Pathways: a culturally appropriate obesity-prevention program for American Indian schoolchildren[1–3]

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ABSTRACT Pathways, a culturally appropriate obesity prevention study for third-, fourth-, and fifth-grade American Indian schoolchildren includes an intervention that promotes increased physical activity and healthful eating behaviors. The Pathways intervention, developed through a collaboration of universities and American Indian nations, schools, and families, focuses on individual, behavioral, and environmental factors and merges constructs from social learning theory with American Indian customs and practices. We describe the Pathways program developed during 3 y of feasibility testing in American Indian schools, with special emphasis on the activities developed for the third grade; review the theoretical and cultural underpinnings of the program; outline the construction process of the intervention; detail the curriculum and physical education components of the intervention; and summarize the formative assessment and the school food service and family components of the intervention. Am J Clin Nutr 1999;69(suppl):796S–802S.

KEY WORDS Obesity prevention, culturally appropriate intervention, American Indians, schoolchildren, school-based prevention, physical activity, Pathways

INTRODUCTION

In 1993, in response to growing concern over the increase in obesity, a risk factor for diabetes and cardiovascular disease (1), the National Heart, Lung, and Blood Institute of the National Institutes of Health sponsored phase 1 of the Pathways study; phase 1 was a 3-y project to determine the feasibility of a full-scale study for the prevention of obesity in American Indian schoolchildren. Pathways represents an innovative approach to the primary prevention of obesity in American Indian children and in children of school age in general (2–4). The project is the result of a unique collaboration among universities and American Indian nations, schools, and families.

Previous research in the United States focused primarily on the measurement of obesity, its treatment, and its relation to certain chronic diseases (5, 6). Few studies, however, have been designed to study the prevention of obesity in susceptible populations. Some prevention research efforts in school-age children have focused on cardiovascular health and have documented several effective approaches to reducing cardiovascular risk factors in school-age children (7). Few studies have been conducted with minority populations, however, and even fewer with American Indians (8, 9).

Growing evidence, reviewed elsewhere in this supplement, suggests that the increase in obesity and obesity-related diseases among American Indians results from adverse effects of acculturation such as the adoption of a high-fat Western diet and a more sedentary lifestyle (10). Studies have shown increased fat and energy intakes and decreased physical activity to be associated with increased rates of obesity (11, 12) and subsequent increased risk of diabetes (11, 13, 14), gallbladder disease, heart disease, and certain cancers (15). The increasing prevalence of obesity among American Indians calls for immediate and appropriate interventions, especially for young people to prevent deleterious effects on their future health status (16). The Pathways intervention team developed and pilot tested the Pathways study in response to this need for early intervention. We provide an overview of the Pathways intervention and describe the methods used in its development.

Emphasizing activities developed for the third grade, we delineate the intervention developed during 3 y of the feasibility phase, specifically: 1) the theoretical and cultural rationale of the intervention, 2) the process used to construct the intervention, 3) the intervention components, and 4) lessons learned during the feasibility study. Because other articles in this supplement discuss in detail 3 components of the intervention—formative assessment (2), family intervention (3), and school food service (4)—this paper focuses on the other 2 components: curriculum and physical education (PE).

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TABLE 1
Intervention model: the 3 types of factors positively influenced by the Pathways intervention

Personal factors
Pathways seeks changes in children's knowledge, values, and sense of personal control of
Health
Physical activity
Nutrition
Food selection and preparation
Behavioral factors
Pathways seeks changes in behavioral attributes that support exercise and healthful eating in children by
Adding to their repertoire of alternatives
Teaching skills for physical activity and food selection and preparation
Providing experience in self-monitoring
Providing experience in goal setting
Providing reinforcement for positive intervention and changes
Environmental factors
Pathways seeks changes in the environment by
Promoting new role models
Providing opportunities
Influencing parents
Reducing barriers
Creating peer support

BACKGROUND

Theoretical model

Pathways builds on the recognition of the need for scientists and educators to work in close cooperation with American Indian communities to promote good health and prevent disease (17–19). The intervention team therefore established collaborative efforts with the teachers, parents, and school administrators of these communities to create a culturally relevant and sustainable program.

Experts recommend that primary prevention of chronic diseases begin with children before the onset and consolidation of risk-related behaviors and eventual lifestyle habits (20). Furthermore, social learning theory provides the best documented and most successful approaches available for school-based interventions in both physical activity and eating behaviors (7, 21). Pathways, drawing on these sources, targets these behaviors related to obesity: physical activity and healthful eating. The program promotes a healthy lifestyle by positively influencing 3 types of factors: personal, behavioral, and environmental. As shown in **Table 1**, Pathways addresses each type of risk factor in multiple ways.

Pathways aims to enhance individual attributes such as children's knowledge about physical activity and food selections; their values about health, physical activity, and nutrition; and their sense of personal control over their choices. The intervention also seeks to change the behavioral attributes of the children toward a positive choice of exercise and healthful eating, both by adding to their repertoire of activities and lower-fat food items and by teaching them skills that include regular activities and the selection and preparation of foods for themselves and their families. The program also equips children with experience in self-monitoring and goal setting to effect changes in their existing habits; in addition, it offers reinforcement for demonstrating their intention to change, making actual changes, and participating in the program. Pathways also promotes changes in the children's environment that support healthful activity and eating patterns. The program introduces new role models, provides opportunities for more exercise and consumption of lower-fat foods, attempts to influence parents' food selections, tries to reduce the barriers to exercise and healthful eating, and creates peer support for exercising and selecting lower-fat foods.

The content and approach of the Pathways intervention combines constructs from social learning theory and cultural concepts that include American Indian customs and practices. Because health behaviors are bound strongly with culture, any intervention must in itself be culturally and linguistically appropriate. Ultimately, the desire for change and the success of the intervention must emerge from the participating community (19, 22). The rich cultural heritage of American Indians, especially in regard to physical activity, active games, and nutritious low-fat foods, coupled with proven approaches to learning new behaviors, provides a framework for developing an interesting and culturally germane intervention. The intervention team therefore drew on the indigenous beliefs and values of each participating American Indian nation to create a program that supports healthier lifestyles and reflects the nations' traditional cultures.

Cultural concepts and an integrated approach to intervention

Approximately 1.5 million American Indians and Alaska Natives, representing 512 federally recognized tribes, reside in the United States. Although each tribe has its own history, social and cultural patterns, and political and economic structures, American Indian nations share many cultural concepts. Among those concepts are certain types of learning patterns. The Pathways intervention team considered American Indian learning modes to be crucial elements in the structure and success of the intervention. The team therefore identified the following indigenous learning modes: learning through observation and practice (23), learning from storytelling (23), learning metaphorically (24, 25), holistic learning (26), learning by trial and error (27), learning through play (18), learning cooperatively (28, 29), and learning through reflection (18). The Pathways intervention incorporates these types of learning modes by designing experiential activities and presenting concepts through storytelling.

The Pathways intervention targets 4 areas: 1) classroom curriculum, 2) PE, 3) family education, and 4) school food service. Formative assessment conducted in each of the participating communities contributed to the development of the intervention by identifying key risk factors for obesity specific to the study populations and engaging members of each tribe in the development and implementation of the program (2).

METHODS

An intervention committee comprising 5 working groups—one for each of the 4 components of the intervention plus formative assessment—coordinated the development of the Pathways intervention. The committee established 5 guiding principles for developing the components of the intervention: each must be 1) culturally acceptable at all intervention sites, 2) integrated into the whole, 3) successful during the feasibility phase, 4) sustainable by the study participants when the study is over, and 5) have a uniform, standardized implementation.

The working groups met for face-to-face meetings and held conference calls regularly. As they developed each new section, they submitted it to a rigorous review by several parties: tribal representatives, American Indian members of the Pathways study, intervention committee members, and the Pathways steering committee, composed of the principal investigators from all 5 participating institutions, the National Heart, Lung, and Blood Institute project scientist, and 2 American Indian representatives. The working groups modified the intervention based on feedback from the review process and from a highly organized process evaluation that included feedback from students, teachers, school administrators, families, and food service workers. Approval for the study was obtained from each academic institution's review board. Similar approval was obtained from each tribe.

Developing an effective, multiculturally appropriate school intervention program to prevent obesity in 6 different American Indian communities was the project's greatest challenge. To design a culturally acceptable intervention that could be implemented in a standardized manner across all sites, the intervention committee conducted a formative assessment in the early stages of the study.

Formative assessment

Formative assessment studies use qualitative and quantitative social science techniques to assess people's beliefs, perceptions, and behaviors for the purpose of developing culturally appropriate interventions. The Pathways formative assessment focused on amassing information to design and evaluate culturally appropriate interventions, developing a qualitative baseline description of the study communities and schools, and providing information for developing instruments for structured data collection and for the process evaluation. Various methods were used to gather information: in-depth interviews, semistructured interviews, focus groups, and direct observation. Data were collected from school staff members (teachers, food service workers, and administrators), third- to fifth-grade students and their caregivers, and other community members.

This data collection yielded an extremely rich database. One of the primary analyses of these data included identifying and prioritizing of a set of behavioral risk factors for obesity that the team used to structure and focus the intervention strategies. The committee identified target behaviors as either high, moderate, or low priority, depending on whether they were present at all intervention sites. Those behaviors selected to be targeted by the Pathways intervention are listed in **Table 2**.

TABLE 2
Obesity risk behaviors targeted in the Pathways intervention

Priority and behavior
High
Few family-based activities (especially outside home)
Little opportunity to do physical activity at home
Children watch (a lot of) television, movies, and videotapes
Little encouragement to do physical activity at home
Little home-based role modeling for physical activity
Children drink (a lot of) sugar drinks at home or in the community
Children eat high-fat foods at home meals
Not enough physical activities for children in school
Food service staff encourages children to finish all their food
Children eat high-fat foods at school meals
Children consume second servings of high-fat foods at school
Children watch a lot of television in class
Parents encourage children to finish all their food
Moderate
Children eat while watching television
Children drink (a lot of) whole milk at home or in the community
Children do not consume enough fruit or vegetables at school
Children eat (a lot of) fast foods outside the home
Children eat a lot of high-fat snacks at home
Limited food preparation methods at home
Children drink (a lot of) whole milk at school
Foods high in fat and sugar are used as rewards at school
High-fat, high-sugar foods are offered at special events at school
Children eat lunch quickly at school
Children eat a lot of high-fat snacks at school
Food service staff does not follow existing school recipes

Curriculum

The Pathways curriculum consists of culturally appropriate school-based lessons that promote healthful eating behaviors and increased physical activity. The curriculum, designed for children in the third, fourth, and fifth grades, targets certain priority behaviors both as identified in the formative assessment (Table 2) and specific to the participating field sites. Beginning with the third-grade curriculum, the curriculum working group structured the program as two 45-min sessions/wk for 12 wk. The titles of the lessons are shown in **Figure 1**. The group selected 7 major theoretical constructs of social learning theory to guide the development of the curriculum: modeling, social support, opportunities, knowledge, self-efficacy, skill building, and reinforcement. They integrated these constructs into a series of stories and activities based on the journey of 2 fictional American Indian children, Amanda and Daryl White Horse, through the 6 Pathways nations. Reflecting the American Indian mode of learning through storytelling, these stories validate a rich and varied cultural heritage of healthful eating and physical activity while simultaneously highlighting local traditions, customs, and practices. Each student receives an activity book, My Pathways Journey, which includes relevant materials such as the "Pathways Nations Map" poster, various food lists, lists of physical activities, illustrations of body cues, goal-setting materials, word games, and evaluation forms. The activity book offers children the opportunity to identify with Daryl and Amanda, constructed as their approximate age mates, and to model the healthy behaviors Daryl and Amanda exhibit. As students taste-test new foods and beverages and set goals for healthful eating and physical activity, they experience the social learning theory constructs of opportunities and self-efficacy.

Teacher support of the curriculum is critical for reinforcing the messages on physical activity and the consumption of healthful food. To ensure successful completion of the curriculum's objectives, Pathways creates a supportive environment for teachers by providing an instructor's manual designed to facilitate the integration and coordination of all intervention components, including family involvement and the role of the school food service program. The introduction to the manual outlines the project's background, student outcomes, the curriculum, and plans for implementation. The remainder of the manual contains a series of detailed lesson plans for teaching 2 lessons/wk for 6 wk in the fall and 6 wk in the spring. Each lesson plan includes a brief overview of the lesson, student objectives, a chronological lesson outline, and a series of learning activities designed to

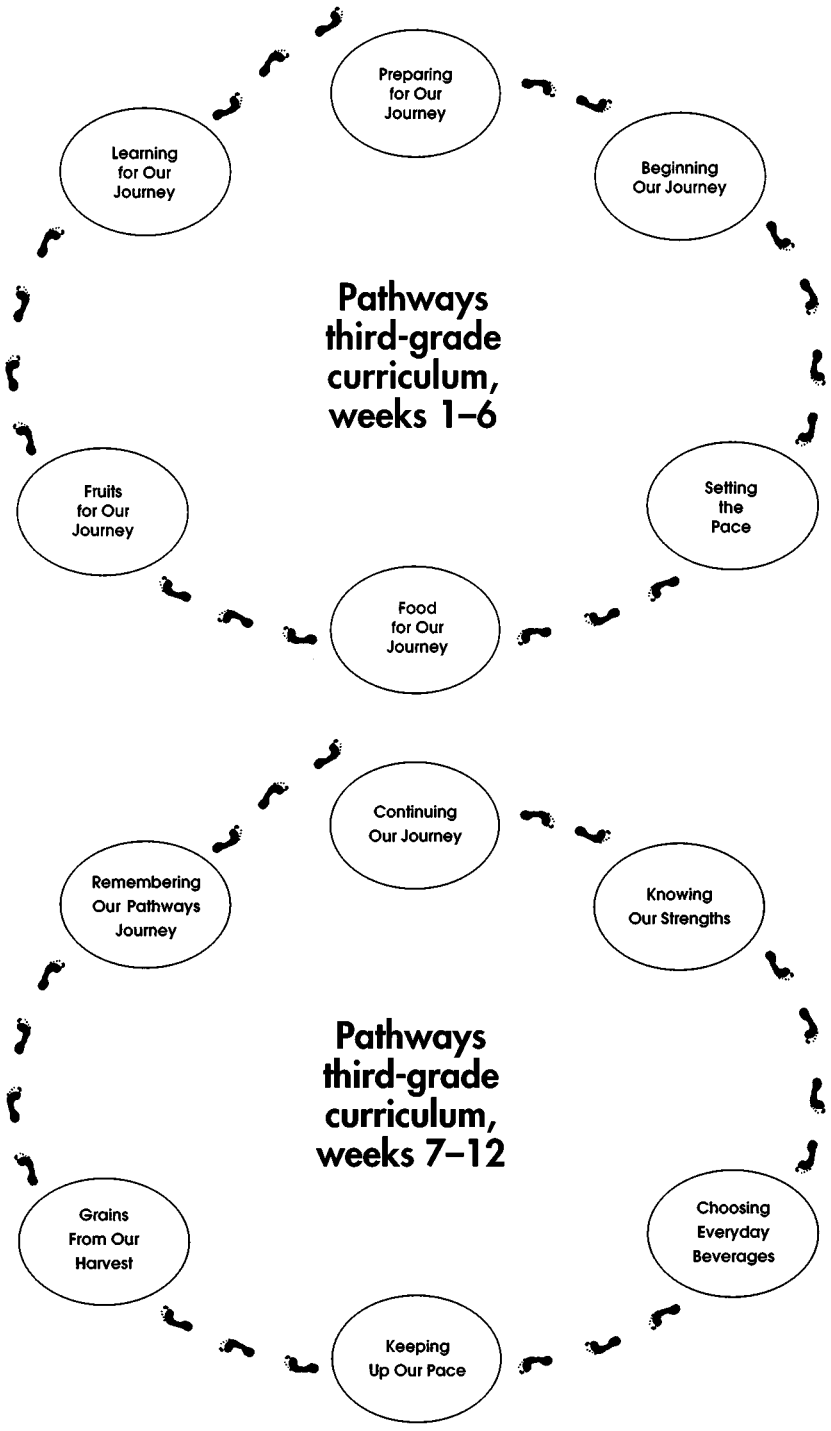

FIGURE 1. Lessons in the Pathways third-grade curriculum.

teach healthful eating and exercise behaviors. Along with the manual, teachers receive all instructional materials necessary for implementing the full curriculum: overhead transparencies, audio tapes, posters such as an "Everyday Foods List" and a "Pathways Nation Map," the contents of family packs, and incentive items. Supplementary materials included in the curriculum provide teachers with information and resources related to the curriculum and other Pathways intervention efforts.

To ensure accurate implementation of the intervention, the Pathways staff held centralized training sessions, each lasting 2 d, twice per year for all classroom instructors teaching the Pathways curriculum. Because the Pathways curriculum was divided into fall (lessons 1–12) and spring (lessons 13–24) sessions, teachers received training for each semester's activities before the beginning of that set of lessons. Members of the Pathways curriculum working group designed the Pathways Trainer's

Manual, which was distributed solely to members of the training team to guide teacher training. The manual offers both a broad overview of the curriculum and detailed information on how to present individual lessons and activities. The 5 sections of the Trainer's Manual cover planning, implementation, exhibits, overhead transparencies, and process evaluation.

In summary, the curriculum addresses its objectives by melding cultural stories, indigenous learning modes, hands-on activities, and games. As the working group developed the curriculum, it prioritized ease of use by teachers, inclusion of educational competencies for core subjects such as social studies and language arts, and the need to be developmentally appropriate to create a program not only culturally relevant but also easy to implement. One of the most innovative aspects of the Pathways curriculum was the creation of a new school environment in which teachers, food service workers, physical educators, and the students' families were united in a common goal of initiating and practicing the new behavioral skills. Local review by American Indians with cultural expertise ensured the relevancy of the curriculum in each of the sites in terms of its applicability to the beliefs, values, traditions, and customs of each participating nation.

Physical education

In the area of physical activity, the Pathways intervention is focused primarily on increasing children's activity and energy expenditure in school by increasing the frequency and quality of PE classes and activity breaks, including recess periods. Secondarily, the program promotes positive attitudes toward physical activity and develops motor skills that encourage children to cultivate and sustain an active lifestyle. Pathways bases its PE intervention on the SPARK program (Sports, Play and Active Recreation for Kids), which has been shown to increase time spent in moderate to vigorous activity in PE classes in school-age children (30). The Pathways PE component focuses on increasing physical activity through both lessons that promote motor skill development and traditional fitness lessons. This attribute of the program has contributed to its acceptance among PE specialists and classroom teachers currently teaching in the pilot schools. The intervention team learned from process evaluation through discussions with American Indian colleagues and teachers in the pilot schools, as well as from observations during pilot tests, that American Indian children enjoy SPARK PE activities (although not originally developed for American Indian children) and American Indian communities accept them.

The PE working group designed a comprehensive PE curriculum that emphasizes health outcomes and meets 3 of the established goals: 1) to develop high levels of physical activity for all children, regardless of skill level; 2) to promote health-related fitness through aerobic activities and allow for sports skill development to enhance success and enjoyment of activities; and 3) to be practical and easy to implement by both classroom teachers and PE specialists (an important consideration because not all sites have PE teachers). Research has shown that regular classroom teachers can effectively teach SPARK PE, resulting in increased activity among the students exposed to such a program compared with those in control schools (30).

To enhance the cultural relevance of the PE component and to expand the PE curriculum, the physical activity working group developed a unit of American Indian games derived from the traditional games of each Pathways nation. Without changing the original object of the games, the working group modified the traditional games to enhance the energy expenditure required for each game by reshaping organization and set-up (for example, smaller teams, shorter lines, and more equipment). This provided more opportunity for participation and, in some cases, made the games safer (for example, balls were substituted for harder objects). The American Indian Advisory Group reviewed and approved the entire unit. Designed for ultimate flexibility, the unit may be used for recess and other active times, in addition to PE class.

The Pathways PE curriculum comprises 14 health-related fitness units (called type 1 units) and 10 sports-related fitness units (called type 2 units), as well as warm-up and cool-down activities, daily conditioning exercises, inclement weather activities, American Indian games, and a "Personal Best Day" designed to allow children to self test and monitor their improvement in fitness. Each unit contains from 8 to 14 lessons presented in a progressive developmental sequence. The PE curriculum incorporates only activities that can be implemented in a variety of school settings, such as those with limited space, equipment, and supplies. Type 1 units highlight the development of muscular strength and endurance, cardiovascular endurance, flexibility, and locomotor and nonlocomotor skills. Type 2 units emphasize development of manipulative and sports-related skills, especially those that have the potential for cardiovascular development and generalization into the community for future sports participation. The physical activity working group designed the curriculum to accommodate various levels of fitness and motor skill; repetition within classes and within units allows students to develop sufficient skills to become comfortable with each activity.

The Pathways program calls for PE specialists or classroom instructors to teach Pathways PE $\geq$3 times/wk for 30 min per class. Each session encompasses warm-up and cool-down activities and a lesson from both a type 1 and a type 2 unit. Warm-up and cool-down activities that require little explanation can be integrated into the main lesson rather than being separate components. For example, children can warm-up for a tag game by first walking, a locomotor skill, and then progressing to running. This reduces both the number of different activities a teacher must plan and the possibility of inactive transitions, thereby maximizing energy expenditure in a 30-min class.

The Pathways staff holds centralized training sessions 3 times/y for PE specialists and classroom teachers who teach Pathways PE and who lead the exercise breaks. Each session lasts $\approx$1.5 d. The Pathways annual PE plan is divided into fall, winter, and spring trimesters. The Pathways staff offers training for each trimester's activities before the beginning of that trimester. In addition, the physical activity working group continues to develop additional strategies to identify school, teacher, and student PE objectives to ensure that the Pathways physical activity intervention maintains its momentum and develops into a needed and valued part of the school's educational philosophy.

Family component

The Pathways family component endeavors to inform families of the program's mission, objectives, and intervention strategies and to work with families to reinforce behaviors promoted by the curriculum, school food service, and PE components. Familiarizing additional family members with Pathways-advocated health behaviors may lead to changes in the household environment. The family component is essential in the development of an environment that supports students' efforts to implement changes in their food choices and levels of physical activity and fosters a working relationship

with the community. To accomplish these goals, the third-grade Pathways family component consists of 3 primary strategies: family packs, school-based family events, and school-based advisory groups. Teufel et al (3) provide details and evaluation outcomes for this segment of the program.

School food service

The goal of the school food service component, developed collaboratively by the Pathways food service and nutrition working group and food service workers at the 4 pilot intervention schools, is to lower the amount of fat in the breakfast and lunch school meals. The Pathways food service and nutrition staff members worked with the curriculum and family working groups on food and nutrition issues. On the basis of other successful food service interventions (31, 32), the planning process included identifying, developing, and then implementing 5 components: 1) nutrient guidelines, 2) behavioral guidelines, 3) material on each behavioral guideline, 4) training for the food service workers, and 5) kitchen visits by the Pathways nutrition staff. Because another paper in this supplement (4) describes in detail the Pathways school food service component, only a brief overview follows.

Initially, the Pathways food service working group developed nutrition guidelines for school meals with the primary nutrient focus on lowering fat content while maintaining adequate energy content. The Pathways nutrient guidelines (4) comply with the US Department of Agriculture school meal regulations (33) for both type and quantity of nutrients and meet the requirement of school meals to contain 30% of energy from fat over 5 consecutive days. In addition, 8 Pathways behavioral guidelines (4) outline skill-building techniques for food service workers in planning, purchasing, preparing, and serving lower-fat foods so that the school meals meet the nutrient guidelines. The food service working group designed a set of materials for the food service component that provides step-by-step instructions and activities for implementing the 8 behavioral guidelines. Finally, the food service working group developed and implemented a 2-h training workshop for the school food service workers at each site. Building on the training sessions, the Pathways food service and nutrition staff members visited each school kitchen at least once each month for 3–5 h, demonstrating to the school food service workers how to best implement a specific behavioral guideline.

LESSONS LEARNED FROM THE FEASIBILITY PHASE

During the feasibility phase, the Pathways staff developed the initial Pathways interventions, designed and produced materials, and completed training in 4 areas: third-grade curriculum, PE, family education, and school food service. The team implemented and pilot tested these interventions at each of the 4 field sites during the 3 y of the feasibility phase. Informed consent was obtained from parents of all children participating in this phase. The pilot testing of the intervention in 6 different American Indian communities revealed the limits to which standardization of an intervention across cultures is possible and provided a better understanding of the need to combine homogeneous intensity of delivery of the program with flexibility to enable its implementation under different settings.

Teacher response to the 12 lessons of the third-grade curriculum for fall showed a trend toward increased satisfaction with the lessons overall, with the students' enjoyment of the lessons, and with the students' attainment of knowledge and skills as the weeks advanced. Classroom observation by Pathways staff members complemented these responses, showing that the children participated actively in and enjoyed the lessons (particularly the story circle and music) and clearly retained some of the primary concepts. The observers noticed, however, that some teachers neglected to follow the complete lesson plan, either omitting parts of a lesson, not working through the activities together with their students, or not using the story visual guides. Some teachers displayed or expressed frustration with the group work and emphasis on activity-type learning. Interviews with teachers revealed that although they enjoyed teaching the curriculum and favored the content and focus on traditional values, they desired more flexibility in how they taught the curriculum. They universally commented that the lessons were too long and concurred that localized, rather than centralized, teacher training by the Pathways staff at the participating schools would improve coordination and support for the program. The Pathways development team continues to work with the teachers in refining the curriculum.

Scheduling and implementation methods of the Pathways PE component differed by school. Although the program calls for integrating ≥3 sessions/wk lasting 30 min each, some schools offered PE only twice weekly. Observation of PE classes in 3 schools during November 1995 indicated that teacher enthusiasm in promoting fitness varied substantially from site to site. Although feedback from 167 students showed that 92.2% liked the PE program in general, specific activities in the recess component received markedly low approval scores: 61.7% for the Southwest ball race and 59.9% for the Mt Pathways recess challenge. Several accounts stated that these activities were not implemented optimally at most sites. Although Pathways offered sessions in both PE and recess training, 1 school immediately reassigned the PE teacher after training and 2 schools neglected to send representatives to the training. From these experiences, the Pathways development team pinpointed the need to emphasize the importance of the PE component of the intervention to both teachers and administrators and to work further with teachers to identify and eliminate the impediments to an effective presentation of the PE segment.

SUMMARY

The Pathways study represents an innovative approach to the primary prevention of obesity in American Indian schoolchildren through a unique collaboration among universities and American Indian nations, schools, and families. The goal of the feasibility phase of the study was to develop and test a culturally appropriate, school-based intervention program that promotes increased physical activity and healthful eating behaviors in American Indian schoolchildren. The program focuses on individual, behavioral, and environmental factors selected from a social learning theory model to target identified risk behaviors in schoolchildren. A formative assessment of each of the participating communities, conducted by both researchers and community members, contributed to the development of the intervention by identifying key risk behaviors for obesity specific to the populations of the study and the most effective and acceptable methods of implementing the intervention. The Pathways intervention was successfully tested in pilot studies in 4 schools representing 6 different American Indian tribes.

REFERENCES

1. Story M, Evans M, Fabsitz R, et al. The epidemic of obesity in American Indian communities and the need for childhood obesity-prevention programs. Am J Clin Nutr 1999;69(suppl):747S–54S.
2. Gittelsohn J, Evans M, Story M, et al. Multisite formative assessment for the Pathways study to prevent obesity in American Indian schoolchildren. Am J Clin Nutr 1999;69(suppl):767S–72S.
3. Teufel NI, Perry CL, Story M, et al. Pathways family intervention for third-grade American Indian children. Am J Clin Nutr 1999;69(suppl):803S–9S.
4. Snyder PM, Anliker J, Cunningham-Sabo L, et al. The Pathways study: a model for lowering the fat in school meals. Am J Clin Nutr 1999;69(suppl):810S–5S.
5. US Department of Health and Human Services, Public Health Service. The Surgeon General's report on nutrition and health. Washington, DC: US Department of Health and Human Services, 1988. [DHHS publication no. (PHS) 88–50210.]
6. National Academy of Sciences, National Research Council. Diet and health: implications for reducing chronic disease risk. Washington, DC: National Academy Press, 1989.
7. Stone EJ, Perry CL, Luepker RV. Synthesis on cardiovascular behavioral research for youth health promotion. Health Educ Q 1989;16:155–69.
8. Harris MB, Davis SM, Ford VL, Tso H. The Checkerboard Cardiovascular Curriculum: a culturally oriented program. J Sch Health 1988;58:104–7.
9. Davis SM, Lambert LC, Gomez Y, Skipper B. Southwest Cardiovascular Curriculum Project: study findings for American Indian elementary students. J Health Educ 1995;26:72–81.
10. Welty TK. Health implications of obesity in American Indians and Alaska Natives. Am J Clin Nutr 1991;53(suppl):1616S–20S.
11. Broussard BA, Johnson A, Himes JH, et al. Prevalence of obesity in American Indians and Alaska Natives. Am J Clin Nutr 1991;53(suppl):1535S–42S.
12. Jackson MY. Nutrition in American Indian health: past, present, and future. J Am Diet Assoc 1986;86:1561–5.
13. Welty TK, Lee ET, Cowan L, et al. The Strong Heart Sudy: a study of cardiovascular disease and its risk factors in American Indians. IHS Prim Care Provider 1992;17:32–3.
14. Welty TK, Lee ET, Yeh J, et al. Cardiovascular disease risk factors among American Indians. Am J Epidemiol 1995;142:269–87.
15. National Institutes of Health, National Cancer Institute. Documentation of the cancer research needs of American Indians and Alaska Natives. Bethesda, MD: NIH, NCI, 1993. (Native American monograph no. 1.)
16. Byers T. The epidemic of obesity in American Indians. Am J Dis Child 1992;146:285–6 (editorial).
17. Freeman WL. Research in rural native communities. In: Bass MJ, Dunn EV, Norton PG, Stewart M, Tudiver F, eds. Conducting research in the practice setting. Research methods in primary care. Vol 5. Newbury Park, CA: Sage Publications, 1993.
18. Bird ME, Kane WM, Shames L, Jager M. Working cooperatively with Native American communities to educate children and youth. In: Matiella AC, ed. The multicultural challenge in health education. Santa Cruz, CA: ETR Associates, 1994:209–32.
19. Davis SM. General guidelines for an effective and culturally sensitive approach to health education. In: Matiella AC, ed. The multicultural challenge in health education. Santa Cruz, CA: ETR Associates, 1994:117–32.
20. Perry CL, Baranowski T, Parcel G. How individuals, environments, and health behavior interact: social learning theory. In: Glantz K, Lewis FM, Rimer B, eds. Health behavior and health education. San Francisco: Jossey-Bass, 1990:161–86.
21. Perry CL, Stone EJ, Parcel GS, et al. School-based cardiovascular health promotion: the Child and Adolescent Trial for Cardiovascular Health (CATCH). J Sch Health 1990;60:406–13.
22. Braithwaite RL, Lythcott N. Community empowerment as a strategy for health promotion for black and other minority populations. JAMA 1988;2261:282–3.
23. Johns-Steiner V. Learning styles among Pueblo children: final report. Report to National Institute of Education, US Department of Health, Education and Welfare. Albuquerque, NM: College of Education, University of New Mexico, 1975.
24. More AJ. Native Indian learning styles: a review for researchers and teachers. J Am Indian Educ 1987;26:17–29.
25. Havinghurst RJ, Gunther MK, Pratt IE. Environment and draw-a-man test: the performance of Indian children. J Abnorm Soc Psychol 1946;41:50–63.
26. Rhodes RW. Nurturing learning in Native American students. Hotevilla, AZ: Sonwai Books, 1994.
27. Little Soldier L. Working with Native American children. Young Children 1992;47(6):15–21.
28. Swisher K, Deyhle D. The styles of learning are different, but the teaching is just the same: suggestions for teachers of American Indian youth. J Am Indian Educ 1989;28:28–32.
29. Gilliland H. Teaching the Native American. Dubuque, IA: Kendall/Hunt Publishing Co, 1992.
30. Sallis J, McKenzie T, Alcaraz J, Kolody B, Faucette N, Hovell M. The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students: Sports, Play and Active Recreation for Kids. Am J Public Health 1997;87:1328–34.
31. Snyder MP, Story M, Lytle L, Trenker L. Reducing fat and sodium in school lunch programs: the Lunch Power! Intervention Study 1992;92:1087–91.
32. Osganian SK, Ebzery MK, Montgomery DH., et al. Changes in the nutrient content of school lunches: results from the CATCH eat smart food service intervention. Prev Med 1996;25(suppl):400–12.
33. US Department of Agriculture, Food and Consumer Services National School Lunch Program and School Breakfast Program: school meals initiative for healthy children; final regulation. Fed Regist 1995;60:31188–222. (7CFR parts 210 and 220.)