Promoting Healthy Lifestyles in Children: A Pilot Program of Be a Fit Kid

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Be a Fit Kid is a 12-week program aimed at improving physical activity and nutritional habits in children. The physical activity component of the program emphasized cardiovascular fitness, flexibility, muscular strength, and bone development through running, yoga, jumping, and strength exercises. All activities were individualized and noncompetitive. The nutrition component focused on current dietary guidelines that emphasize a diet rich in vegetables, fruits, unsaturated fats, and whole grains, and low in saturated fat and sugar. Following the 12-week intervention, significant improvements were observed in body composition, fitness, nutrition knowledge, dietary habits, and in those who participated 75% of the time, significant reductions in total cholesterol and triglyceride levels were observed. Findings from the pilot trial suggest that health promotion programs can be well received by children and may favorably alter overweight and the development of adult lifestyle-related diseases.

Keywords: children’s health; physical activity; nutrition; childhood obesity

The National Institutes of Health recently reported that the number of obese children in America has nearly quadrupled in the past 30 years. This has triggered dramatic increases in type 2 diabetes and heart disease in adolescents and young adults. Obesity, type 2 diabetes, and heart disease are primarily associated with sedentary lifestyles and poor eating habits that have their roots in childhood (U.S. Department of Health and Human Services [USDHHS], 2001). Comprehensive health promotion programs aimed at children have great potential to prevent obesity, type 2 diabetes, and heart disease. Be A Fit Kid, a traveling 3-month after-school pilot program, was created to improve physical activity behaviors and nutritional habits in elementary schoolchildren and their families. The PRECEDE-PROCEED model (Green & Kreuter, 1991), a nine-step organizational planning process, was used in the design of Be A Fit Kid. The purpose of this article is to describe the Be A Fit Kid pilot intervention and offer suggestions for ways in which universities and communities can work together to implement innovative and successful health promotion programs in elementary schools.

METHOD

Sample

Child participants were recruited to participate in the program through flyers and announcements at school assemblies. The baseline sample consisted of 91 children, ages 6 to 12 years, from four elementary schools.

Authors’ Note: We would like to acknowledge the following undergraduate students for their contributions to the exercise intervention and data collection: Shirley Brown, Andrew Vaughn, Joe Bruner, Matilda Baker, Bruce Williams, and Jaime Stanford. We would also like to acknowledge the contributions of Rogue Valley Medical Center Laboratory, Ashland Food Cooperative, and the several community sponsors that contributed to the program including n’Spired Foods, Bob’s Red Mill, Nature’s Path, Lean Bean Burrito, Cycle Sport, Ski Ashland, Mt. Shasta Ski Park, Ashland Community Hospital, Senior Sam’s, Genisoy, Robert’s American Gourmet, Subway, Pyramid Juice, Great Harvest, and the RRRink.
schools. Preintervention data are presented for 91 children. The 12-week intervention was completed by 75 children (34 girls, 41 boys). The intervention was conducted in a primarily White, rural community.

**Protocol**

The program was offered 3 times each week after school for 2 hours each session for 12 weeks at each school. The intervention followed the same protocol at each school.

**Physical activity.** The physical activity component of the program emphasized cardiovascular fitness, flexibility, muscular strength, and bone development through running, jumping, yoga, and strength exercises. The physical activity portion of the intervention always began with lap running and running drills. The goals and number of laps completed varied for each child based on ability and fitness level. Following the children’s running activity, college students worked with participants in small groups. Strength training activities included lunges, squats, arm curls, chin-ups, sit-ups, and arm-hang; jumping activity involved jumping 30 to 40 times off 1½ foot blocks to the floor; and yoga involved several yoga poses and stretches. Hiking and ice-skating field trips were planned a few times during the term to break up the routine and provide exposure to other leisure-time physical activities.

An incentive program was established to motivate children and to reinforce their achievements through community contributions. In this regard, children were rewarded with healthy rewards such as whole-grain pancake mix or cereal as they met their individual goals that were continually created throughout the course of the program. Another motivator was the distribution of inexpensive plastic feet tokens and running medals (purchased from Fitness Finders) that could be attached to a wrist or backpack chain. These items were distributed to children as they accumulated laps on the track.

**Nutrition.** The nutritional aspect of the Be A Fit Kid intervention followed the physical activity component and focused on current dietary guidelines that emphasize a diet rich in vegetables, fruits, unsaturated fats, and whole grains, and low in saturated fat and sugar. All the children received the nutrition component of the intervention at the same time. A variety of foods, donated by community sponsors, were distributed to the children each session for them to sample. The food tasting portion of each session reflected the information delivered during the nutrition education portion of the session. For instance, salmon and almond butter were served during the healthy fat week. Nutrition packets were sent home each week to parents. Every child received a healthy raffle prize each week if parents signed a form indicating that they reviewed the weekly nutrition material. In addition, a field trip to a local supermarket took place each term where children learned which food items to select and had the opportunity to ask questions about different foods.

**Parent involvement.** More than 95% of parents of participating children attended an initiation lecture prior to the start of the program that covered nutrition and physical activity principles. Parents were asked to participate in the program by reading the nutrition information sent home and contributing a healthy snack for the children to sample toward the end of the program.

**Measurements**

**Fitness.** The timed mile run and number of sit-ups in 60 seconds were administered before and after the intervention.

**Nutrition knowledge and diet composition.** Nutrition knowledge was assessed through administration of a simple nutrition test. Parents were asked to fill out 24-hour food logs for their children. Diet composition was assessed by analyzing a 24-hour food log using Diet Analysis Plus 6.0 software (Wadsworth/Thomson Learning, 2003) and a simple yes or no questionnaire was distributed to parents following the 12-week intervention.
to assess changes made in eating habits by their children during the program. A similar questionnaire was sent to parents 6 months following the completion of the program to determine the extent by which positive changes in dietary and physical activity habits were maintained.

**Body composition.** Body weight and height were measured without shoes to calculate body mass index (BMI). Skinfold thicknesses were measured with a Lange skinfold caliper at three sites on the right side of the body (triceps, subscapular, and calf). Total body fat was calculated by taking the average body fat obtained from two equations developed for children (Slaughter et al., 1988).

**Lipids and lipoproteins.** Venous blood was collected in the morning by venipuncture following a 12-hour fast. Levels of metabolic variables were analyzed by Rogue Valley Medical Center. Quality control of the Rogue Valley Medical Center laboratory is monitored by the Lipid Standardization Program of the Centers for Disease Control and Prevention (CDC). Measurements of glucose, lipid, and lipoprotein cholesterol were within specific limits established by the Lipid Standardization Program of the CDC.

**Statistics**

Summary statistics were used to report fitness, dietary, body composition, and metabolic characteristics. Mean differences in fitness, dietary, body composition, and metabolic variables between pre- and postintervention were analyzed using two-tailed paired t-tests with a Type I error rate of .05. All statistical procedures were performed using SPSS for Windows, Version 11.0 (2002).

## RESULTS

Table 1 shows the percentage of children in the current sample not meeting national norms for fitness (Ross, 1987) and recommendations for diet composition (Expert Panel on Detection, Evaluation and Treatment, 2001), body composition (Heyward & Stolarczyk, 1996; Whitney & Rolfes, 2002), and levels of lipids and lipoproteins (National Cholesterol Education Program, 1992; National, Heart, Lung, and Blood Institute, 1980) at baseline. The majority of children in the current sample were unable to meet the national norms for the mile run and sit-ups and exceeded recommendations for saturated fat and sodium at baseline before the Be A Fit Kid intervention. Based on recommendations for BMI and body fat for children, nearly one half exceeded recommendations for BMI and more than one half exceeded recommendations for body fat at baseline. With respect to the metabolic variables, more than one third of children in the current sample had high levels of total cholesterol, low-density lipoprotein cholesterol (LDL-C), and triglycerides, and two thirds of children had low levels of high-density lipoprotein cholesterol (HDL-C) at baseline. In addition, 75% of children had a total cholesterol-to-HDL-C ratio greater than 3. Only one child had borderline high levels of glucose before the intervention. It is important to note that 82% of children had one risk factor for heart disease, and 13% had four risk factors at baseline (data not shown).

Significant improvements were observed in all fitness measures, all body composition measures, nutrition knowledge, and some dietary habits following the intervention. Significant reductions in HDL-C and near-significant reductions in total cholesterol were observed.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Baseline Data: Percentage of Children Not Meeting National Norms and Recommendations</th>
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</thead>
<tbody>
<tr>
<td><strong>Fitness:</strong> Percentage of children less than the 50th percentile for national averages</td>
<td></td>
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<tr>
<td>Mile run</td>
<td>81</td>
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<tr>
<td>Sit-ups</td>
<td>68</td>
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<tr>
<td><strong>Dietary composition:</strong> Percentage of children exceeding dietary recommendations</td>
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<tr>
<td>Saturated fat intake</td>
<td>77</td>
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<tr>
<td>Sodium intake</td>
<td>82</td>
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<tr>
<td>Cholesterol intake</td>
<td>41</td>
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<tr>
<td><strong>Body composition:</strong> Percentage of children exceeding optimal range</td>
<td></td>
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<tr>
<td>Body mass index</td>
<td>48</td>
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<tr>
<td>Body fat</td>
<td>66</td>
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<td><strong>Lipid and lipoprotein levels:</strong> Percentage of children exceeding recommendations</td>
<td></td>
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<tr>
<td>LDL-C&lt;sup&gt;a&lt;/sup&gt;</td>
<td>36</td>
</tr>
<tr>
<td>Total cholesterol&lt;sup&gt;a&lt;/sup&gt;</td>
<td>38</td>
</tr>
<tr>
<td>HDL-C&lt;sup&gt;b&lt;/sup&gt;</td>
<td>66</td>
</tr>
<tr>
<td>Triglyceride&lt;sup&gt;a&lt;/sup&gt;</td>
<td>34</td>
</tr>
<tr>
<td>Glucose</td>
<td>1</td>
</tr>
<tr>
<td>Total cholesterol/HDL &gt; 3</td>
<td>75</td>
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NOTE: LDL-C = Low-density lipoprotein cholesterol; HDL = high-density lipoprotein cholesterol. Values are percentage of sample.

a. Percentage of children at or above the 75th percentile rank for U.S. children based on age and gender (19).
b. Percentage of children at or below the 25th percentile rank for U.S. children based on age and gender (19).
following the intervention. When separating children based on attendance, significant reductions in total cholesterol and triglycerides were observed in children who participated in at least 75% of the Be A Fit Kid sessions. No significant changes were observed in levels of LDL-C following the intervention (Table 2).

More than 75% of children increased their intake of vegetables, fruits, whole grains, healthy fats, and water, and decreased their intake of cheese, red meat, candy, and soda (data not shown). All the children who drank reduced fat or whole milk changed to low-fat milk, and a few who drank low-fat milk changed to nonfat milk. Positive changes made in dietary habits were maintained by the majority of children 6 months following the intervention (data not shown).

**DISCUSSION**

A substantial amount of information exists to suggest that obesity and unfavorable levels of lipids and lipoproteins in childhood persist and are related to the development of type 2 diabetes and heart disease in adulthood (Berenson et al., 1998; Charlotte, Parker, Lamont, & Craft, 2001). The high proportion of overweight children and children with low fitness, high intakes of saturated fat and sodium, poor nutritional knowledge, and unfavorable levels of lipids and lipoproteins in participants at baseline support the argument for heart disease risk-factor screening in children and the need for comprehensive physical activity and heart-healthy nutrition intervention for school-age children in our southern Oregon communities.

Several programs across the country have introduced heart-health education into the elementary school classroom curriculum and have increased physical activity in children. The Child and Adolescent Trial for Cardiovascular Health (CATCH; Edmundson et al., 1996) and the Heart Smart Cardiovascular School Health Promotion Program (Arbeit et al., 1992) addressed large numbers of elementary schoolchildren over a few years with a multicomponent approach by including nutrition education, physical fitness activities, heart-healthy cafeteria choices, school staff training, and parent education. Both programs were successful in favorably altering cafeteria meals, increasing participation in physical activity, and improving eating habits. The program curriculum of CATCH is now part of the State School Health Curriculum in Texas and is called a Coordinated Approach to Child Health to reflect the shift from a research trial to a proven, sustainable program.
Another major intervention in elementary schoolchildren was the first Cardiovascular Health in Children Study (CHIC I; Harrell, McMurray, Gansky, Bangdiwala, & Bradley, 1999). The study lasted 8 weeks and compared the effects of a public health approach (inclusion of a heart-healthy curriculum in the classroom for all third and fourth graders) to a risk-based approach (inclusion of nutrition education and physical activity for third and fourth graders with known heart disease risk factors). The intervention did not address cafeteria offerings or involved parents. Findings from CHIC I concluded that the classroom-based approach was more effective overall and more easily adapted into the regular classroom setting.

The Be A Fit Kid pilot trial presented in this article addressed behaviors related to nutrition and physical activity in a relatively small volunteer sample of elementary schoolchildren in an after-school setting. School staff and food services were not involved. Improvements were observed in fitness, dietary habits, and risk factors associated with heart disease in participating children following the intervention. Improvements were greater in children who had higher participation rates.

At baseline, only 19% of the Be A Fit Kid sample were able to meet the national averages for the mile run time, yet following the intervention, 59% were able to meet national standards. Many children, particularly overweight children, do not participate in school-based physical education or in organized sports outside of school because of the emphasis on sports skills, intimidation, lack of confidence, fear of competition and failure, and lack of individualized attention and encouragement. The physical activity component of Be A Fit Kid was unique from school-based physical education in that fitness activities were individualized and noncompetitive, and the staff's mission was focused on increasing self-esteem and confidence in each child. The enthusiasm of the staff and the incentive program contributed to high participation among the children. In this regard, college students ran with the children each session and encouraged them to meet their individual goals. Each time a child achieved his or her goal, a healthy prize was awarded and a new goal was made. Creating different goals for children largely eliminated competition between children and ensured the success of each child. Furthermore, by separating children into smaller groups, each child received more individualized attention, there were fewer behavioral problems, and we were able to include all ages and genders in the program.

Although we hoped to see a significant reduction in levels of LDL-C, there may not have been enough of a reduction in saturated fat intake among participants during the intervention or a long enough time period between pre- and postintervention testing for LDL-C levels to significantly change. The undesirable decrease in HDL-C levels was related to the significant reduction in dietary intake of total fat and increase in carbohydrates. Thus, it is important that the intake of monounsaturated fat increases when reducing intake of saturated fat to offset the undesirable decreases in HDL-C. Despite no improvements in LDL-C or HDL-C, the significant reductions in levels of total cholesterol and triglycerides in children who participated in the Be A Fit Kid program at least 75% of the time were encouraging and emphasize the importance of participation.

Favorable changes made in eating habits by child participants as reported by parents on a simple dietary questionnaire following the Be A Fit Kid intervention suggest that the program was effective in improving children’s attitudes, awareness, and behaviors related to dietary habits. Results from the 6-month questionnaire suggest that changes made in dietary habits and physical activity were maintained by the majority of children. The questionnaire was limited, however, in that it did not include questions regarding the specific amount of decrease or increase in any of the foods.

To support the nutrition education component of the program, healthy foods, donated by community sponsors, were distributed to children at each session for snacks, raffle prizes, and awards as they met their individual fitness goals. Exposure to and taste testing of new foods is essential for the success in a nutrition program for children. In addition, the field trip to the local supermarket educated children in being able to make more health-conscious food choices. Based on our experience with the Be A Fit Kid program, we found that the most effective approach to teaching nutrition to elementary schoolchildren is to keep the concepts simple and expose children to specific foods associated with the concepts presented. The staff must be enthusiastic, supportive, and serve as role models.

Although favorable changes were observed in the majority of children’s eating habits during the 3-month intervention period and maintained 6 months following the intervention, ongoing adherence and further improvements over time can only be achieved if the school environment supports and fully adopts the nutrition principals delivered to children in the program. Based on recommendations from the USDHHS (1997) urging states and school districts to establish nutrition education policies, many schools across the country have adopted nutrition policies aimed at improving the quality of school foods and beverages. Several schools and school districts have formed committees made up of principals, school nurses, parents, and food service staff to enforce these nutrition policies. For instance, Aptos
Middle School in San Francisco removed soda, chips, Slim Jims, nachos, prepackaged burritos, mega-cheese burgers, French fries, hot wings, and oversized pizza from the cafeteria menu. These items were replaced with heart-healthy foods including pasta, salads, homemade soups, sushi, and fajitas (Malloy, Johanson, & Wootan, 2003). The New York City School System, the largest school district in the United States, has increased servings of fresh and frozen vegetables, fresh fruit, fish, whole grains, and plant-based protein products, reduced the amount of highly processed foods, and exclusively offers water, milk, and 100% juice as beverages (Malloy et al., 2003).

In addition to the need for the school environment to serve as a model of healthy behavior, successful health promotion programs for children must educate and involve parents in the process. Parents are the primary role models for their children and have the most influence over what their children eat because parents are responsible for food shopping and preparation. For children to fully adopt and maintain physically active lifestyles, parents must be physically active themselves and must support their children’s participation in physical activity (USDHHS, 1997). Research shows that children are 6 times more likely to be physically active if both parents are physically active (Walters, Hollowman, Blomquist, & Bollier, 2003). During the course of the Be A Fit Kid intervention, it became clear that most children were interested in eating healthy and taking care of themselves, yet some lacked the support at home. Although most parents were very involved and supportive of the program, about 10% were not. Despite the comprehensive parent night and weekly nutrition packets, some parents were unable to incorporate the information because of their own barriers relating to food and physical activity. A parent’s avoidance and unwillingness to alter his or her own health-behavior habits will make it almost impossible for a child to alter his or her own health-behavior habits.

Findings from the Be A Fit Kid pilot program are limited by the lack of a control group and must be evaluated with caution. The findings do suggest, however, that nutrition and physical activity programs can be well received by children and that heart-healthy programs should be included in school curriculum. Children participating in the Be A Fit Kid program were clearly interested in improving their health but didn’t have the education, resources, and support to do so.

**CONCLUSION**

Programs such as Be A Fit Kid, which are individualized and noncompetitive, and focus on building confidence and knowledge, have potential to address the needs of many children who are not receiving sufficient health and physical education at school. Physical activity and nutrition programs such as Be A Fit Kid can be reproduced in other areas. Most universities have some form of health and physical education, exercise science, and/or nutrition department. Because college students attending these universities are often required to participate in practicum experience, implementing a program such as Be A Fit Kid in elementary and middle schools provides an ideal opportunity for college students to apply their knowledge, gain practicum credits, and gain experience for their future as health educators. Overall administration of the project and volunteer supervision was coordinated by the project director, an associate professor at the Southern Oregon University. The project director received a small amount of seed money from the university ($1,500) to initially create and implement the program. Out of commitment to children’s health and desire to see the program expand into the regular school day throughout southern Oregon communities, the project director donated her time for the pilot trial in addition to teaching a full load at the university.

The Be A Fit Kid pilot program was entirely community supported. Healthy food donations were achieved through request letters and follow-up phone calls by the project director. The portion sizes distributed to children participating in the Be A Fit Kid pilot program were very small. The emphasis was on exposure, not quantity. The local hospital supported the lipid and glucose analyses for the program, and the local food cooperative contributed $1,000 for the purchase of healthful foods. Several community sponsors contributed a variety of foods and gift certificates to the program. For instance, n'Spired Foods donated several cases of natural almond and peanut butter, Bob's Red Mill contributed several cases of 10-grain pancake mix, and Subway contributed 100 certificates for turkey and/or chicken breast sandwiches on whole wheat buns with a minimum of two vegetables and no cheese.

The planning, design, and implementation of Be A Fit Kid followed the basic organizational framework of the PRECEDE-PROCEED model (Green & Kreuter, 1991). The first two steps in designing Be A Fit Kid involved an examination of the recent data identifying the dramatic increases in obesity, type 2 diabetes, and heart disease in American youth during the past two decades, and what other communities have done to address these health issues. In Step 3 of the PRECEDE-PROCEED model, existing behavior factors of children (physical activity and dietary habits) and environmental factors (foods sold in school cafeterias and vending
machines, health-behavior habits of school staff and parents, and current nutrition and physical education curriculum) in our community were assessed. Because the policies and practices of schools can be identified as environmental factors and because the behavioral factors of physical activity and dietary habits among children are largely influenced by the school environment, the long-term effectiveness of physical activity and nutrition programs such as Be A Fit Kid is dependent on policy and organizational change at the institutional level to increase the opportunities for physical activity and the availability of heart-healthy foods in the schools. This highlights the need for community-level behavior change theories with respect to activating parents, school staff, physicians, and communities in general to work together to effectively change the environmental conditions that influence participation in physical activity and heart-healthy eating among persons in our community.

Predisposing, enabling, and reinforcing factors that would influence the likelihood of behavioral and environmental change were identified in Step 4 of the PRECEDE-PROCEDE model. Predisposing factors included knowledge, attitudes, and beliefs relating to physical activity and dietary habits among parents and children. Enabling factors included the inclusion of daily noncompetitive and individualized physical activity; inclusion of nutrition education in the curriculum; availability of heart-healthy school cafeteria meals, foods sold in vending machines, and foods sold at school functions; elimination of candy and unhealthy food rewards in the classroom; school staff education and training in health promotion and program implementation; and parent education and involvement. Reinforcing factors included healthy food tasting; weekly raffle of healthy prizes; healthy rewards and plastic medals for goals accomplished; school staff, peer, and parent support; and praise. This highlights the need for interpersonal and individual-level behavior change theories with respect to addressing the predisposing, enabling, and reinforcing factors at play with this target population.

After identifying the predisposing, enabling, and reinforcing factors that would influence behavioral and environmental change relating to children’s physical activity and eating habits, Be A Fit Kid was designed and implemented (Steps 5 and 6 of the PRECEDE-PROCEDE model). In these stages, we were able to delineate what we could and could not initially address in the pilot program by assessing the availability of necessary resources. Based on the number of student volunteers from the university, the available time of the project director to implement the program, and limited funding, the Be A Fit Kid pilot trial was targeted as an afterschool program for a maximum of 100 volunteer children from four elementary schools in our community (25 children from each school). We were unable to address several environmental barriers in the pilot trial, mainly school policy regarding cafeteria meals and other foods sold at schools, and school staff education and training for program sustainability.

Although we understood that the inability to include food services and school staff in the initial implementation of Be A Fit Kid would hinder the program’s overall effectiveness and sustainability, we hoped that the evaluation of the pilot program (Steps 7-9 of the PRECEDE-PROCEDE model) would provide valuable data and information that could be used to generate interest in our community to raise sufficient funds to implement the program on a larger scale. Based on the pilot data, Be A Fit Kid has been established as a program within the nonprofit organization, Healthy Kids Now. Be A Fit Kid is currently included in the fourth-grade curriculum in one southern Oregon school district. New objectives of Be A Fit Kid address the school environment and involve parents to a greater extent through bimonthly parent education meetings. Nutrition education workbooks are distributed to participating children and parents. Fourth-grade teachers receive a teacher curriculum and are trained in program administration for sustainability for incoming fourth graders each year. In addition, the project director of Be A Fit Kid is a member of the Wellness Committee in the school district that is currently in the process of establishing a nutrition and physical activity policy that addresses the recommendations outlined by the USDHHS (1996) including the inclusion of nutrition education; increasing the offerings of heart-healthy foods in the cafeteria, vending machines, student stores, and school events; and replacing food rewards in the classroom (i.e., candy, ice cream, root beer floats) with other rewards such as colorful plastic book and math awards (purchased through Fitness Finders) that can be attached to wrist or backpack chains.

The need for comprehensive and innovative health promotion programs is evident based on the increasing number of overweight and obese American children. Programs such as Be A Fit Kid have important implications for prevention of obesity, type 2 diabetes, and heart disease, and can positively impact and improve the quality of life extending well beyond childhood. Providing children with the knowledge to make informed choices about their dietary habits now and in the future and to incorporate consistent physical activity patterns into their lives can favorably alter the prevalence of obesity and disease in the United States.
REFERENCES


