



Resolution No. 06-2001-149

**RESOLUTION OF THE
WHITE MOUNTAIN APACHE TRIBE OF THE
FORT APACHE INDIAN RESERVATION**

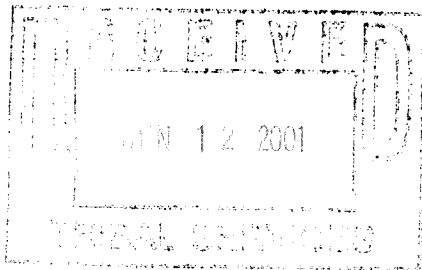
WHEREAS, Becky Ethelbah on behalf of Johns Hopkins University, Pathways, has approached the Tribal Council this date with a request that the Tribal Council approve the following Pathways manuscript for publication: "Pathways Process Evaluation Results": *A School-Based Prevention Trial to Promote Healthful Diet and Physical Activity in American Indian Third, Fourth and Fifth Grade Students*"; and

WHEREAS, this manuscript reviews the intervention process at twenty-one (21) schools where process evaluation data were collected for training of school personnel; implementation of the classroom and physical activity curricula; implementation of the project's food service guidelines in the school cafeterias; adult participation in family events; and students' perceived exposure to the Pathways intervention. There was a significant difference between intervention and control students perceived exposure to Pathways type interventions; and

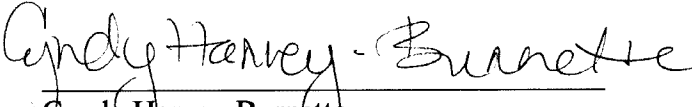
WHEREAS, the Tribal Council concludes that it would benefit the members of the White Mountain Apache Tribe to recommend publication of this manuscript.

BE IT RESOLVED by the Tribal Council of the White Mountain Apache Tribe that it hereby approves for publication the Pathways Manuscript, "Pathways Process Evaluation Results": *A School-Based Prevention Trail to Promote Healthful Diet and Physical Activity in American Indian Third, Fourth and Fifth Grade Students.*"

The foregoing resolution was on June 7, 2001, duly adopted by a vote of EIGHT for and ZERO against by the Tribal Council of the White Mountain Apache Tribe, pursuant to authority vested in it by Article IV, Section 1 (a), (g), (s), (t) and (u) of the Constitution of the Tribe, ratified by the Tribe on September 30, 1993, and approved by the Secretary of the Interior on November 12, 1993, pursuant to Section 16 of the Act of June 18, 1934 (48 Stat. 984).




Dallas Massey, Sr.
Chairman of the Tribal Council


Cyndy Harvey-Burnette
Secretary of the Tribal Council

Pathways Process Evaluation Results: A School-Based Prevention Trial to Promote Healthful Diet and Physical Activity in American Indian Third, Fourth and Fifth Grade Students

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ABSTRACT

Background: Pathways was a large-scale, multi-site, 3-year, study testing a school-based intervention designed to lower percent body fat in American Indian children.

Methods: At the 21 intervention schools process evaluation data were collected for: training of school personnel; implementation of the classroom and physical activity curricula; implementation of the project's food service guidelines in the school cafeterias; adult participation in the family events; and, students perceived exposure to the Pathways interventions.

Results: Students received about 93% of the classroom curriculum lessons. The minimum requirement of physical education being taught three times per week for at least 30 minutes duration was achieved by the fifth grade. The implementation of the food service behavioral guidelines increased from 51% in the third grade to 87% in the fifth grade. The family events had lower than anticipated adult participation. The participation rates were 45% during the third grade, 41% and 63% during the fourth and fifth grades, respectively. There was a significant difference between intervention and control students' perceived exposure to Pathways type interventions.

Conclusion: The Pathways interventions were successfully implemented with good reach, high extent and fidelity.

INTRODUCTION

Obesity is a risk factor for both heart disease and type 2 diabetes [1]. Prevalence of obesity among American Indians is higher than in the general U.S. population. One study reported that approximately 33.7% of American Indian adult males (18 and over) and 40.3% of American Indian adult females are obese, compared with rates of 24.1% of adult males and 25.0% of adult females overall in the U.S. [2]. American Indian preschoolers and adolescents are more overweight than the general U.S. population in the same age groups. Studies suggest that obese children are more likely to be obese in adulthood than those who were not obese in their early years [2]. Childhood, therefore, is an important age group upon which to focus an obesity prevention intervention among American Indians.

In obesity prevention, research has been conducted using school-based health education programs. During the 1980's, the National Heart, Lung and Blood Institute funded a number of school-based studies focusing on eating and physical activity behavior [3]. Building on these studies, in 1987 the NHLBI funded the first school-based, multi-centered randomized trial, the Child and Adolescent Trial for Cardiovascular Health (CATCH). The multilevel intervention components were food service, physical education, classroom curricula, and family. The study was implemented in four regional sites across the United States in ninety-six elementary schools (56 intervention and 40 control schools) [4]. The importance of process evaluation, especially in studies with multiple levels of intervention and measurement, was demonstrated in this study [5].

The second multi-center, school-based trial supported by NHLBI was Pathways. This was also a large-scale, multi-site study testing a school-based health promotion intervention designed to lower percent body fat in American Indian elementary school children. The design and methods used in the Pathways study have been previously described [6], and are summarized in Caballero, et al. in this supplemental issue of *Preventive Medicine*.

The Pathways' intervention design closely modeled that of CATCH, building on CATCH's successes while attempting to affect a selected population, i.e., American Indian

children. The Pathways intervention also drew from previous school based interventions designed specifically for American Indians, e.g., the Checkerboard Cardiovascular Curriculum, the Southwest Cardiovascular Curriculum, and Pathways to Health, and an extensive formative assessment [7]. The Pathways intervention was based on social learning theory, which applies a multi-level strategy involving individual behavior change and environmental modifications to support changes in individual behavior. Social learning theory asserts that interventions must address personal, behavioral, and environmental factors in order to successfully change behaviors [8].

Pathways had four coordinated intervention components that were designed to work together to address behavioral and environmental factors related to students' dietary and physical activity behaviors. The components were: (1) a culturally-appropriate classroom curriculum designed to promote healthful eating behaviors and increased physical activity, and introducing daily five-minute exercise breaks into the regular classroom, (2) a physical activity component aimed at maximizing energy expenditure during physical education classes, (3) a food service intervention intended to lower the amount of fat in school meals by changing or enhancing food service staff skills in planning, purchasing, preparing and serving lower-fat meals, and (4) a family program involving take-home "family action packs" linked to the classroom curriculum, and several school-based family events each year that encouraged parents to promote reduced fat meals and exercise [6]. Through these four components, Pathways attempted to increase student knowledge and efficacy about physical activity and food choices, and change the school environment in order to provide more opportunities for exercise and more healthy food choices.

Like CATCH, Pathways included an extensive process evaluation component. Process evaluation is considered particularly important for projects that employ multiple interventions. [9,10]. The uses of process evaluation include documenting exposure to interventions, demonstrating degree of adherence to interventions protocols, providing data on environmental

forces that affect interventions, informing outcome findings, and conducting quality assurance [11,12].

Baranowski and Stables suggest that program implementation consists of two main components: fidelity and extent [13]. Fidelity is the quality of delivery, extent is the number or amount of units delivered or provided, and dose is a combination of fidelity and extent. Assessing dose is a test of internal validity in that ineffective interventions due to low implementation are likely to be detected [13, 14]. Reach, another important process evaluation component, is defined as the degree to which the program contacted or was received by the targeted group [13].

This paper presents the process evaluation design, methods, and results for the three years (1997-1999) that the Pathways project was implemented. The main question addressed in this report is, "to what extent were the four Pathways interventions implemented?" Specifically examined are the reach, extent and fidelity of the Pathways intervention components.

PROCESS EVALUATION METHODS

As shown in Table 1, a total of eighteen instruments were used to collect process evaluation data for Pathways [15]. Column 4 of Table 1 indicates the process evaluation component that each instrument was designed to measure. Several different types of process data were collected for each intervention as described below.

[insert table 1 about here]

Classroom Curriculum

Four types of process data were collected for the classroom curriculum intervention component. Classroom teacher training occurred each year at the beginning of each semester. Teachers' attendance at each training session was recorded (reach). In addition, each teacher completed a brief evaluation of the training program (extent and fidelity). During the curriculum training, each teacher received a checklist that contained each unit and each lesson. The teachers

filled out this form during the time they were teaching the Pathways curriculum. The teachers were asked to indicate whether they "fully," "partially," or "did not" teach each lesson. At the end of each semester, a process evaluation staff person visited teachers and reviewed the checklist with them. In addition, a brief interview was conducted (extent and fidelity).

Physical Activity

Five types of process data were collected for the physical activity component of the Pathways intervention. At each physical activity training session, teacher attendance was recorded (reach), and the teachers completed a brief evaluation (extent and fidelity). Each physical education teacher completed a PE calendar each month during the three years of Pathways (extent). The calendars noted when PE was taught, how many students participated, and what activity or lesson from the Pathways physical education curriculum was used (a modified SPARK and American Indian Games curriculum). Physical education teachers were visited periodically by a mentor. This was a person, hired by the Pathways project at each site, who was a certified PE teacher and who had received special training in all of the components of the Pathways physical education curriculum. Twice in the fall semesters, and three times in the spring semesters, PE mentors completed a brief form that indicated the purpose of their visit to each school, what lessons they had demonstrated or explained, and what their observations were concerning how the Pathways program was being implemented in the school (fidelity). The final process evaluation data collection for physical activity was an end of semester checklist and interview completed by process evaluation staff with each physical education teacher. During this in-person interview, each teacher was asked to check those Pathways physical activities that had been taught that semester. In addition, the teachers were asked open-ended questions about how each lesson had been received by the students, any problems they had in teaching any of the activities, and any overall comments they had about the Pathways physical activity curriculum (extent and fidelity).

Food Service

Process evaluation of the food service intervention involved the use of five data collection methods. Training of food service staff was conducted at the beginning of each semester. Attendance at the training session by food service workers was recorded (reach), and each attendee completed a brief evaluation of each training session (extent and fidelity). Each Pathways site employed a nutritionist (called a "food service coordinator") who periodically visited each intervention school cafeteria kitchen. The coordinators worked in partnership with school food service staff to lower the fat in school meals. Twice during the fall semesters, and three times during the spring semesters, the coordinators completed a "Food Service Kitchen Contact Form" (extent and fidelity). On this form, the coordinators indicated the primary purpose of their visit, what guidelines they had explained or demonstrated, and what guidelines they had observed being carried out by the food service staff. If the food service staff were implementing a guideline incorrectly, this was also noted on the form. They also wrote their overall impressions of how the food service component of Pathways was going in that school. At the end of each semester, a structured interview was conducted by a Pathways process evaluation staff member with the food service manager of each intervention school. In this interview, food service managers were asked to indicate which of the food service guidelines they had implemented, and which guidelines they were not able to implement that semester. They also were asked to indicate any problems they had experienced in trying to implement the Pathways food service guidelines. They also were asked about any overall or general comments they had about the Pathways food service intervention (fidelity).

Family

The goal of the process evaluation for the family intervention was to document how many family members of Pathways students attended each family event. At each family event

attendance was taken (reach). Attendance was recorded in such a way that the number of family members of Pathways students attending an event was logged. In addition to attendance, each adult and each Pathways student completed a brief written evaluation of each family event (fidelity). A form was developed to allow project staff members to record their observations of a family event (fidelity). The process evaluation staff members had been trained in what to observe and how to record their qualitative observations.

Students

At the end of each school year, Pathways students were given a written questionnaire concerning their knowledge, attitudes, and practices in nutrition and physical activity. Ten questions were added to the questionnaire that assessed the extent to which the students recognized elements of the Pathways interventions. These questionnaire items measured the students' perceived exposure to the Pathways interventions (extent).

Process evaluation site staff

One staff person at each field site was designated as the process evaluation site staff. This person was responsible for insuring that all of the process evaluation data were collected each year. The process evaluation site staff was provided an orientation each year concerning the data collection requirements, and received training on how to administer all the measures. They then provided training to appropriate school staff concerning the process evaluation data to be collected that year.

Data management and data analysis

At least one staff person at each field site was designated to do all the data entry. This person received annual training provided by the study coordinating center. Each data entry staff person received all of the forms from the process evaluation site staff and other local staff, e.g., food service coordinators. The data were entered into pre-established electronic forms that were

then forwarded to the coordinating center where they were logged, cleaned and analyzed. The quantitative data were analyzed using the SAS statistical program, and the qualitative data were analyzed using NUD*IST [16].

RESULTS

Results for Classroom Curriculum

Training

As shown in Table 2, the attendance of teachers at the curriculum sessions was 95.6% during third grade, 98.0% during fourth grade, and 92.0% during fifth grade. As indicated in Table 3, the teachers' evaluation of the curriculum training suggests that a majority of teachers felt they learned why children needed to learn about nutrition and physical activity, the purpose of each lesson in the Pathways curriculum, what to emphasize in each activity, how to coordinate teaching the curriculum with other Pathways programs such as physical activity and food service, and specific terms used in the lessons.

[insert tables 2 and 3 about here]

Curriculum implementation

As shown in Table 4, on average, across all of the classrooms in the Pathways schools, over 90% of the Pathways curriculum lessons were successfully taught in the third, fourth, and fifth grades. Each year's curriculum also included suggested family activities. Throughout the curriculum, students took home "Family Packs" which were ideas for activities that families could do together to help improve nutrition and physical activity. For example, one activity was for the family to take a walk together. To help ensure that the Family Packs actually got home to the families the students were asked to return a card signed by their parents. Overall, the rate of return of these cards was lower than anticipated, ranging from a high of 63.2% in the fall of the third grade to a low of 39.8% in the spring of the fourth grade. The decline in returns of cards was significant over the three years of the project (Chi Square = 77.78, df = 2, $p < .005$; not

shown in tables). This decline may suggest an initial enthusiasm by students and parents that decreased over the years of the study.

[insert table 4 about here]

Part of the Pathways classroom intervention included exercise breaks that teachers could use in their classrooms. These were very brief physical activities, such as stretching, that students could do at their desks. During the curriculum training, teachers were given a file box that included over 50 cards of exercise breaks that they could use in their classroom, and they practiced doing some of the exercises. Teachers were encouraged to integrate these breaks daily in their classroom. The process evaluation results show that across the three years of Pathways, classroom teachers did on average 1.6 exercise breaks per school day (not shown in tables).

Teachers' comments about the curriculum

In the analysis of the qualitative interview data with teachers for all three school years, six main themes were found: (1) the teachers reported that they could integrate the Pathways curriculum with other subjects. For instance, one teacher noted, "The curriculum easily carries over into other subject curriculum." They also noted that the curriculum was "well organized." (2) The brief exercise breaks were an opportunity for students to have some exercise in the classroom. The exercise breaks received mixed reviews from teachers, and in fact, most teachers did not do them everyday as suggested. While some teachers said they enjoyed doing them with their students, others had trouble remembering to do them. (3) Snack preparation and taste testing was a favorite activity of students. It involved preparing healthy snacks such as fruit kabobs and trail mix during the lesson. (4) Active games included within the curriculum lessons each year were popular with students and teachers. (5) For many teachers it took more time to teach the classroom curriculum than had been planned. While a majority of teachers reported that they were able to complete the classroom lessons in the allotted 45-60 minutes, many teachers noted that some lessons were too long, and required extensions over several days. (6) Teachers

felt that the students benefited from the curriculum and a number of teachers indicated they would continue using it. One teacher commented, "Excellent program! I see results in students' health, self-concept, and eating habits. I would like to see it continued through all grades."

Results for Physical Activity

Training

Table 3 shows the teachers' evaluations of the trainings in which they learned about the Pathways physical education program. The results shown in the table suggest that the physical education trainings had high extent and fidelity. They were successful in helping the teachers understand: the need for the Pathways physical activity program, the goal of three to five PE classes per week, the cultural significance of the American Indian games that are part of the physical education curriculum, what to emphasize in the PE curriculum, and the importance of daily recess.

Implementation of the physical education curriculum

The goal for the intervention schools was to teach the Pathways physical education curriculum for thirty minutes at least three times per week, or 90 minutes per week. While the minimum goal was to teach physical activity three times per week, the schools were encouraged to teach it five times per week. In analyzing the physical activity process data, we examined the duration and number of days per week of physical education classes. We looked at whether schools met the minimum of offering physical education three times per week, and the extent to which they offered it five times per week.

In terms of duration, all of the schools were able to teach physical education for thirty minutes whenever it was taught. In the third grade, the average number of minutes of physical education was 32.5, in the fourth grade, it was 32.9, and in the fifth grade, it was 33.2 (not shown

in tables). The thirty-minute duration for physical education, by-and-large, was not a problem for the Pathways schools.

The second column of Table 5 shows the average number of days of physical education taught in the third, fourth and fifth grades of the Pathways intervention schools. The third column of this table indicates the expected number of days of physical education if the schools had taught it three times per week. The expected number of days has been adjusted for holidays and school wide events during which physical education could not have been taught. For instance, in the third grade, on average, the schools taught 70.8 days of physical education. If they had taught it every possible day, three times per week, they would have taught physical education 87.4 days. Therefore, physical education was taught on average 81.0% of the available days it could have been taught. This table suggests that the teaching of physical activity at least three times per week increased from third, to fourth to fifth grade. By the fifth grade many of the Pathways schools exceeded the requirement of three times per week.

[insert table 5 about here]

Columns five and six of Table 5, show how the number of days that physical education was taught compared to the ideal of five times per week. For example, in the third grade if the schools had taught it every available day (excluding holidays, etc.) they would have taught physical education for 145.7 days. Thus, on average, in the third grade, the schools taught PE 48.6% of the available days. Columns 5 and 6 of Table 5 indicate that the Pathways schools increased the number of days that physical activity was taught (on a five-day per week basis). The number of days that PE was taught increased from 48.6% in third grade, to 60.8% in fifth grade.

PE teachers' comments about the physical education curriculum

During all three years of the study, PE teachers indicated their positive reaction to the physical education curriculum. One teacher remarked that "the curriculum is laid out very well

and it was good to work with." Another PE teacher said, "The activities really help the students with fitness and learning to listen and pay attention." In addition, several teachers spoke of how Pathways PE meshed well with their current PE curriculum. The few negative comments from some fifth grade teachers concerned the perception that the games were no longer challenging for the students and some students seemed to be bored. A typical comment by fifth grade PE teachers is: "I really like the curriculum. I have been teaching PE for the last seven years and this is the best. You get a chance to describe the activity and it is fun, the kids and I found it fun."

Food Service Intervention Results

Training

As with the other two interventions, there was good attendance at the food service trainings. During the third grade attendance was 92.9%, for the fourth grade it was 95.5%, and it was 166.7% in the fifth grade. (Attendance was greater than 100% because schools sometimes sent more food service workers to the training than was required, i.e., one manager per cafeteria). (Table 2) Trainings of food service personnel occurred at the beginning of each semester of the school year. Evaluation of the food service training consisted of three open-ended questions to which the food service workers were asked to give written responses. The three questions were: "What did you like best about the training," "what did you like least about the training," and "general comments."

Across all three years of the Pathways project, the food service staff members gave very positive reviews of the food service training. For instance after the first training one participant wrote, "I found everything educational and fun." Other attendees commented that "the whole training was all very good, no weak points." The portion of training that covered how to rinse and drain ground beef made a strong impression, as evidenced by numerous comments from participants at all sites. Another recurring theme was a desire to have more training. Following the second and third food service trainings, comments on the evaluation form indicated that the

school food service staff enthusiastically welcomed learning about the Pathways behavioral guidelines, approved of Pathways overall objectives, and enjoyed the training.

Implementation of the Behavioral Guidelines

For the food service intervention, there were nine primary and four secondary (total of 13) behavioral guidelines that school food service personnel were trained to implement (see Story, et al., and Cunningham-Sabo, et al. in this issue of *Preventive Medicine*). Table 6 lists each of the food service behavioral guidelines and the percent of times they were observed being correctly implemented during the third, fourth, and fifth grade interventions. The food service coordinators did a structured observation of a lunch preparation twice each fall semester, and three times each spring semester. During the third grade 134 observations were completed, during the fourth grade there were 306 observations, and during the fifth grade there were 237 observations. The coordinators noted whether a particular guideline was: (1) not being implemented that day, e.g., no cheese was being served that day, (2) the guideline was being implemented correctly, or (3) the guideline was being implemented incorrectly. The percents shown in Table 6 are the number of times each guideline was observed being correctly implemented divided by the total number of observations of each guideline (if a particular guideline was not observed on a given day, it is not counted in the denominator) for each of the three grades.

[insert table 6 about here]

The Pathways food service intervention group determined a specific goal for each guideline. While the overall goal was to have the food service guidelines applied at all of the schools, all of the time, based on experience, it was determined that certain realities, such as staff turnover, food ordering problems, costs and other barriers would hinder the schools' ability to implement the guidelines. Therefore, the intervention group developed goals for each of the food service behavioral guidelines. These goals are shown in column 2 of Table 6.

As shown in Table 6, on average, the percent of food service behavioral guidelines being implemented increased from 51.5% during the third grade, to 80.6% during the fourth grade, and 87.5% during the fifth grade. While not statistically significant, there was a trend of increasing implementation of the food service guidelines from third to fourth to fifth grades. The three guidelines with the highest rate of implementation during the fifth grade intervention year were: (1) drained and rinsed ground meat (97.5%), (2) no fats, such as butter, on the serving line (98.7%), and (3) the required amounts of menu items were offered (97.3%), e.g., used appropriate serving size amounts for all menu items. The three food service behavioral guidelines that had the lowest rate of implementation during the fifth grade were: (1) offered choices of fruits and vegetables (69.7%), (2) offered only 1% or skim milk (71.8%), and (3) used low-fat cheese (71.8%).

Across the three years of the Pathways project, the food service guidelines were implemented correctly 77.9% of the times they were observed. While this is a relatively high rate of implementation, it is below the study goal of 85.8%.

End of semester food service manager interviews

At the end of each semester, the process evaluation site staff conducted an in-person interview with the food service manager of each intervention school cafeteria. During the third grade, several food service managers commented about receiving all of their cheese through a USDA commodities program that did not provide low fat cheese. Several food service managers commented that they previously had been trained in lower fat cooking, and had already begun to make the transition to this type of cooking before Pathways began. Other food service managers indicated that the information provided by Pathways was new to them.

During the fourth and fifth grade intervention years, the managers' comments about the Pathways program were mostly positive. For instance, during the fourth grade interview, one food service manager said, "We have learned a lot. It has been a lot of fun and it was a lot of

changes the cooks had to get used to, but they did it." Some also indicated they would continue to use the food service guidelines after the formal Pathways project ends.

Family Intervention Results

The family events were designed to reach parents and other adult family members with the Pathways message of eating lower fat foods and the benefits of regular physical activity for both children and adults. The events were held at the Pathways participating schools during the school day, in the late afternoon, or during the early evening. The events were designed to be participatory, interesting, skills-oriented, and fun for students and their parents. There were four family events held during the third grade, three during the fourth grade, and two in the fifth grade.

Attendance at Family Events

Table 7 shows the overall attendance at the family events for both students and adults. "Total number of Pathways students" refers to the total number of students who were eligible to attend all of the family events in a given school year. Because there were multiple events each year, the total number of students eligible is greater than the total number of students who actually participated in the Pathways study. Across the three years of the Pathways project, on average fifty-eight percent of Pathways students attended a family event. Student attendance was 45.5% in the third grade, 67.3% in the fourth grade, and 66.3% during the fifth grade (this increase was statistically significant).

The main purpose of the family events was to reach parents and adult relatives with the Pathways message. The goal was to have one parent, guardian or other adult relative attend for each Pathways student. As Table 7 indicates, in the third grade, the ratio of adult attendance to the total number of Pathways students was 0.45, in the fourth grade, it was 0.41, and in the fifth grade, it increased to 0.63 (this increase was not statistically significant). Over the three years of the Pathways project, the average overall adult attendance ratio was 0.47. This means that

slightly less than half of the Pathways students had a parent or other adult relative who attended a family event.

[insert Table 7 about here]

Comments made by adults about the family events

Adults who attended the family events were asked to complete a brief written evaluation form. When asked to comment on how worthwhile the family events were for them, adults overwhelmingly gave positive responses for all three years. Parents said that it was time that the family spent together, the activities were fun, they liked and were surprised by the tastiness of the low fat food, and they felt they learned things that they would do at home in regards to low fat food preparation and physical activity.

When asked how the family events could be improved, adults said parental attendance needed to be increased. They also indicated the need for increased attendance by teachers and by students. A frequent comment made by parents on the evaluation forms was the lack of lead-time in being notified about the family events. Overall, the process evaluation data suggest moderate to lower attendance by adults at the family events across the three years of the Pathways study than anticipated. In contrast, however, those adults who did attend found the events to be worthwhile and entertaining learning opportunities.

Perceived Student Exposure Results

At the end of each of the three school years of the Pathways study, students in both the intervention and control schools completed a brief, in-class questionnaire concerning their perceived exposure to the Pathways interventions. Typical items included, "Did you take short exercise breaks in class every week?" "Did your family go to family events at school about exercise?" "Did you make and eat low fat snacks in class?" The items were scored on a 0-1 scale, with one being the "exposed" value for all items. Table 8 presents the results for each grade and

compares intervention and control groups. As can be seen, in each year there was a significant difference between intervention and control students' perceived exposure to the Pathways interventions. For instance, in the third grade, the least square mean was 0.71 for the intervention group, and 0.45 for the control group, with a p value of 0.0001. Clearly, the intervention students perceived themselves to have been exposed to Pathways type interventions to a much greater extent than the students in the control schools.

[insert Table 8 about here]

DISCUSSION

Interpretation of Results

The process evaluation data suggest that the extent and fidelity of implementation of the classroom curriculum was high. During the three study years, students received an average of 93% of the classroom curriculum lessons. The successful implementation of the Pathways classroom curriculum appeared to be based on having a culturally sensitive, grade appropriate curriculum that could be taught by regular third, fourth, and fifth grade teachers working in schools on American Indian reservations. In addition, the reach, extent, and fidelity of the classroom teacher training were all found to be high, and appeared to be effective in enabling teachers to implement the curriculum. This was also true for the both the training of physical education teachers and food service staff.

There are two ways of interpreting the physical education curriculum implementation results. The first is based on the minimum requirement of physical education three times per week for at least 30 minutes duration. In short, this goal was achieved, indicating high extent and fidelity. The second, a suggested goal of teaching physical education five times per week was reached half of the time, i.e. moderate extent and fidelity. The success in implementing the

physical education curriculum may have been due to the addition of PE teachers by some sites after the third grade process evaluation data indicated low PE implementation.

Implementation of the food service intervention was designed to increase each year. This goal appears to have been achieved. The percent of behavioral guidelines increased from 51% implementation in the third grade to 87% in the fifth grade, indicating a high extent and fidelity of implementation. The family events, while being successfully implemented, tended to have lower than anticipated adult participation, with an average attendance of Pathways adults of 47%, i.e., lower than anticipated reach. However, although not statistically significant, there was an increase in adult attendance during the fifth grade.

The process evaluation results also can be useful in helping to explain the Pathways project outcome results, particularly the secondary aims. For instance, it is not unreasonable to conclude that the strong implementation of the curriculum lead to the positive knowledge, attitudes and behaviors of students found at the end of the study, (See Stevens, et al., in this issue of *Preventive Medicine*). The survey results that indicated a significant difference between intervention and control students on food choices, physical activity behavior, and weight-related knowledge are probably a result of successful Pathways curriculum implementation. The finding that there was no difference in food self-efficacy, knowledge of fat in foods, and dieting behavior may be an indication of the limitations of the Pathways curriculum, the questionnaire used to measure knowledge, attitude and behavior (see Stevens, et al., in this issue of *Preventive Medicine*), and the limited control children this age have over their food intake.

Going, et al. in the article reporting the Pathways' physical activity results, found a trend for activity in intervention schools to be higher than control schools, but there were no statistically significant differences (see Going, et al., in this issue of *Preventive Medicine*). Furthermore, the family events, which stressed the need for physical activity outside of school only reached approximately half of the eligible Pathways adults, i.e., moderate reach.

The nutrient analysis of the school lunches and the 24-hour recall data show a difference between intervention and control schools. Students in intervention schools consumed fewer calories from fat, from saturated fat, and greater calories from carbohydrates in school meals and in their overall diet (see Himes, et al., Cunningham-Sabo, et al., and Story, et al., in this issue of *Preventive Medicine*). The process evaluation data suggest that the food service intervention, which reached an implementation rate of 87% (high extent and fidelity) in the final year of the study was most likely a major contributing factor to the nutrient changes in the school meals served in the intervention schools. The student exposure data, which found clear differences between intervention and control schools, support the findings that the generally high extent and fidelity of implementation of the Pathways intervention components were most likely important contributors to the positive secondary outcome results.

Limitations

One of the limitations was that almost no process evaluation data was collected from the control schools. The main exception was the student exposure data. No process evaluation data were collected concerning nutrition related classroom activities, physical activity and physical education efforts, or food preparation and service activities in cafeterias in the control schools.

Another limitation of the process evaluation data was that some of it was retrospective and self-administered. An example was the curriculum checklist completed by the classroom teachers. Teachers were given the checklist during training and were instructed to complete it as they taught each lesson. While some teachers followed this procedure, a number of teachers left the completion of the checklist until the end of the semester when they were visited by a project staff person who reviewed the checklist with them and conducted a brief interview, which potentially introduced some recall bias.

The dietary behavioral guideline data, which provided the main process evaluation results concerning the school food service, were collected by the nutrition coordinators. This was an exception to the study's separation of intervention and measurement staff to reduce bias. An

important component of Pathways was an attempt to reach and involve parents and other adult relatives of Pathways students. Very little process data were collected from parents and other adults. Future studies should select a sample of parents to survey or interview concerning their perceptions of a program.

Strengths

A strength of the process evaluation was that it generated a large amount of both quantitative and qualitative data. This data served at least two important functions. First, it was analyzed in a timely fashion each semester and used for quality control purposes. Second, it provided an understanding of the extent to which the four intervention components were implemented, and how they were perceived by key school personnel. In addition, it was designed to keep the respondent burden to a minimum.

Implications for Practice

One goal of the Pathways project was to determine whether a multi-level school based intervention could be successfully implemented in American Indian schools. The process evaluation results indicate that it is possible to implement such a program with good reach, high extent and fidelity. This is particularly true of culturally appropriate classroom and physical education curricula. It is also true for a behavioral intervention directed at food service staff. The one intervention component that needs further theoretical and practical development is reaching students' parents and other adult family members. One of the reasons for the high level of implementation of the Pathways interventions was the repeated trainings that also had good reach, high extent and fidelity. These implications for practice are similar to those reported by Perry et al. in the process evaluation results of the CATCH study [5].

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REFERENCES

1. Welty T. Health implications of obesity in American Indians and Alaska Natives. *Am J Clin Nutr* 1991; 53:116S-20S.
2. Brouard BA, Johnson A, Himes JH, Story M, Fichtner R, Hauck F, Bachman-Carter, K, Hayes J, Frohlich K, Gray N. Prevalence of obesity in American Indians and Alaska Natives. *Am J Clin Nutr* 1991; 53 (suppl. 6):1535S-42S.
3. Parcel GS, Simons-Morton BG, O'Hara NM, Baranowski T, Wilson BS. School promotion of diet and physical activity: Impact on learning outcomes and self-reported behavior. *Health Educ Q* 1989; 16:181-99.
4. Perry CL, Stone EJ, Parcel GS, Ellison RC, Nader PR, Webber LS, et al. School-based cardiovascular health promotion: The Child and Adolescent Trial for Cardiovascular Health (CATCH). *J Sch Health* 1990; 60:406-13.
5. Perry CL, Sellers DE, Johnson C, Pedersen S, Bachman KJ, Parcel GS, et al. The Child and Adolescent Trial for Cardiovascular Health (CATCH): Intervention, implementation,

- and feasibility for elementary schools in the United States. *Health Educ & Behav* 1997; 24:716-35.
6. Caballero B, Davis S, Davis CE, Ethelbah B, Evans M, Lohman T, Stephenson L, Story M, White, J. Pathways: A school-based program for the primary prevention of obesity in American Indian children. *J Nutr Biochem* 1998; 9:535-43.
 7. new ACJN ref. Partic. Res.
 8. Baranowski T, Perry CL, Parcel GS: How Individuals, Environments, and Health Behavior Interact: Social Cognitive Theory. In Glanz K, Lewis FM, Rimer BK (Eds.) *Health Behavior and Health Education: Theory, Research and Practice*, (2nd ed.). San Francisco, Jossey-Bass, 1997.
 9. McGraw SA, Stone EJ, Osganian SK, Elder JP, Perry CL, Johnson CJ, et al. An overview of process evaluation on CATCH: The Child and Adolescent Trial for Cardiovascular Health. *Health Educ Q* 1994; 25(suppl.): S5-26.
 10. Viadro CI, Earp JAL, Altpeter M. Designing a process evaluation for a comprehensive breast cancer screening intervention: Challenges and opportunities. *Eval and Program Plan* 1997; 20:237-49.
 11. Israel, BA, Cummings, KM, Dignan MB, Heaney CA, Perales DP, Simons-Morton BG, Zimmerman MA. Evaluation of health education programs: Current assessment and future directions. *Health Educ Q* 1995; 22:364-89.
 12. Bartholomew LK, Parcel GS, Kok G, Gottlieb NH. *Intervention Mapping: Designing theory and evidence based health promotion programs*. Mountain View, California: Mayfield, 2001.
 13. Baranowski T, Stables G. Process Evaluations of the 5-a-Day Projects. *Health Educ & Behav* 2000; 27:157-66.
 14. Basch CE, Sliepcevich EM, Gold RS, Duncan D, Kolbe L. Avoiding Type III errors in health education program evaluations: A case study. *H Educ Q* 1985; 12:315-31.
 15. Helitzer D, Davis S, Gittelsohn J, Going S, Murray D, Snyder P, et al. Process evaluation in a multi-site obesity primary prevention trial for Native American school children. *Am J Clin Nutr Suppl* 1999; 69:816S-24S.
 16. QSR NUD*IST, Version 4, Qualitative Solutions and Research, Pty., Ltd., 1997

Table 1
Process Evaluation Measures

Intervention	Data Collection Forms	When Collected	Process Evaluation Component
Curriculum	1. Classroom teacher training attendance log	At each training session	Reach
	2. Training evaluation form	At each training session	Extent and Fidelity
	3. Family pack challenge return log	End of each semester	Extent and Fidelity
	4. Classroom teacher/curriculum checklist and interview	End of each semester	Extent and Fidelity
Physical Activity	5. PE teacher training attendance log	At each training event	Reach
	6. Training evaluation form	At each training event	Extent and Fidelity
	7. Physical education calendar	End of each semester	Extent
	8. PE Mentor visit summary form	2 times in fall; 3 times in spring	Fidelity
	9. PE Teacher checklist and interview	End of each semester	Fidelity
Food Service	10. Food service personnel training attendance log	At each training event	Reach
	11. Food service training evaluation form	At each training event	Extent and Fidelity
	12. Food service Kitchen contact form	2 times in fall 3 times in spring	Extent and Fidelity
	13. Food service manager interview	End of each semester	Fidelity
Family	Family events: 14. Registration form	At each family event	Reach
	15. Student evaluation form	"	Fidelity
	16. Adult evaluation form	"	Fidelity
	17. Field notes form	"	Fidelity
Student Exposure	18. Student exposure questionnaire	End of each year	Extent

Table 2
Intervention training attendance - classroom curriculum, physical activity, and food service, by grade

	Curriculum Attendance Rate			Physical Activity Attendance Rate			Food Service Attendance Rate		
	No. Attended	No. Expected	Per-cent	No. Attended	No. Expected	Per-cent	No. Attended	No. Expected	Per-cent
3 rd Grade	92	96	95.6	42	43	97.8	39	42	92.9
4 th Grade	97	99	98.0	47	47	100.0	42	44	95.5
5 th Grade	46	50	92.0	25	24	104.4	35	21	166.7
Total	235	245	95.9	114	114	100.0	116	107	108.4*

* Percent is greater than 100 because some schools sent more than the required number of attendees

Table 3
Classroom teacher training and physical education training evaluation, by grade

Question	Percent "Strongly Agree" and "Agree"		
	Third Grade	Fourth Grade	Fifth Grade
Evaluation of Classroom Teacher Training			
Number of Participants	97	107	46
Understand the need to teach Pathways curriculum	96.9%	99.1%	97.8%
Understand the purpose of each lesson	99.0	100.0	97.8
Know what points to emphasize in each activity	99.0	99.1	91.3
Identify and know how to use the extra materials for each lesson (visual aids, family packs, etc.)	97.9	98.1	95.6
Know how to make the necessary arrangements for lessons that involve the help of the other Pathways programs (food service, physical education, family)	89.7	97.2	84.8
Begin to become familiar with the specialized vocabulary of the Pathways curriculum ("everyday foods," Native American glossary, etc.)	87.6	96.3	89.1
Gain overall skill and confidence in teaching the Pathways curriculum	90.7	95.3	87.0
Look forward to teaching the Pathways curriculum	91.7	95.3	91.3
Evaluation of Physical Education Training			
Number of Participants	48	62	37
Understand the: need to teach Pathways physical activity program	95.8%	96.8%	97.3%
the goal of 5 physical activity classes per week	87.5	96.8	97.3
minimum requirement of 3 physical activity classes per week for 30 minutes	95.8	95.7	94.6
points to emphasize in each PE unit presented	93.7	98.4	100.0
importance of daily recess sessions	93.7	98.4	97.3
role of American Indian games in Pathways PE program	85.4	85.5	89.2
role of daily exercise breaks	91.7	87.1	91.9

Table 4
 Percent of classroom lessons completed, by grade

Grade	Number of lessons in Pathways Curriculum		N ^b	Percent Completed
	Fall	Spring		
Third	12	12	3736	94.8
Fourth	12	12	3779	93.4
Fifth	16 ^a	--	2277	93.4
Total	40	24	9792	93.9

- a. The Pathways curriculum was only offered in the Fall semester of the fifth grade
- b. N = The total number of lessons taught for all classrooms in all 21 Pathways intervention schools

Table 5
Minimum and maximum total number of PE days as a percent of all school days, by grade

Grade	No. of PE days	Minimum expected days of PE		Maximum encouraged days of PE	
		Expected No. of days	Percent	Possible No. of days	Percent
Third	70.8	87.4	81.0	145.7	48.6
Fourth	87.9	88.6	99.2	146.6	60.0
Fifth	88.5	87.1	101.6	145.5	60.8
Total	82.4	87.7	93.9*	145.98	56.5**

* Chi Square = 3.18, df = 2, p = n.s.

** Chi Square = 84.33, df = 2, p < .005

Table 6
Percent of visits where food service guidelines were followed, by grade

		3 rd Grade	4 th Grade	5 th Grade	Total
Number of Visits		134	306	237	677
Guideline	Goal	Percent	Percent	Percent	Percent
1. Offered only 1% or skim milk	90	24.6	64.7	71.8	60.5
2. Drained and rinsed ground meat	90	79.7	92.0	97.5	91.5
3. Used low-fat vendor entrees	80	37.3	86.6	82.4	75.4
4. Used low-fat salad dressing	80	36.2	80.0	91.9	75.5
5. Used low-fat cheese	80	39.3	62.2	71.8	61.0
6. Prep/serve breads w/o added fat	90	60.2	82.6	94.7	82.4
7. Prep/serve pasta w. little/no fat	90	57.6	86.2	93.2	83.0
8. Prepare gravy with no fat	90	54.5	80.9	93.8	80.2
9. Prep/serve hot vegetables w/o fat	90	81.9	91.4	95.7	91.0
10. No fats on serving line	90	72.4	93.8	98.7	91.3
11. Offered choices of fruits and vegetables	75	37.5	58.4	69.7	58.2
12. No seconds of entrees	80	36.9	72.1	79.6	67.8
13. Offered req'd. amount of menu items	90	**	93.9	97.3	95.4
Mean percent	85.8	51.5	80.6	87.5	77.9
Number of guidelines meeting or exceeding goal		0/12	6/13	9/13*	

* Chi Square = 5.00, df = 2, p = n.s.

** Not measured

Table 7
Pathways family events attendance, by grade

	3 rd Grade	4 th Grade	5 th Grade	Total
Number of events	4	3	2	9
Total number of registered students ^a	2254	2003	1148	5405
Number of Pathways students attended ^b	1024	1349	761	3134
Percent ^c	45.5%	67.3%	66.3%	58.0% ^f
Number of Pathways adults attended ^d	1010	813	721	2544
Ratio ^e	0.45	0.41	0.63	0.47 ^g

^a Each student counted each time a Pathways student was registered for a Pathways event.

^b The total number of Pathways students that attended events each year.

^c Average percent of Pathways students attending events

^d Total number of adults attending events each year

^e Ratio of number adults attending to total number of Pathways students

^f Chi Square = 51.8, df = 2, p < .005 (a significant increase in percent of students attending)

^g Chi Square = 0.79, df = 2; p = N.S. (not a significant increase in ratio of adults attending)

Table 8
 Students' Perceived Exposure to the Intervention, By Group and Grade

Grade ^a	Intervention				Control				P
	N	LSMean ^b	SE	Alpha	N	LSMean	SE	Alpha	
Third	713	0.71	0.02	0.69	686	0.45	0.02	0.66	0.0001
Fourth	641	0.79	0.02	0.72	636	0.44	0.02	0.63	0.0001
Fifth	633	0.77	0.03	0.77	627	0.42	0.03	0.71	0.0001

a. In the third grade there were 11 items in the scale, in the fourth and fifth grade, there were 12 items.
 b. Least Square Mean, adjusted for site and school effects.