5-2-1-0 Goes to School: A Pilot Project Testing the Feasibility of Schools Adopting and Delivering Healthy Messages During the School Day

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ABSTRACT

OBJECTIVE. Our goal was to determine the feasibility of school staff voluntarily adopting strategies to deliver health-promotion messages to primary and middle school students during the school day.

METHODS. During the 2006–2007 school year, we provided a resource kit with strategies for promoting physical activity and healthy eating through use of the 5-2-1-0 message (encouraging ≥5 servings of fruits and vegetables daily, limiting screen time to ≤2 hours per day, promoting ≥1 hour of physical activity daily, and avoiding sugar-sweetened beverages) to 7 primary schools and 2 middle schools in southern Maine. Teachers and administrators voluntarily implemented resource-kit strategies in classrooms and schools. The resource kit included educational handouts that could be sent home to parents. Administrators, teachers, and parents were surveyed at the end of the school year to ascertain their level of awareness of the project, ease of implementation, and perceived usefulness of the resource kit. In small discussion groups with students, we assessed their level of awareness of and attitude toward the 5-2-1-0 message.

RESULTS. Most administrators and teachers and half of the parents reported being more aware of the 5-2-1-0 message as a result of the project. Eighty percent of the teachers who reported using the resource kit found it easy or extremely easy to use. Ninety percent of the teachers reported that they would be willing to continue implementing strategies in the future; of those who would not, a lack of time was cited as the reason. All administrators reported that the project had been worthwhile for their district. Parents were less aware of the message than teachers and administrators; 2 in 5 parents reported receiving educational handouts. Most students responded positively to the messages.

CONCLUSIONS. It is feasible for primary and middle schools to voluntarily deliver health-promotion messages during the school day through implementing strategies from the 5-2-1-0 resource kit. For school staff to fully implement the strategies, time constraints, both real and perceived, need to be addressed.

During the past 2 decades, the prevalence of obesity among children and adolescents in the United States has increased significantly. Results from the 2003–2004 National Health and Nutrition Examination Survey indicated that 13.9% of children aged 2 to 5 years, 19% of children aged 6 to 11 years, and 17% of adolescents aged 12 to 19 years are at ≥95th percentile for BMI. In Maine in 2002, 15.2% of kindergarteners were at ≥95th percentile for BMI, and 21.3% were between the 85th and 95th percentiles for BMI. Among Maine high school students in 2007, 12.8% were at ≥95th percentile for BMI, and 13.1% were between the 85th and 95th percentiles for BMI. There is evidence that overweight in children and associated comorbidities often persist into adulthood. Medical problems associated with overweight include cardiovascular complications, type 2 diabetes, and psychosocial problems, among others.

To address the childhood obesity epidemic, it is necessary for pediatric communities to take a leadership role in prevention and early detection of childhood overweight; in both health care and community settings. Multicomponent interventions that include promoting physical activity in the school and family or community settings have been shown to have the potential to increase activity levels significantly. The Kids CO-OP (Clinical Outcomes and Outreach Program) at the Barbara Bush Children's Hospital at Maine Medical Center developed and piloted a wellness project called 5-2-1-0 Goes to School in 9 primary and middle schools in York County, Maine, during the 2006–2007 school year.

York County (population: 202,232) has a median household income of $48,363, with 10.7% of children younger than 18 years living in poverty. In 2005, 27.6% of children were eligible for free and reduced-price lunch. The population of York County is >97% non-Hispanic white, including 32.4% Franco American. Of those older than 5 years, 9.4% speak a language other than English at home.
TABLE 1  5-2-1-0 Resource-Kit Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
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<tbody>
<tr>
<td>Encourage healthy snacks brought in from home and available at school-related events.</td>
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<td>Provide healthy choices at school meals, including fresh fruits and vegetables on most days.</td>
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<td>Discourage the use of food as a reward.</td>
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<td>Promote reading by starting or continuing an incentive program.</td>
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<td>Participate in National TV Turn Off week or create your school’s own television turn-off week.</td>
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<td>Limit sedentary screen time and encourage the use of electronics that support physical activity and reduce inactivity.</td>
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<td>Incorporate physical activity into the school day by participating in “Take Time” or a similar program.</td>
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<td>Use physical activity as a reward.</td>
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<td>Increase the proportion of time in physical education classes during which students are physically active.</td>
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<td>Organize physical activity programs before and after school and/or during recess.</td>
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<td>Participate annually in 1 or more school-wide events that promote physical activity and wellness.</td>
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<tr>
<td>Offer water or low-fat milk and other healthy drink options at all school-related events.</td>
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<tr>
<td>Encourage water and low-fat milk as the drinks of choice during the school day.</td>
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The 5-2-1-0 Goes to School project tested the feasibility of schools voluntarily implementing strategies (Table 1) to increase healthy eating and physical activity among students during the school day. We built these strategies on the 5-2-1-0 message, which was originally used by the Maine Center for Public Health’s Maine Youth Overweight Collaborative, a learning collaborative for improving care and outcomes for overweight and obese youth. 5-2-1-0 stands for:

- 5—eat at least 5 fruits and vegetables per day
- 2—limit television and computer use (not related to school) to ≤2 hours/day
- 1—get ≥1 hour of physical activity every day
- 0—drink less sugar; try water and low-fat milk instead of soda and drinks with a lot of sugar

We also provided 5-2-1-0 educational materials in the communities in which the schools are located to create consistent messaging. Our goals were to (1) test the feasibility of schools promoting the 5-2-1-0 message and (2) promote healthy habits through the delivery of this message to students.

METHODS

Intervention Design and Implementation
The first phase of the project was the development of a steering committee and resource kit and the selection of schools. The committee consisted of a cross-section of stakeholders including school administrators, teachers, physicians, Coordinated School Health Program staff, school food service directors, a nutritionist, parents, and representatives of a local public health initiative, the Coastal Healthy Communities Coalition. This committee created an intervention for working with schools and teachers and developed the strategies offered in the resource kit. The resource kit was not a curriculum for teachers; rather, it was a resource to enhance curriculum with healthy messages and activities related to promoting these messages. A list of resource-kit contents is provided in Table 2.

During the summer of 2006, we met with superintendents, principals, and school boards from 3 school districts in southern Maine to propose our project. Seven primary schools and 2 middle schools with a total enrollment of 3570 students agreed to participate. From the onset, this project was voluntary for schools and staff; at participating schools, each teacher and staff member had the choice of whether to participate or not. The voluntary nature of this project was intended to make it less onerous for busy school staff to implement. Rather than providing staff with a mandatory curriculum, the resource kit offered a set of strategies from which staff could select and which could be implemented in a flexible manner.

The second phase of the project was the implementation of the resource kit in schools. A champion was identified at each participating school to spearhead the project. At some schools, staff teams were formed to oversee project implementation. At other schools, individual champions led the project. A resource-kit overview session was held at each participating school, and schools selected as many or as few strategies as they wished to implement on the basis of their individual capacities. Technical assistance was provided to help each participating school set goals related to implementing their chosen strategies. Monthly check-ins with the school teams and/or champions allowed for ongoing assistance.

In addition, we formed partnerships with local organizations, including doctors’ offices, recreation centers, and physical activity– and nutrition-oriented groups, to disseminate the 5-2-1-0 message throughout the community and provide consistent messaging to children and their families.

Data Collection and Analysis
In May 2007, we surveyed school administrators (including superintendents, principals, and assistant principals) and teachers on (1) awareness of the 5-2-1-0 message, (2) practice of implementing the resource kit, and (3) evaluation of the resource kit and overall project by using survey instruments that we developed. We surveyed parents on awareness of the 5-2-1-0 message and project, the usefulness of parent handouts, and changes made at home. Parent surveys were sent home with students and included addressed, postage-paid enve-
lopes for return by mail. We conducted small discussion groups with students to assess their awareness of and attitude toward the 5-2-1-0 message and its promotion in schools. To analyze results, we created univariate tables corresponding to each survey question. This project was approved by the institutional review board of Maine Medical Center.

RESULTS
One of the 9 participating schools dropped out of the project because of severe environmental issues in the school building that required the school to be relocated during the school year. Therefore, the project took place in 8 schools with a total of 16 administrators, 234 teachers, and 3570 students. Because of the voluntary nature of this pilot study, not all teachers participated. Of the 16 administrators approached, 13 (including 3 superintendents, 6 principals, and 4 assistant principals) (81%) responded to the feedback survey. Eighty-eight teachers (38%) responded to the feedback survey. Of the 3510 parent surveys sent home with students, 396 (11%) were returned.

Awareness

Administrators and Teachers
All administrators reported being aware that the project was taking place in their district. All administrators and 92.1% (n = 81) of the teachers reported being more aware of the 5-2-1-0 message as a result of the project. All administrators reported being aware of the meaning behind some or all of the numbers; 4 in 5 teachers reported knowing the meaning behind all 4 numbers. Tables 3 and 4 display sample quotations from administrators and teachers on their awareness, practice, and evaluation of the project.

Parents
Half (50% [n = 197]) of the parents reported being aware of changes occurring over the school year in the areas of nutrition and physical activity in their child’s classroom or school. Three (57.4% [n = 228]) in 5 parents reported being aware that the 5-2-1-0 project had been taking place in their child’s school. Although one third of the parents reported knowing the meaning behind all of the numbers, 2 in 5 parents did not know the meaning behind any of the numbers. Table 5 displays sample quotations from parents on their awareness, practice, and evaluation of the project.

Students
Most students were aware of the 5-2-1-0 message. Many students commented that they had seen the message not only in their schools but also in other community settings such as the doctor’s office, local hospitals, grocery stores, after-school programs, and the dentist’s office. Some students were unaware that the project existed but were familiar with some components of it. For example, they were aware that some classrooms used a dance video game, “Dance Dance Revolution,” to promote physical activity during the school day.

Practice

Administrators
Twelve (92.3%) of the 13 administrators reported that the 5-2-1-0 project contributed something new to existing obesity-prevention work in their school or district, and the remaining administrator reported having had no preexisting obesity-prevention work in place. Eleven (84.6%) of the 13 administrators reported that the project had strengthened their wellness policy.

Teachers
More than half of the teachers (56.6% [n = 43]) reported not having used the 5-2-1-0 resource kit. Of those who reported having used the kit (43.7% [n = 33]), 4 (78.8% [n = 26]) in 5 found it easy or extremely easy to use. Three (56.3% n = 49) in 5 teachers reported having implemented strategies from the resource kit; 2 (43.7% [n = 38]) in 5 reported that they did not imple-

TABLE 3 Sample Administrator Comments on Awareness, Practice, and Evaluation

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<td>“Great program, supports the needs of our community and students. This is not a curriculum but needs to be embedded in all curricula. Got some new ideas for programming fun activities. The students really could understand the message. They became creative with food to be served at activities. Validated the importance of good nutrition and exercise for children as well as adults. It added support to our message and weight to our objectives for students. It gave us more resources and common language. It pushed us to follow through and implement activities through the school year that were school-wide as well as classroom based. 5-2-1-0 was a user-friendly, kid-friendly approach.”</td>
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TABLE 5 Sample Parent Comments on Awareness, Practice, and Evaluation

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<td>“I am... more aware of how much TV time my kids are getting. Now it’s in writing for my children to understand it is not just Mom saying it. I didn’t know a program was going on. I have been sending healthier lunches and snacks to school. Tried to set a better example by walking more, eating more fruits and vegetables, drinking more water, monitoring hours wasted on TV more closely. Adopted phrase “screen time” in the house. Gave her the veggies she requested. Stopped sending sweet treats for school parties. Zero sugar a little difficult to enforce. Confirmation of what we already did.”</td>
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TABLE 4 Sample Teacher Comments on Awareness, Practice, and Evaluation

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<td>“I realized that there are many ways to incorporate 5-2-1-0 into the daily curriculum. Also, children are excited about this. Easy to use. Students loved it! One more resource kit to review, but it wasn’t really a problem. Hard to fit more into the already busy days. I have so many notebooks—it got lost for a little while. They [students] became more literate, aware, verbal about the importance of healthy habits, eating, and lifestyles. I have so much on my plate already—I had difficulty knowing what to let go of. Great information... critical to get info to families. I think it is a helpful way to develop healthier habits.”</td>
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S274 ROGERS, MOTYKA
ment strategies from the resource kit. Half (49.4% \(n = 39\)) of the teachers reported having never sent re-source-kit handouts home to parents. Two (20.5% \(n = 32\)) in 5 reported having done so 1 to 3 times, 6 (7.5%) reported having done so 4 to 9 times, and 2 reported sending home all 10 parent handouts from the resource kit.

**Parents**
One third (33.1% \(n = 95\)) of the parents reported having made changes because of the 5-2-1-0 message. Two thirds (66.9% \(n = 192\)) of them reported making no changes.

**Students**
Table 6 displays quotations from students about how the 5-2-1-0 project influenced their behaviors relating to physical activity and healthy eating.

### Table 6: Sample Student Comments on Practice

<table>
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<tr>
<th>Comment</th>
<th>Percentage</th>
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<tr>
<td>&quot;I discovered new foods. I used to watch 4 hours of TV a day. I learned to eat healthier. I cut down on junk food and soda. I don't drink a lot of sugary drinks anymore. I go outside more. I used to eat candy before a [sports] game, but not anymore. I used to eat lots of junk food—I eat healthier now. I choose active play.&quot;</td>
<td>100%</td>
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**Evaluation**

**Administrators**
All administrators \((n = 13)\) reported that the project had been worthwhile for their school or district, and 7 (53.9%) of the 13 considered the project to have been extremely worthwhile. All administrators reported that they would recommend the project to other schools.

**Teachers**
Four (82.1% \(n = 64\)) in 5 teachers reported that the project had contributed something new to their school in the areas of physical activity and nutrition. Nine (89.5% \(n = 68\)) in 10 teachers reported being willing to continue implementing the project if it were to continue into the next school year. Among those not willing to continue implementing the project (10.5% \(n = 8\)), time constraint was the reason reported. Nearly three quarters (73.5% \(n = 61\)) of the teachers reported having seen changes in students as a result of the project.

**Parents**
Two (38.6% \(n = 154\)) in 5 parents reported receiving parent handouts from the resource kit. Nine (91.2% \(n = 145\)) in 10 parents who reported having received parent handouts, and who commented on their usefulness, did find them useful.

**Students**
Several students stated that they liked the project, using words like “fun,” “unexpected,” “fascinating,” and “awesome.” Other students stated that it was “a big change” and “a good way to get kids healthy.” Another student said that “it was exciting because it created positive competition for the students to be healthy.” Students also commented that “5-2-1-0” was easy to remember. One student commented that “it’s easier than remembering the new food pyramid.”

### Table 7: Sample Teacher Comments on Successes Implementing 5-2-1-0 Strategies

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<th>Comment</th>
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<tr>
<td>“Stretch breaks were incorporated throughout the day. We’re exercising at transition breaks. More children have yogurt...at lunch. More activity in the classroom and less sweets for snacks. Used the weight room as reward for homework completion. Walked outside with students. Encouraging water—kids always have water bottles.”</td>
<td>100%</td>
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**DISCUSSION**

We determined that it is feasible to implement voluntary staff-driven healthy messaging initiatives during the school day in primary and middle schools. All administrators considered the project to have been worthwhile, and of those, more than half considered it to have been extremely worthwhile. All administrators reported that they would recommend the project to other schools. Ninety percent of the teachers reported being willing to continue implementing the project if it were to continue into the next school year.

The 5-2-1-0 message is seen by some as a common language for school administrators, teachers, parents, and children to use when talking about healthy behaviors. One parent expressed that the 5-2-1-0 message gave her and her child a common language for discussing the importance of physical activity and healthy eating.

Schools and teachers were able to achieve small changes in the school environment. Table 7 describes some of the teachers’ successes in implementing small changes during the school day. Recently, Rodearmel et al\(^\text{10}\) found that the small-changes approach, which was proposed first by Hill et al\(^\text{11}\) and advocates small reductions in energy intake and small increases in energy expenditure to prevent excessive weight gain, successfully helped reduce weight gain in overweight children. The success of the small-changes approach suggests that there may be an important role in health promotion for the types of small changes that were implemented in the school environment as a result of this project.

5-2-1-0 Goes to School was designed to be conducted by school staff. Although hospital staff developed the resource kit and provided limited technical assistance to schools, project implementation occurred in schools by school staff. We intended for this to help promote sustainability and contain costs. Costs for this project were low; this project was completed over the course of a year with <1 full-time equivalent total staff time and a $5000 grant for materials and evaluation costs.

Although the provision of the resource kit alone was enough impetus for the project to take hold in some schools, others needed more support and technical assistance to establish the project. Although there was a part-time program coordinator available to provide tech-
technical assistance, some schools indicated that more support than we were able to provide would have eased project implementation. Two of the 3 districts that participated in this project also participate in the US Centers for Disease Control and Prevention Coordinated School Health Program and, therefore, had a school health coordinator to help implement the project. Having dedicated staff to work exclusively on school wellness helped to move this project along in several of the schools, but it was not essential to successful implementation. Other important factors that influenced ease of implementation were senior leadership support and the presence of a school implementation team, led by a program champion. Teams helped to reinforce the project throughout the schools.

All administrators in school districts already working on health promotion viewed this project as a way to enhance ongoing wellness initiatives in schools. Administrators appreciated the support of the children’s hospital in providing resources for this intervention and adding legitimacy to ongoing efforts. With the urgent need for a multicomponent response to the childhood obesity epidemic, children’s hospitals and physicians must play a role in developing and supporting obesity prevention and other programs promoting physical activity and healthy eating in community settings.

Time constraints were reported to be the biggest barrier to project implementation. Some teachers reported that they did not have time to review the resource kit to tie it into the curriculum and that they did not have enough time to implement the 5-2-1-0 strategies in their classrooms. Despite this, 89.5% of the teachers reported that they would be willing to continue implementing the 5-2-1-0 strategies during the next school year. This suggests that teachers did find the project worthwhile even as they were challenged to find the time to implement it.

There are some limitations to our data. The response rates among teachers (38%) and parents (11%) were low, although these were calculated on the basis of total potential population reached and not actual population reached, because that would be difficult to quantify as a result of the nature of the project.

CONCLUSIONS

Physician-supported school-based wellness initiatives may be an effective way to deliver health-promotion messages to students. Although administrators and teachers reported that this project was worthwhile for their districts and schools, the challenge of adopting projects such as this during the already-full school day remains. However, the 5-2-1-0 message and the voluntary delivery of this message through the use of a resource kit were perceived as simple and efficient ways to enhance ongoing wellness initiatives and bring a common language regarding physical activity and nutrition to school staff, students, and parents.

ACKNOWLEDGMENTS

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