i>p</i> value
Parents reporting awareness of Let's Go! or 5-2-1-0	34 [28, 40]	64 [55, 73]	85 [80, 90]	19.50	<.001
Parents correctly identifying all four 5-2-1-0 recommendations	39 [33, 44]	51 [42, 61]	58 [51, 65]	43.15	<.001

Note: CI = Confidence interval. Table includes only parents with any reported message awareness, *n* = 441. The responses do not include parents reporting no awareness of the messaging. Total survey sample size is *N* = 802.

^aCochran-Mantel-Haenszel, a linear-by-linear association χ^2 test.

Table IV. Percentage of Sites Implementing the Let's Go! Strategies in Most or All Classrooms, 2011

Let's Go! strategy	Child care programs (<i>n</i> = 16) %	Elementary schools (<i>n</i> = 29) %	Afterschool programs (<i>n</i> = 15) %
Healthy eating			
Encourage healthy choices for snacks	100	69	100
Encourage healthy celebrations	81	59	87
Encourage water	100	69	87
Encourage low or no fat milk	100	66	13
Discourage the use of food as a reward	100	62	80
Collaborate with the school lunch program	Not measured	66	33
Active living			
Limit recreational screen time to <2 h/day	56	45	47
Increase physical activity during the day	94	72	100
Changes to promote sustainability			
Implement or strengthen the wellness policy	38	55	Not measured
Include community organizations to promote healthy living	38	41	73

Note: Survey administered to local champions in April-May 2011. Reported percentages are not adjusted for non-responses.

and memorable, a concern voiced in the discussion of The Verb™ (Asbury, Wong, Price, & Nolin, 2008). The sizeable improvement in awareness, however, is coupled with a much smaller improvement over the same time period for two of the four behaviors. This finding is a reminder of the complex set of influences that determine behavior and the psycho-social supports that may be needed to bring about behavior change in individuals. Awareness and knowledge of healthy behaviors along with supportive environments are some of the components that lead to behavior change, in conjunction with other motivating factors (Atkins & Michie, 2013).

Furthermore, this demonstration project describes how volunteers in schools, child care programs, and afterschool programs may implement site-based programs to promote healthy eating and physical activity when allowed to choose local priorities from a list of evidence-based strategies and when given consistent easy to understand messages. Adapting community-level interventions

to the unique circumstances of local settings is an important feature of effective interventions and increases community support for the intervention (McLaren, Ghali, Lorenzetti & Rock, 2007). The Let's Go! network of site-based volunteers serves as an extension of traditional health interventions, creating an important intersectoral approach that is far more effective than the health sector addressing a public health issue alone (Gilson, Doherty, Loewenson, & Francis, 2007). This study further reinforces the importance of building on existing community relationships as a viable approach to establish the partnerships essential for successful and sustained community-based obesity prevention interventions as called for by Economos et al. (2007) in the Shape Up Somerville project. However, the findings also show that while community partners implemented widespread changes to local environments, few reported having site-based policies that would codify and sustain the improved environments into the future.

The study has several limitations of note. Parent responses in the telephone surveys about their child's behaviors are subject to limitations in parent knowledge, and may be influenced by a parent's tendency to provide a socially desirable response. Our analysis focused on the differences in awareness and behaviors rather than the absolute results and so attempted to mitigate self-report and social desirability bias. Future research would be improved by using child reported behavior surveys, such as those administered in schools by state health departments, by using site-based observations of child behaviors, and by measuring child body mass index as the ultimate health outcomes. We are currently working with local and state education and health care professionals to identify the appropriateness of using existing longitudinal datasets of child behaviors, as well as height and weight measures, to quantify any changes in health behaviors and weight status.

In addition, the site-based surveys documented implementation at each site and the total populations frequenting each site, but the study did not measure the actual reach of participants impacted by the community-based program components. The study methods did not include a structured observational assessment to verify the site-reported outcomes. This will be important in future studies to check for consistency in reporting local outcomes. Finally, it is important to acknowledge that, as with most community-based programs focusing on important local issues, there were other child-centered healthy eating and physical activity efforts active in the region and state at the same time, making it difficult to attribute outcomes to a single program. Some of the programs included the Coordinated School Health Program, the Maine Nutrition Network, and WinterKids. Thus, it was not feasible to use a control or comparison region to isolate program effects. Although this may be a limitation in measuring specific impact, it is also an opportunity for future research to explore the collective impact of regional groups working together to address common issues (Kania & Kramer, 2011).

Recognizing the complexities and interconnections of the factors at play in preventing obesity, community-based programs and studies should focus on three components for future work: Engaging parents, strengthening policies in local sites, and expanding partnerships to harness collective impact. Parents and guardians play important roles in teaching and reinforcing healthy habits with their children. Future programs would benefit from supporting parents in creating and maintaining healthy home environments, so health messages seen and heard at school and in the community are then reinforced culturally and socially in the home environment.

In addition, building on the interest of local sites to change environments, community-based programs have an opportunity to develop and promote the adoption of model policies addressing healthy eating and active living in schools, child care, afterschool, health care, and other community sites to increase the possibility of sustaining and preserving the environmental changes and reinforcement of healthy habits. Community or regional partnerships like Let's Go!, with broader reach, may have more success in building support for these policy changes than single sites acting alone.

Finally, the Let's Go! program was founded by a group of area businesses that shared the same goal of reducing obesity among area children. Their commitment and collaboration was the catalyst for program development, implementation, and ultimate community engagement in the effort. Collective action by community leaders and organizations is a promising means to create community change to address complex public health issues such as childhood obesity.

In summary, a community-based awareness and environmental change approach to increase physical activity and healthy eating that reaches families in multiple settings was associated with improved parent understanding of these behaviors as well as some child behavior changes. Further, it shows that volunteers in schools, child care programs, afterschool programs, health care practices, community sites, and worksites make changes to their environments to support healthy eating and activity when given simple tools and information to support their efforts. A community-based multi-setting environmental change program, reinforced with a memorable message, is a viable foundation for mitigating the influences that lead to childhood obesity.

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References

- American Academy of Pediatrics. (2003). Prevention of pediatric overweight and obesity. *Pediatrics*, *112*(2), 424–430.
- Asbury, L.D., Wong, F.L., Price, S.M., & Nolin, M.J. (2008). The VERB campaign: Applying a branding strategy in public health. *American Journal of Preventive Medicine*, *34*(Suppl. 6), S183–S187.
- AAPOR (American Association for Public Opinion Research). (2011). *Standard definitions: Final dispositions of case codes and outcome rates for surveys* (7th ed.). Ann Arbor, MI: AAPOR.
- Atkins, L., & Michie, S. (2013). Changing eating behaviour: What can we learn from behavioural science? *Nutrition Bulletin*, *38*(1), 30–35.
- Banspach, S. W. (2008). The VERB campaign. *American Journal of Preventive Medicine*, *34*(Suppl. 6), S275.
- Berkey, C.S., Rockett, H.R., Field, A.E., Gillman, M.W., Frazier, A.L., Camargo, C.A. Jr, & Colditz, G.A. (2000). Activity, dietary intake, and weight changes in a longitudinal study of preadolescent and adolescent boys and girls. *Pediatrics*, *105*(4), E56.
- Bray, G.E. (2004). Medical consequences of obesity. *The Journal of Clinical Endocrinology & Metabolism*, *89*(6), 2583–2589.
- Centers for Disease Control and Prevention. (2007). *Behavioral risk factor surveillance system survey questionnaire*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Centers for Disease Control and Prevention. (2007). Youth Risk Behavior Survey Questionnaire. Retrieved from www.cdc.gov/yrbs. Retrieved February 2, 2007.
- Dietz, W.H. (1998). Health consequences of obesity in youth: Childhood predictors of adult disease. *Pediatrics*, *101*, 518–525.
- Economos, C.D., Hyatt, R.R., Goldberg, J.P., Must, A., Naumova, E.N., Collins, J.J., & Nelson, M.E. (2007). A community intervention reduces BMI z-score in children: Shape up Somerville first year results. *Obesity*, *15*, 1325–1336.
- Freedman, D.S., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (1999). The relation of overweight to cardiovascular risk factors among children and adolescents: The Bogalusa Heart Study. *Pediatrics*, *103*(6 Pt. 1), 1175–1182.
- Freedman, D.S., Khan, L.K., Serdula, M.K., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (2005). The relation of childhood BMI to adult adiposity: The Bogalusa Heart Study. *Pediatrics*, *115*(1), 22–27.
- Fryar, D., Carroll, M.D., & Ogden, C.L. (2012). Prevalence of obesity among children and adolescents: United States, trends 1963-1965 through 2009–2010. *National Center for Health Statistics*. Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_child_09_10/obesity_child_09_10.htm
- Gilson, L., Doherty, J., Loewenson, R., & Francis, V. (2007). Challenging inequity through health systems. *Final Report of the Knowledge Network on Health Systems*. Geneva: WHO Commission on the Social Determinants of Health.
- Guo, S.S., Huang, C., Maynard, L.M., Demerath, E., Towne, B., Chumlea, W.C., & Siervogel, R.M. (2000). Body mass index during childhood, adolescence, and young adulthood in relation to adult overweight and adiposity: The Fels longitudinal study. *International Journal of Obesity*, *24*, 1628–1635.
- Hill, O.J., Wyatt, H.R., Reed, G.W., & Peters, J.C. (2003). Obesity and the environment: Where do we go from here? *Science*, *299*, 853–855.
- Kania, J., & Kramer, M. (2011). Collective impact. *Stanford Social Innovation Review*, *1*(9), 36–41.
- Loth, K. A., Mond, J., Wall, M., & Neumark-Sztainer, D. (2011). *Journal of Pediatric Psychology*, *36*(2), 216–225.

- Maine Department of Health and Human Services & Maine Department of Education. (2011). *Maine Integrated Youth Health Survey*. Retrieved from https://data.mainepublichealth.gov/miyhs/report_fact_sheets
- McLaren, L., Ghali, L. M., Lorenzetti, D., & Rock, M. (2007). Out of context? Translating evidence from the North Karelia project over place and time. *Health Education Research*, 22(3), 414–424.
- Must, A., Barish, E.E., & Bandini, L.G. (2009). Modifiable risk factors in relation to changes in BMI and fatness: What have we learned from prospective studies of school-aged children? *International Journal of Obesity*, 33, 705–715.
- Must, A., Jacques, P.F., Dallal, G.E., Bajema, C.J., & Dietz, W.H. (1992). Long-term morbidity and mortality of overweight adolescents. A follow-up of the Harvard Growth Study of 1922 to 1935. *New England Journal of Medicine*, 327(19), 1350–1355.
- Polacsek, M., Orr, J., Letourneau, L., Rogers, V., Holmberg, R., O'Rourke, K., . . . Gortmaker, S. (2009). Impact of a primary care intervention on physician practice and patient and family behavior: Keep ME Healthy—The Maine Youth Overweight Collaborative. *Pediatrics*, 123, S258.
- Rogers, V., & Motyka, E. (2009). 5-2-1-0 goes to school: A pilot project testing the feasibility of schools adopting and delivering healthy messages during the school day. *Pediatrics*, 123, S272–S276.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton Mifflin.
- Singh, A. S., Mulder, C., Twisk, J. W. R., Van Mechelen, W., & Chinapaw, M. J. M. (2008). Tracking of childhood overweight into adulthood: A systematic review of the literature. *Obesity Reviews*, 9, 474–488.
- Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion*, 10, 282–298.
- Stroup, D.F., Johnson, V.R., Hahn, R.A., & Proctor, D.C. (2009). Reversing the trend of childhood obesity. *Preventing Chronic Disease*, 6(3), A83.
- Swinburn, B.A., Caterson, I., Seidell, J.C., & James, W.P.T. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutrition*, 7(1A), 123–146.
- U.S. Census Bureau. (2010). Profile of General Population and Housing Characteristics, 2010 for Maine. Retrieved from <http://econ.maine.gov/index/build>. Retrieved May 13, 2012.
- Zielske, H.A., & Henry, W.A. (1980). Remembering and forgetting television ads. *Journal of Advertising Research*, 20, 7.