

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

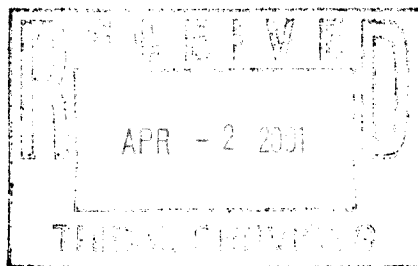
**WHEREAS,** Becky Ethelbah, on behalf of Johns Hopkins University, Pathways, has approached the Tribal Council this date with a request that the Tribal Council approve the oral presentations of the Experimental Biology 2001 Abstracts; and


**WHEREAS,** each of the abstracts listed in the Experimental Biology 2001 Abstracts are related to the Pathways Project and include seven different participating tribes and forty-one (41) schools; and

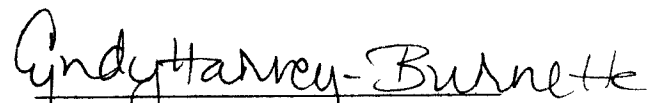
**WHEREAS,** the Tribal Council concludes that it should grant approval to have these abstracts orally presented at the Annual Nutrition meeting in March 2001.

**BE IT RESOLVED** by the Tribal Council of the White Mountain Apache Tribe that it hereby approves the oral presentation of the above listed abstracts and that upon final completion of each manuscript, each will be submitted as required for Tribal Council review and direction.

The foregoing resolution was on January 3, 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

EB 2001 Abstracts

1. Design, trial description, and body composition results. **Ben Caballero**
2. Classroom and Family Interventions to Promote Physical Activity and Healthful Eating in American Indian Schoolchildren: Pathways A Multi-component Study. **Sally Davis**
3. The Impact of the Pathways Intervention on the dietary intake of American Indian Schoolchildren. **John Himes**
4. The Impact of the Pathways Intervention on Physical Activity in American Indian Schoolchildren. **Scott Going**
5. The Impact of the Pathways Intervention on Obesity-related Knowledge, Attitudes and Behaviors in American Indian Schoolchildren. **June Stevens**
6. Childhood Obesity - A Priority for Prevention in American Indian Schoolchildren. **Mary Story**
7. Process Evaluation of a Multi-component Collaborative Study to Increase Physical Activity and Promote a Healthful Diet in American Indian Schoolchildren. **Allan Steckler**
8. Elementary School Climate Assessment: Pathways Multi-center Study. **Joel Gittelsohn**
9. The Benefits and Challenges of a Collaborative Multi-site Study in American Indian Schools and Communities. **Sally Davis**
10. Body composition results. **Tim Lohman**
11. School meals. **Pat Snyder**

## **The Pathways Obesity Prevention Study: Overview of Design and Measurements**

B Caballero, T Clay, S Davis, B Ethelbah, B Holyrock, T Lohman, M Story, J Stevens, L Stephenson, E Stone, for the Pathways Collaborative Research Group

Pathways is a randomized trial aimed at evaluating a culturally-appropriate, school-based intervention to reduce the problem of obesity in American Indian children. The program targeted 3rd grade children, and implemented the intervention during three consecutive school years in 41 schools, 20 intervention and 21 controls. The components of the program were a) a classroom curriculum emphasizing healthy eating habits and physical activity; b) a school food service intervention, aimed at reducing percent calories from fat; c) a physical activity program, with the goal of introducing at least three 30-minute sessions of PA per week, plus exercise breaks during each school day; and d) a family component, aimed at involving families into the program by take-home assignments and school family events.

The main outcome variable was percent body fat, measured by a combination of anthropometry and bioelectrical impedance, using equations previously validated in this population. The goal of the program was defined as a difference in average percent body fat in intervention schools of at least \*2.7% relative to the control group at the end of the 3-year study period. Other variables measured included dietary intake (by direct observation and dietary recall), physical activity (by questionnaire and motion sensors), knowledge, attitudes and behaviors (KAB). A comprehensive process valuation data collection was also carried out throughout the study. All enrolled schools completed the program.

### **School-based Interventions to Promote Healthful Eating and Physical Activity in American Indian Schoolchildren: Pathways A Multi-site Study**

S. Davis<sup>1</sup>, T. Clay<sup>1</sup>, M. Smyth<sup>2</sup>, V. Arviso<sup>1</sup>, B. Holy Rock<sup>2</sup>, R. Brice<sup>3</sup>, D. Stewart<sup>2</sup>, J. Altaha<sup>4</sup>, H. Flint-Wagner<sup>5</sup>, J. Reed<sup>5</sup>, L. Metcalf<sup>5</sup>, E. Stone<sup>6</sup>

<sup>1</sup>The University of New Mexico, Albuquerque, NM 87131, <sup>2</sup>University of Minnesota, Minneapolis, MN 55454, <sup>3</sup>University of North Carolina, Chapel Hill, NC 27599, <sup>4</sup>The Johns Hopkins University, Baltimore, MD 21205, <sup>5</sup>University of Arizona, Tucson, AZ 85721, <sup>6</sup>National Heart, Lung, and Blood Institute<sup>6</sup>, Bethesda, MD 20892. *The Pathways Collaborative Research Group*

Pathways was a multi-site school-based study aimed at promoting healthful eating and increasing physical activity in American Indian schoolchildren. It was designed as a randomized field trial involving 1705 students in 41 schools in seven different American Indian communities. Twenty-one served as intervention schools and twenty were in the comparison group. The intervention schools received four integrated components including a classroom curriculum, school food service, physical activity, and family in grades 3-5. Both groups were measured at baseline, spring and fall 1997; interim, spring 1998 and 1999; and after the intervention, spring 2000. Results of the curriculum and family components will be presented. The results showed that the curriculum was successful in promoting positive changes related to self-reported healthful eating and physical activity. A questionnaire, which examined knowledge related to the healthy eating and lifestyle messages conveyed by the curriculum, showed a statistically significant increase in the intervention group at each year. There was also a significant retention of knowledge over the three years, based on the results of repeating the third and fourth grade test items in the fifth grade. Process evaluation showed that parents participated in and enjoyed family events and take home activities. These results suggest that the curriculum and family interventions were well received and increased knowledge. Supported by NHLBI.

## **Impact of the Pathways Intervention on Dietary Intake of American Indian School Children**

John H Himes, Leslie Cunningham-Sabo, Joel Gittelsohn, Lisa Harnack, Kim Ring, Chirayath Suchindran, Janice Thompson, Judith Weber: Pathways Collaborative Research Group, 1300 S 2nd St, Suite 300, Minneapolis, MN 55454

Dietary intake is one of the modifiable proximate causes of obesity. Accordingly, one of the secondary hypotheses of the Pathways study was that the intervention would be associated with a reduction in the percent calories from fat. The impact on dietary intake was investigated using two methodologies. At baseline and annually thereafter, a random sample of children in each school was directly observed eating lunch. Observations were made during the same five-day period that food service menus and recipes were collected. Menu/recipe data and direct observation data were entered into the NDS-R software system (University of Minnesota) and nutrients were calculated for school lunch. At the end of the study 24-hour recalls were collected on a random sample of students using NDS-R in a post-test only design. Longitudinal lunch-observation data indicate the Pathways intervention was associated with differences of  $\pm 3.68\%$  calories from fat,  $\pm 2.35\%$  calories from saturated fat, and  $3.76\%$  calories from carbohydrates; all statistically significant ( $p \leq 0.05$ ). The 24-hour recall data showed intervention-related differences of  $\pm 265$  kcal,  $\pm 2.53\%$  calories from fat,  $\pm 1.14\%$  calories from saturated fat, and  $2.59\%$  calories from carbohydrates; all statistically significant ( $p \leq 0.05$ ). No other nutrients showed significant intervention-related changes. The results indicate that the Pathways intervention was effective at reducing fat calories in the school food service and that similar responses were seen in total daily intakes. The intervention did not significantly alter other nutrients important for child health. Supported by the NHLBI.

## **The Effects of the Pathways Obesity Prevention Program on Physical Activity in American Indian Children**

S Going, E Stone, L Harnack, J Thompson, J Norman, D Stewart, C Corbin, and C Hastings.

Low levels of physical activity are generally believed to contribute to the increasing prevalence and degree of childhood obesity. Formative assessment during the development of Pathways, a multi-site school-based childhood obesity prevention program, supported this notion in participating American Indian communities and led to an intervention focused partly on increasing physical activity at school and at home. Greater frequency and more active time during physical education classes, more frequent recesses, and daily exercise breaks were designed to increase activity at school. Family events included activity, and curriculum lessons and take home materials emphasized physical activity in traditional Indian culture and daily life. Minute-by-minute triaxial Tritrac (model RD30) accelerometry in a subsample ( $n=493$  of  $N=XXX$ ) of children provided an objective test of intervention effects on physical activity. Approximately 12 fifth grade boys and girls from each Pathways school ( $n=41$ ) in six Midwest and Southwest Indian communities wore accelerometers in sealed fanny packs over about 24 hours except while sleeping. Gender comparisons of least squares average vector magnitudes showed boys ( $n=xx$ ) were  $16.5\%$  ( $p=0.0001$ ) more active than girls ( $n=xx$ ). Overall, average vector magnitude was  $10\%$  higher for children in intervention schools ( $n=21$ ) compared to children in control schools. While not significant ( $p=0.08$ ), there was an encouraging trend for activity in intervention schools to be higher than control schools in 3 of the 4 sites. Minute-by-minute recordings of average vector magnitude provides the opportunity for segmental analyses and in follow up analyses we will examine whether intervention effects differed for intervals before, during and after- school.

## **The Impact of the Pathways Intervention on Obesity-related Knowledge, Attitudes and Behaviors in American Indian Schoolchildren**

June Stevens, Mary Story, Kim Ring, Joel Gittelsohn, Scott Going, Carol Cornell, Juhaeri, Matilda Marquez, David Murray

Reduction of the high prevalence of obesity in American Indian children is likely to require changes in obesity-related knowledge, attitudes and behaviors (KAB). The Pathways study included questionnaires to examine the impact of a 3-year, school-based intervention to prevent obesity. The KAB questionnaire examined food self-efficacy, food choices, physical activity self-efficacy, physical activity behaviors, weight-related knowledge, knowledge of fat in foods and dieting behaviors. Question and answer choices were read to children by trained staff and children marked their own answers. Each variable was measured in a scale that had been set to range from 0 to 1 such that 0 was the least healthy score and 1 was the most healthy score. Mixed model analyses were used to compare results in 1,150 fifth grade children in 20 control and 21 intervention schools. Baseline scores measured in the third grade were included in models.

Scales indicated healthier scores in fifth grade children in intervention schools compared to controls for food choices (0.66 versus 0.53), physical activity behaviors (0.27 versus 0.24) and weight-related knowledge (0.77 versus 0.65) ( $p < 0.05$  for all). There were no differences in food self-efficacy or physical activity self-efficacy, knowledge of fat in foods or dieting behaviors. The Pathways program had a positive impact on several aspects of obesity-related knowledge, attitudes and behaviors.

Supported by the National, Heart, Lung, and Blood Institute.

### **Childhood Obesity - A Priority for Prevention in American Indian School Children**

Mary Story, Sally Davis, Becky Ethelbah, John Himes, Bonnie Holy Rock, Larry Stephenson, June Stevens, Elaine Stone: Pathways Collaborative Research Group, 1300 S 2nd St, Suite 300, Minneapolis, MN 55454

American Indians of all ages and both sexes have a high prevalence of obesity. The health risks associated with obesity are numerous and include type 2 diabetes mellitus, hypertension, dyslipidemia, sleep apnea, and respiratory problems. Obesity has become a major health problem in American Indians only in the past few generations and is believed to be associated with the relative abundance of high-fat foods and the rapid change from active to sedentary lifestyles. Intervention studies are urgently needed in American Indian communities to develop and test effective strategies for weight reduction. The poor success rate of adult obesity treatment programs in the general population points to the need to develop prevention approaches aimed toward children. Because eating and physical activity practices are formed early in life and may be carried into adulthood, prevention programs that encourage increased physical activity and healthful eating habits targeted toward young people need to be developed and tested. Healthy eating and physical activity patterns need to be reinforced at home, in schools and throughout the community. To be effective, educational and environmental interventions must be developed with full participation of the American Indian communities. Supported by the NHLBI.

## **Process Evaluation of a Multi-Component Collaborative Study to Promote a Healthful Diet and Increase Physical Activity in American Indian School Children**

Allan Steckler, Mary Smyth, Marla Paredilla, Dawn Stewart, Elaine Stone, Becky Ethelbah, Jim McMahon, Jane Martin, Joel Gittelsohn, Maihan Vu, David Fenn

**Objective:** The process evaluation conducted during the Pathways study examined the delivery, accuracy and proficiency of four intervention components: classroom curriculum, family activity, food service and physical activity in a three year, multi-component collaborative study on diet and physical activity of American Indian school children.

**Methods:** At the 21 elementary intervention schools, training attendance rates, classroom lessons, family participation, food service guidelines and physical activity classes were examined using self administered data collection forms and one-on-one interviews conducted by project staff. Data collection occurred during the school year, at the end of each semester, at the time of activity and at the end of training.

**Results:** Over 90 percent of classroom teachers, physical education teachers, and food service personnel attended the training each school year. During each of the three years, 90 percent of the classroom curriculum were successfully implemented. For family events, attendance of Pathways students increased from 45 percent in the 3rd grade to 66 percent in the 5th grade. In the 3rd grade, the ratio of Pathways adults to students was 0.45 and increased to 0.63 in the 5th grade. In food service, the number of guidelines that met or exceeded the implementation index goal increased from 3rd grade (zero percent) to 5th grade (76.9 percent). The number of days that PE was taught increased from 50 percent in 3rd grade to 71 percent in 5th grade of all school days.

**Conclusions:** Overall, classroom and PE teachers, and food service workers displayed dedication and skill in successfully implementing the project interventions.

### **School climate in an intervention to prevent obesity in American Indian school children: Results from the Pathways study**

Gittelsohn J, Davis S, Martin J, Merkle S, Noel J, Steckler A, Stone E, Story M. (alpha order for now following lead author)

Organizational factors, such as school climate, have the potential to positively or negatively impact the success of intervention trials during implementation and in terms of their sustainability. As part of the school climate assessment in Pathways, in-depth interviews were conducted with school administrators, food service personnel, PE instructors and classroom teachers in all 21 intervention schools. Over 300 school climate interviews were collected at the end of third (n=102), fourth (n=101) and fifth (n=107) grades. Data were coded and analyzed using the NUD\*IST software program. Parent and student support were perceived as crucially important to the success of the program, as well as strong administrative leadership and support. The most common barriers to the implementation of the Pathways intervention were seen to be scheduling conflicts, lack of resources (eg. getting supplies), and poor coordination of activities with the school food service. Respondents varied in their assessment of the long-term sustainability of the Pathways intervention in their schools, giving most likelihood to sustaining the food service changes, moderate likelihood to the curriculum and PE components, and the least likelihood to family events. Lack of resources and staff turnover were seen as the primary barriers to sustainability.

## **The Benefits and Challenges of Pathways a Collaborative Multi-Site Study in American Indian Schools**

Davis S, Stephenson L, Clay T, HolyRock B, Sedillo L, Metcalfe L, Steckler A  
University of New Mexico, Albuquerque, NM, University of Arizona, Tucson, AZ, University of Minnesota, Minneapolis, MN, University of North Carolina, Chapel, Hill, NC *The Pathways Collaborative Research Group*

Pathways, a multi-site school-based study to prevent obesity in American Indian children encountered many challenges in conducting the research. These challenges will be described in the following categories: Historical, geographical, cultural, temporal, institutional, and educational. Examples of each will be given and solutions presented. Benefits of the intervention study for students, families, schools, tribes, and research teams will be highlighted. The lessons learned from Pathways should provide other researchers valuable insight into successful approaches to the challenges inherent in school-based research in rural settings and how to maximize and share the benefits of such a study. Supported by NHLBI.

### **The effect of Pathways Obesity Prevention Study on Body Composition in American Indian Children**

T. Lohman, S. Going, D. Stewart, B. Caballero, J. Stevens, J. Himes, J. Weber, J. Thompson, E. Davis, J. Norman, for the Pathways Collaborative Research Group.

A randomized trial was designed to reduce body fat using a three year culturally-appropriate, school-based intervention. A comprehensive intervention program aimed at increasing physical activity and decreasing percent dietary fat calories was implemented in 21 schools. Another group of 20 schools served as a comparison group. The intervention began in 3<sup>rd</sup> grade children and was completed at the end of 5<sup>th</sup> grade. The primary outcome variable, percent body fat, was measured from a previously validated multiple regression equation with body weight, bioelectrical impedance and two skinfold used as predictors. Body composition data was obtained on 704 children (intervention) and 665 children (comparison). There were no significant difference in mean body fat or mean BMI between intervention and comparison groups after the 3-year intervention period. Mean values of body fat (%) and BMI (kg/m<sup>2</sup>) for the intervention group were 41.9 and 22.0 for boys and 41.6 and 22.0 for girls. For the comparison group body fat and BMI were 41.6 and 22.1 for boys and 41.5 and 22.3 for girls. We conclude that the intervention program did not reduce % body fat in this three year time period.

Supported by NHLBI

## Pathways School Food Service Intervention

Pat Snyder, Leslie Cunningham-Sabo, Jean Anliker, Judith Weber, Harrison Platero, Linda Nielsen, Arlene Chamberlain, Stacey Gyenizse: Pathways Collaborative Research Group, 1300 S 2nd St, Suite 300, Minneapolis, MN 55454

The Pathways School Food Service intervention goal was to lower the fat in school meals to 30% of calories from fat and saturated fat to 10% of calories from fat while maintaining calories and key nutrients. This Pathways component was an essential and integrated part of the Pathways three-year obesity prevention intervention that was implemented in forty-one schools (21 intervention and 20 control schools) in seven American Indian Nations. The Pathways food service staff worked in partnership with each intervention school's food service staff to plan, prepare, and serve lower fat school meals. The intervention developed nutrient and behavioral guidelines that were implemented through training sessions and kitchen visits by the Pathways staff. To evaluate the effectiveness of the intervention on the nutrient composition of school meals, menu data were collected for five consecutive days at baseline and the final intervention year. To determine the nutrient content of intervention and control school menus, a nutrient database and average daily nutrient content of intervention and control school menus were compared. In the final year data, results of this analysis indicated a significantly greater mean reduction of calories from fat and saturated fat in the intervention schools. The control schools mean levels were 29.9% of calories from fat and 11% of calories from saturated fat while the intervention schools were 26.1% of calories from fat and 9.5% of calories from saturated fat. No significant statistical differences were found for calories and other key nutrients of calcium, iron, sodium, Vitamin A, and Vitamin C between the intervention and control schools. The final results indicate that the intervention was effective in lowering the fat and saturated fat in schools while maintaining calories and the other key nutrients. Supported by the NHLBI.