Resolution No. 06-2001-150

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 for publication the Pathways manuscript: *"Impact of the Pathways Intervention on Psychosocial Variables Related to Diet and Physical Activity in American Indian School Children"*; and

WHEREAS, this manuscript reviews the impact of Pathways Intervention. The Pathways intervention program had a positive impact on several aspects of obesity-related knowledge, attitudes and behaviors; and

WHEREAS, the Tribal Council concludes that it would be in the best interest of the White Mountain Apache Tribe to approve 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 entitled; *"Impact of the Pathways Intervention on Psychosocial Variables Related to Diet and Physical Activity in American Indian School Children."*

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).

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TRIBAL SERVICES

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The impact of the Pathways intervention on psychosocial variables related to diet and physical activity in American Indian School children

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Running Title: Psychosocial variables in American Indian children.

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ne Pathways school-based intervention program had a positive impact on several aspects of obesity-related knowledge, attitudes and behaviors in American Indian schoolchildren.

Abstract

Background: Little is known about the impact of an intervention to prevent obesity on psychosocial variables related to diet and physical activity among American Indian children.

Methods: Schools serving American Indian children were randomized to receive a multi-component intervention or control. At baseline (fall of 3rd grade) and in the spring semester of 3rd, 4th and 5thgrades 755 boys and 692 girls completed a classroom-administered questionnaire.

Results: Knowledge of nutrition and physical activity messages increased in both boys and girls in the intervention group compared to controls, however, knowledge of which foods contained more fat did not increase consistently. Self-efficacy to be physically active increased among girls in intervention schools, but not among boys, whereas self-efficacy to make more healthy food choices did not increase in either gender. In the intervention group healthy food intentions and participation in physically active behaviors increased in both boys and girls. Perception of healthy body size and weight loss attempts did not differ in the intervention and control groups.

Conclusion: The Pathways intervention program had a positive impact on several aspects of obesity-related knowledge, attitudes and behaviors.

Keywords: American Indian, children, prevention, self-efficacy, attitudes, diets, nutrition, obesity

INTRODUCTION

Although American Indians are not a homogeneous group, overall they have a higher prevalence of overweight and obesity compared to the U.S. general population. As summarized by Story et al (1), prevalence rates are higher not just in adults, but also in children and adolescents. The causes of obesity are complex and incompletely understood, but it appears that determinants are rooted in multiple factors associated with genetics and the environment as well as behaviors (2, 3). Most American Indian populations developed obesity only in the past few generations, and it is believed to be related to the relative abundance of high-fat, high-calorie foods accompanied by rapid changes from an active to a sedentary lifestyle (4, 5).

The Pathways study (6, 7) was designed to evaluate the effectiveness of a school-based, multi-component intervention to reduce obesity in American Indian children in grades 3-5. ›cial learning theory was selected as the overall theoretical framework for the Pathways intervention (8). The intervention promoted a healthful lifestyle by positively influencing three interacting factors: 1) personal factors, 2) behavior, and 3) environment. As summarized by Davis et al. (9) the Pathways intervention combined constructs from social learning theory and cultural concepts that included American Indian customs and practices.

The conceptual framework of Pathways was based on the premise that psychosocial factors mediate dietary and physical activity behaviors and those in turn influence percent body fat. The primary outcome in the Pathways study, percent body fat, was not different in the intervention and control groups at the end of the trial. However, individual-level psychosocial factors were more proximal targets of the intervention and therefore, might be considered more likely to be affected. The purpose of this paper was to examine the impact of the Pathways

intervention on psychosocial variables related to physical activity and diet in American Indian children.

METHODS

The Pathways Study

The Pathways intervention had four major components: 1) a food service intervention which modified foods served in the school cafeteria; 2) a physical education component which increased physical activity at school; 3) a classroom curriculum that focused on knowledge and practices related to healthy eating and lifestyle habits; and 4) a family component aimed at involving parents of children participating in the program, to create a positive and supportive environment for modifying dietary practices and physical activity. The intervention was developed with active participation of American Indians, and was designed to be culturally-relevant and compatible with the different traditions represented by participating American Indian communities.

Participants

Participants were American Indian children in 41 schools located in Arizona, New Mexico, and South Dakota. The schools were located on seven Indian reservations and included public, parochial, Bureau of Indian Affairs (BIA), and tribal contract schools. Tribes represented included San Carlos Apache (N'Dee), White Mountain Apache (Dee), Oglala Lakota, Sicangu Lakota, Navajo (Diné), Gila River (Akimel O'odham and Maricopa), and Tohono O'odham. Schools were recruited within four field centers which were staffed by local residents and affiliated with Johns Hopkins University, the University of Arizona, the University of Minnesota or the University of New Mexico. The University of North Carolina at Chapel Hill served as the study coordinating center.

In the spring of 1997, baseline anthropometric data were collected on 1706 second grade children attending Pathways schools. The following fall, 1586 (93%) of these children remained in Pathways schools, and 1455 completed a baseline knowledge, attitudes, and behavior (KAB) questionnaire. The KAB questionnaire was readministered to the Pathways cohort in the spring of the 3rd, 4th, and 5th grades. Among those who completed the baseline questionnaire participation rates at the end of the 3rd, 4th and 5th grades were 83.9%, 77.5%, and 70.5%, respectively.

The questionnaire

The KAB questionnaire was developed to measure knowledge, attitudes, and behaviors related to diet and physical activity among American Indian schoolchildren (10). The scales were based on constructs from social learning theory (e.g., self-efficacy, intentions, knowledge) (8). During the feasibility phase of Pathways (1993-1996), the psychometric properties of the KAB questions and scales were evaluated for test-retest reliability, internal consistency (standardized coefficient alpha), content validity, cultural-appropriateness, and age-appropriateness with a representative sample of fourth grade American Indian children (10). Descriptions and results from baseline have been reported previously for some scales (11). A brief description of the scales is given below.

Food Self-Efficacy. This 8-item scale measured children's self-efficacy to choose foods lower in fat and sugar using a 4-point ordinal response set (i.e., I know I can, I think I can, I'm not sure I can, I don't think I can). A sample item was: At the store, I can ask to buy fruit instead of potato chips. The Cronbach's alpha for this scale was 0.64 in the fall of 3rd grade and 0.75 in the spring of 5th grade.

Food Choice Intentions. This scale consists of 8 items in a paired-choice format in which students were asked which food they would choose in different situations. For each food choice pair presented, one choice was lower in fat or sugar. Each pair included a line drawing of the food, in addition to the name of the food below each drawing. A sample item was: Which would you do? (choices: eat corn with no butter or eat corn with butter). The alpha for this scale was 0.46 in the fall of 3rd grade and 0.58 in the spring of 5th grade in the Pathways cohort.

Which Food Has More Fat? This 6-item scale was composed of the question, which food has more fat?, followed by 6 different sets of 3 answer choices. For each set options included a lower fat food, a higher fat food and "don't know". Each set included a line drawing of the foods and the names of the foods. A sample item was: Which food has more fat? (choices: boiled potato, fried potato, don't know). The alpha for this scale was 0.42 in the fall of 3rd grade and 0.74 in the spring of 5th grade.

Physical Activity Self-Efficacy. This 3-item scale measured children's confidence to participate in physical activity and followed the 4-point ordinal response set of the food self-efficacy scale. A sample item was: I can play hard during most of recess. Answer choices were a 4-point ordinal response set (i.e., I know I can, I think I can, I'm not sure I can, I don't think I can). The alpha for this scale was 0.61 in the fall of 3rd grade and 0.69 in the spring of 5th grade.

Physical Activity. This scale consisted of a 77-item list of activities that were recalled in specific time frames. Children were asked to indicate in which of 29 activities they had participated that day before school started, in which of 30 activities they participated yesterday after school was over and in which of 18 activities they had participated yesterday during school. Each activity included an artist's drawing of the activity as well as the name of the activity. The response options were: none, a little, a lot. The score for this scale was calculated by summing

the products of published MET values for each activity (12) weighted by the duration of the activity as follows: none=0, a little = 1 and a lot = 2.

Curriculum Knowledge. This 7-item scale measured nutrition and physical activity knowledge and concepts introduced in the first year of the Pathways curriculum and reinforced in subsequent years. Items were in a forced choice format with 3 answer options. A sample item was: Which kinds of foods are the most healthy to eat every day? (choices: foods with no fat or very little fat, foods that are fried, foods that have butter or margarine added to them). The alpha for this scale was 0.54 in the fall of 3rd grade and the same in the spring of 5th grade. This scale was included in the questionnaire administered in the 3rd grade and the 5th grade, but not in the questionnaire administered in the 4th grade.

Attempted Weight Loss. This scale consisted of six dichotomous items assessing attempted weight loss. A sample item was: Are you now trying to lose weight? The alpha for this scale was 0.77 in the fall of 3rd grade and 0.84 in the spring of 5th grade.

Healthy Body Size Perception. Gender-specific drawings were used to ascertain perceived healthy body sizes. Line drawings, similar to those developed by Stunkard et al, (13) showing 8 body sizes ranging from very thin to very heavy, were adapted to be ethnic and age-appropriate for American Indian children (10). Children were asked: Which student or students show the sizes that you think are the most healthy? They could mark more than one figure. The mean score for the figures chosen was calculated, with the thinnest drawing scored as 1 and the heaviest drawing scored as 8. In the developmental testing with fourth grade students, the test-retest correlation coefficient for the body size figures was 0.6 (10). This scale was included in the questionnaires administered at baseline and in the spring of 5th grade only.

Survey administrators for this instrument were members of the Pathways measurement team at each site who were trained annually to deliver the questionnaire using a standardized protocol. Questionnaires were distributed to children in their classrooms. Pathways staff read aloud each question and the corresponding answer choices. Children followed along and marked their answers on the questionnaire.

Anthropometrics

Height and weight were measured using a standard procedure by trained and certified data collectors with children wearing light-weight clothing and without shoes. Height was measured to the nearest 0.1 cm using the Shorr measuring board and body weight was measured to the nearest 0.1 kg using the Seca Model 770 scale (14). For both height and weight, measurements were repeated in sets of two until the difference between the two measurements was <1.0 cm for height and 0.5 kg for weight. The average of the two acceptable measures was used as the final value for each child.

Body weight categories were determined using age-and gender-specific percentile cut offs for BMI from the growth curves from the Centers for Disease Control and Prevention (15). For this paper, children with a BMI at or above the 85th percentile were classified as overweight.

Data analysis

In instances when an answer to only one question in a scale was missing, data were imputed by inserting the mean score among all children for that question. If more than one question in a scale was missing, the child's data were excluded for that scale. Only 1-2% of the students had more than one question in a scale missing.

Mean scores for each scale were reported after setting each item on the scale to range from 0 to 1.0, with 1.0 being the most healthy answer and 0 being the least healthy answer.

Therefore, if a child answered every question in the scale with the most healthy answer the mean score would be 1.0, and if they responded with the least healthy answer to each question on a scale their mean score would be zero. One exception to this system was the question on perceived healthy body size; it was scored between 1 and 8. Low scores indicated a very thin body size, high score indicated an obese body size and scores toward the middle of the range were considered most desirable.

We modeled each KAB scale at baseline in intervention and control boys and girls using mixed model regression methods appropriate to the design of the study (9, 16). Baseline KAB and treatment condition were included in the models as fixed effects while field center and school nested within field center x treatment condition were included as a random effects. We then examined the effects of the intervention on KAB at the end of 3rd, 4th and 5th grades. For these analyses, we used the same regression model, but the dependent variable was the change on the KAB measure from baseline to end of 3rd, 4th or 5th grade.

To determine if the associations between treatment and KAB measures were modified by gender or weight status, we tested gender-treatment and weight status-treatment interaction terms in separate models using the scores from the 5th grade follow-up as the outcomes. To test for an interaction between gender and treatment we added a gender-treatment interaction as a fixed effect and an interaction between gender and school nested within field center x treatment condition as a random effect to the main-effects model described above (16). Similarly, to test the interaction between weight status and treatment we added a weight status-treatment interaction as a fixed effect and an interaction between weight status and school nested within field center x treatment condition as a random effect to the main-effects model described above.

Data were analyzed using the Statistical Analysis System (SAS), Version 6.12 (PROC MIXED) (17).

Study protocols were approved by tribal and school authorities. Parental consent and student assent were obtained for measurements. Study protocols and procedures were reviewed and approved by Institutional Review Boards for human subjects protection at each of the universities involved.

RESULTS

Table 1 shows mean KAB scores at baseline in intervention and control groups by gender. Also shown are the differences in the scores between children randomized to the intervention versus the control treatments. As might be expected by chance, 1 of the 16 differences shown was significant at the $p < 0.05$ level (food self-efficacy among girls). Scores on the scales that were standardized to a 0 to 1 scale ranged from 0.34 to 0.73. This indicated that there was potential for improvement in all of the scores, albeit there was more room for improvement in some scales than in others.

We found no evidence of effect modification by baseline weight status in the control and intervention groups in the 5th grade for any of the scales. However, there was evidence of an interaction between gender and treatment assignment in several of the scales. The p-value for the interactions was less than 0.05 for food self-efficacy, food choice intentions, physical activity self-efficacy and curriculum knowledge. The p-value for the interaction was less than 0.1 for attempted weight loss and perceived healthy body size. Therefore, an interaction with gender was retained in our models and the effects of the treatment on KAB scales are reported by gender.

Table 2 shows changes in KAB by gender from baseline in 3rd grade (Fall, 1997) to Spring of 3rd, 4th and 5th grades. In these analyses, for each child the score on each scale at baseline was subtracted from the score at follow-up and this difference was used as the outcome variable. In general, mean scores at follow-up tended to be higher than at baseline (i.e. more healthy) in both the intervention and the control groups for all the scales except for those measuring physical activity and attempted weight loss. In addition, the difference between the change observed in the two conditions tended to be positive, favoring the intervention group. Of the 40 differences reported in Table 2 that were standardized to range from 0 (least healthy) to 1 (most healthy), 37 (92.5%) favored the intervention condition. Differences in the changes between the control and intervention groups tended to be the largest for curriculum knowledge (ranging from 0.08 to 0.18) and food choice intentions (ranging from 0.09 to 0.20).

For food self-efficacy, changes between baseline and follow-up scores were not different in the control versus the intervention group in 3rd or 4th grade boys or girls. In the 5th grade only, food self-efficacy increased in the boys in the control group (mean change 0.04) while the mean score in the intervention groups decreased by 0.01. There was no difference between the changes in the treatment and control groups in food self-efficacy among 5th grade girls.

Mean scores on the food choice intentions scale were increased above the baseline level in the intervention groups at each follow-up, and the increase was consistently higher than that seen in the controls. In the final follow-up the difference in the change in the intervention and control groups was 0.09 among boys and 0.15 among girls.

For the scale examining knowledge of the fat contents of foods, the changes from the baseline scores were consistently larger in the intervention group than in the control group,

however, this difference was statistically significant only in the 4th grade. This pattern was observed in both the boys and the girls.

Changes in reported physical activity were higher in the intervention group than in the treatment group in both boys and girls at every follow-up. In the 5th grade the difference was 0.04 among boys and 0.03 among girls. However, it should be noted that physical activity declined in both the control and intervention groups and this difference indicated that the decline was smaller in the intervention group than in the control group.

Curriculum knowledge scores tended to be higher among boys and girls in the 5th grade compared to the 3rd grade in both the intervention and the control groups. Scores were consistently higher among children who received the intervention compared to those who did not.

In general, changes in the scale on weight loss attempts were negative in both the intervention and control groups, indicating more attempts at dieting and use of weight loss strategies at the follow-ups compared to baseline. However the changes were not different between the intervention and the control group suggesting that the Pathways intervention did not increase dieting behaviors in the children. Similarly the body sizes thought to be most healthy did not change with the intervention.

Figures 1-6 show the mean scores at baseline and follow-for scales with data available for all of the three follow-up surveys. For the baseline value, the model was the same as that used to generate the means shown in table 1, and for follow-up values the model used was the same as that used to generate table 2. However, the analyses differed from those shown in table 2 in that the score at each survey was used as the outcome, rather than the difference in the score between baseline and follow-up. Using the same models, we also calculated the mean difference

etween intervention and control groups centered to the mean of the intervention group. We then plotted the 95% confidence intervals of the mean difference between intervention and control groups centered to the intervention group. In instances in which this confidence interval did not include the control value, the intervention group was different from the control group at $p < 0.05$. In Table 2 and in the figures the same trends are seen and the same variables were statistically significant at $p < 0.05$. However, the table and figures differ in that the table shows changes from baseline to follow-up and p-values, whereas the figures show the scores at the follow-up, adjusted for baseline as a covariate, and indicate the 95% confidence interval of the difference between the control and intervention conditions.

DISCUSSION

The conceptual framework of Pathways assumed that individual-level psychosocial factors would impact dietary and physical activity behaviors and those in turn would influence percent body fat. Thus, psychosocial variables measured here were among the most proximal variables targeted by the intervention and therefore, might be considered the variables most likely to be affected.

The combined exposure to a classroom curriculum, a food service program, a physical education program and a family-targeted program did result in changes in some aspects of children's knowledge, self-efficacy, intentions and reported behaviors related to diet and physical activity. However, the intervention did not uniformly affect these constructs in both boys and girls. In regard to knowledge, several variables addressed in the curriculum increased in both boys and girls in the intervention group; however, knowledge of which food contained more fat did not consistently increase above levels observed in controls. Self-efficacy to be ıysically active increased among girls in intervention schools, but not among boys, whereas

self-efficacy to make more healthy food choices did not increase in either gender. Although self-efficacy to choose healthy foods did not increase in the intervention group, healthy food intentions did increase in both boys and girls in the intervention schools. In addition, reported participation in physically active behaviors increased in both intervention boys and girls.

Perception of healthy body size and attempted weight loss did not change as a result of the intervention. In contrast to the constructs associated with healthy eating and physical activity, these constructs were not targets of the intervention. These questions were included to allay concerns that the intervention might inadvertently increase body size concerns or increase dieting. There was no evidence that the intervention had such unintended effects.

Other school-based interventions also have modified psychosocial variables related to eating and physical activity behaviors (18-28). One of these, the Child and Adolescent Trial for Cardiovascular Health (CATCH) (20, 28, 29), provides an interesting source of comparisons because of the similarities in some of the psychosocial variables examined and the target age group. CATCH was also a 3-year multi-center, school-based trial in which the intervention was implemented in the 3rd to 5th grades. In contrast to Pathways, CATCH did not focus on one ethnic group, and included Caucasion, Hispanic and African American children. Participants were students attending one of 96 schools located in four states so the interventions were designed to be appropriate for diverse cultural and socioeconomic groups. The Pathways and CATCH interventions were similar in that they both strove to decrease percent calories from fat and increase physical activity levels using multi-component interventions delivered primarily by existing personnel in schools.

At the end of 5th grade, CATCH found sustained effects on knowledge, intentions, self-efficacy, behavior and perceived social reinforcement for healthy food choices ($p < 0.001$ for all)

(20). Less consistent results were observed for perceived positive and negative support for physical activity and self-efficacy for physical activity.

Planet Health (22) like Pathways was a school-based intervention designed to prevent obesity in a multi-ethnic group. Planet Health was aimed at slightly older children in grades 6 to 8. The Planet Health intervention focused on decreasing television viewing, decreasing consumption of high-fat foods, increasing fruit and vegetable intake, and increasing moderate and vigorous physical activity. Dieting behaviors were assessed using an instrument similar to that used in Pathways. Like Pathways, Planet Health found no increase in dieting behaviors associated with the intervention.

Several other school-based studies focused on reduction of cancer or cardiovascular risk factors have included some assessment of knowledge, attitudes and/or behaviors. These studies, conducted in a variety of ethnic groups have, in general, found increases in knowledge and favorable changes in reported attitudes and behaviors (19, 21, 24, 26, 27, 30-32).

The Pathways Study is unique among all these studies in that it investigated the effects of a multi-faceted, school-based intervention in American Indian children. This study is the first to develop and evaluate culturally relevant and age- appropriate instruments for assessing psychosocial determinants related to diet and physical activity in American Indian elementary school children. The study is also notable for its large sample size and ability to assess changes over a 3-year period. The sample also represents children in 41 schools in 3 states from 7 American Indian tribes, increasing the generalizability of the findings across different groups of American Indian children. It is important to note, however, that all of the children in the sample were living in non-urban areas; ranging from geographically isolated communities to rural areas

just beyond the suburbs of a large city . The applicability of these findings to American Indian children living in urban areas and attending non-reservation schools is unknown.

This study shares the limitations common to studies that use data from self-reports. The amount of bias or "social desirability" associated with a school-based intervention is unknown, but could be substantial. This bias would not be likely to affect measures of knowledge, but could impact all other self-report measures described here. Moreover, social desirability may have influenced scores for some scales. Social desirability may be particularly problematic for the Food Choice Intentions measure. For example, Toporoff et al. (33) examined the ability of food choice intentions (assessed in 10 paired food choices) to predict actual food choices in 204 American Indian children in grades 2 through 5 in a school setting. Their data showed that although children often reported that they would choose the healthier food, when allowed to actually choose between two foods to consume, they chose the food that was higher in fat and sugar.

Although the scales used here were evaluated for content validity, no criterion-related validation procedures were performed for scales other than food choice intentions; so the relationships between KAB scores and actual behaviors are unknown. An additional weakness of this study was low levels of internal consistency for some scales, with alpha coefficients falling below the targeted Cronbach's alpha value of at least 0.7.

The Pathways Study was able to produce changes in several psychosocial variables related to diet and physical activity, but did not change the primary outcome of percent body fat (7). This causes us to speculate whether we were measuring the correct constructs and whether the changes that were detected were of insufficient size to impact these outcomes. In a recent review Baranowski and colleagues (34) found that psychosocial variables related to dietary fat

and fruit and vegetable consumption had low predictive ability among elementary school children. They concluded that environmental influences (e.g. availability and accessibility of foods at home and elsewhere) may be more important and influential than psychosocial factors.

Future studies with more intense and more broadly reaching interventions may be needed to change behaviors in children sufficiently to impact physiologic measures of good health. Environmental approaches and active family involvement deserve further study. There is also a need for better instruments to measure psychosocial variables. Nevertheless, the current study has shown that a school-based program can improve psychosocial variables related to diet and physical activity in American Indian children.

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able 1. KAB scores at baseline in 3rd grade American Indian boys and girls in the Pathways Study

	Intervention		Control		Mean	P-value
	N	Mean	N	Mean	Difference	
Boys						
Food self-efficacy	398	0.71	355	0.72	-0.01	0.602
Food choice intentions	398	0.43	357	0.42	0.01	0.462
Which food has more fat?	398	0.51	357	0.51	0	0.969
Physical activity self-efficacy	375	0.73	340	0.71	0.02	0.604
Physical activity	394	0.34	354	0.34	0	0.819
Curriculum knowledge	398	0.45	357	0.44	0.01	0.660
Attempted weight loss	398	0.49	357	0.44	0.05	0.066
Healthy body size	394	3.76	354	3.68	0.08	0.491
Girls						
Food self-efficacy	360	0.68	331	0.73	-0.05	0.020
Food choice intentions	361	0.48	331	0.50	-0.02	0.422
Which food has more fat?	361	0.51	331	0.52	-0.01	0.710
Physical activity self-efficacy	343	0.58	319	0.60	-0.02	0.468
Physical activity	357	0.35	329	0.35	0	0.852
Curriculum Scale	361	0.47	331	0.47	0	0.940
Attempted weight loss	361	0.50	331	0.47	0.03	0.399
Healthy body size	358	3.60	329	3.52	0.08	0.754

Results are from mixed models analyses with treatment condition, gender and gender * treatment condition as fixed effects and with field center, school nested within field center * treatment condition and gender * school nested within field center * treatment condition as random effects.

Table 2. Changes in KAB scales from baseline in American Indian boys and girls in the Pathways Study *

	Spring 1998 (3rd grade)				Spring 1999 (4th grade)				Spring 2000 (5th grade)			
	Inte	Control	Diff	P-value	Int	Control	Diff	P-value	Int	Control	Diff	P-value
					Boys							
Food self-efficacy	0.02	0	0.02	0.239	0.03	0.03	0	0.985	-0.01	0.03	-0.04	0.022
Food choice intentions	0.17	0.03	0.14	0.001	0.17	0.06	0.11	0.001	0.13	0.04	0.09	0.003
Which food has more fat?	0.12	0.07	0.05	0.065	0.20	0.12	0.08	0.004	0.22	0.18	0.04	0.225
Physical activity self-efficacy	0.12	0.08	0.04	0.119	0.11	0.10	0.01	0.686	0.11	0.12	-0.01	0.751
Physical activity	0	-0.05	0.05	0.004	-0.04	-0.08	0.04	0.045	-0.09	-0.13	0.04	0.022
Curriculum knowledge	0.23	0.08	0.15	0.001	--	--	--	--	0.27	0.19	0.08	0.001
Attempted weight loss	-0.01	-0.05	0.04	0.098	-0.09	-0.10	0.01	0.772	-0.12	-0.11	-0.01	0.810
Healthy body size	--	--	--	--	--	--	--	--	0.24	0.16	0.08	0.547
					Girls							
Food self-efficacy	0.05	0.04	0.01	0.733	0.07	0.03	0.04	0.102	0.08	0.06	0.02	0.396
Food choice intentions	0.23	0.11	0.12	0.001	0.29	0.09	0.20	0.001	0.27	0.12	0.15	0.001
Which food has more fat?	0.11	0.07	0.04	0.191	0.24	0.17	0.07	0.007	0.28	0.23	0.05	0.136
Physical activity self-efficacy	0.03	0.01	0.02	0.525	0.10	0.02	0.08	0.002	0.13	0.06	0.07	0.014
Physical activity	0.00	-0.05	0.05	0.007	-0.02	-0.06	0.04	0.039	-0.07	-0.10	0.03	0.020
Curriculum knowledge	0.28	0.10	0.18	0.001	--	--	--	--	0.36	0.21	0.15	0.001
Attempted weight loss	0	-0.05	0.05	0.084	-0.04	-0.10	0.06	0.087	-0.10	-0.15	0.05	0.099
Healthy body size	--	--	--	--	--	--	--	--	0	0.16	-0.16	0.112

*Results are from mixed models analyses with baseline score, treatment, gender and gender * treatment condition as fixed effects and with field center, school nested within field center * treatment condition and gender * school nested within field center * treatment condition as random effects. The P-values indicate the probability associated with a difference between the intervention and control groups.

Figure Legends

Figure 1. Mean scores on food self-efficacy in boys (a) and girls (b) in the Pathways study. The 95% confidence interval for the difference between the control and intervention conditions is shown.

Figure 2. Mean scores on food choice intentions in boys (a) and girls (b) in the Pathways study. The 95% confidence interval for the difference between the control and intervention conditions is shown.

Figure 3. Mean scores on Which food has more fat? in boys (a) and girls (b) in the Pathways study. The 95% confidence interval for the difference between the control and intervention conditions is shown.

Figure 4. Mean scores on physical activity self-efficacy in boys (a) and girls (b) in the Pathways study. The 95% confidence interval for the difference between the control and intervention conditions is shown.

Figure 5. Mean scores on physical activity in boys (a) and girls (b) in the Pathways study. The 95% confidence interval for the difference between the control and intervention conditions is shown.

Figure 6. Mean scores on attempted weight loss in boys (a) and girls (b) in the Pathways study. The 95% confidence interval for the difference between the control and intervention conditions is shown.

Figure 1a. Food Self-efficacy

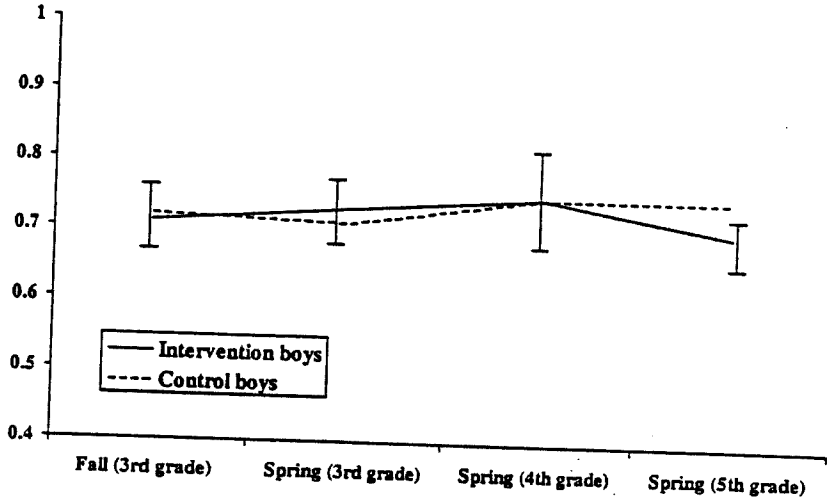


Figure 1b . Food Self-efficacy

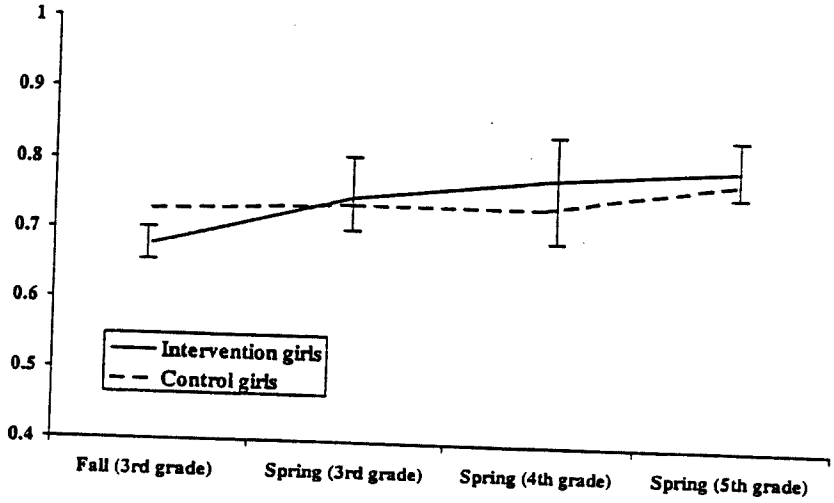


Figure 2a. Food choice intentions

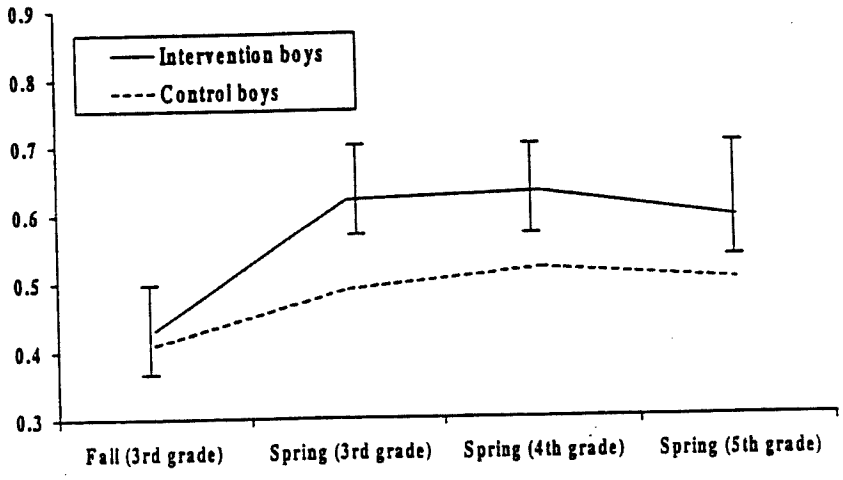


Figure 2b . Food choice intentions

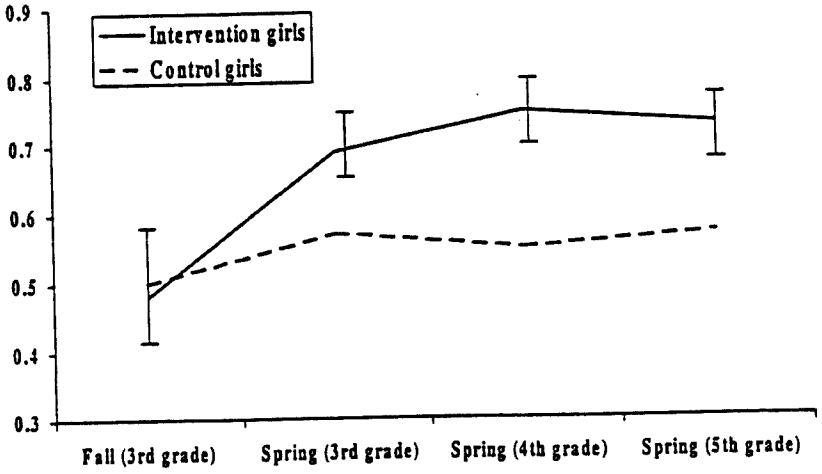


Figure 3a. Which food has more fat?

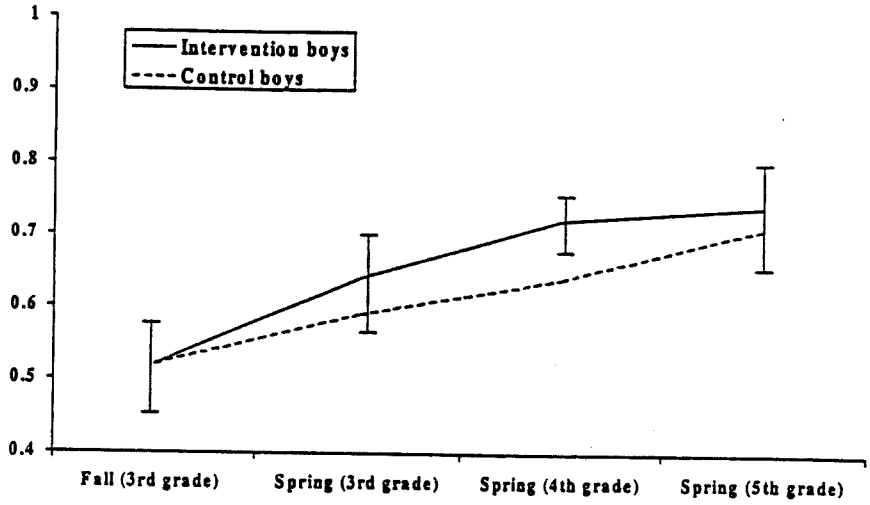


Figure 3b . Which food has more fat?

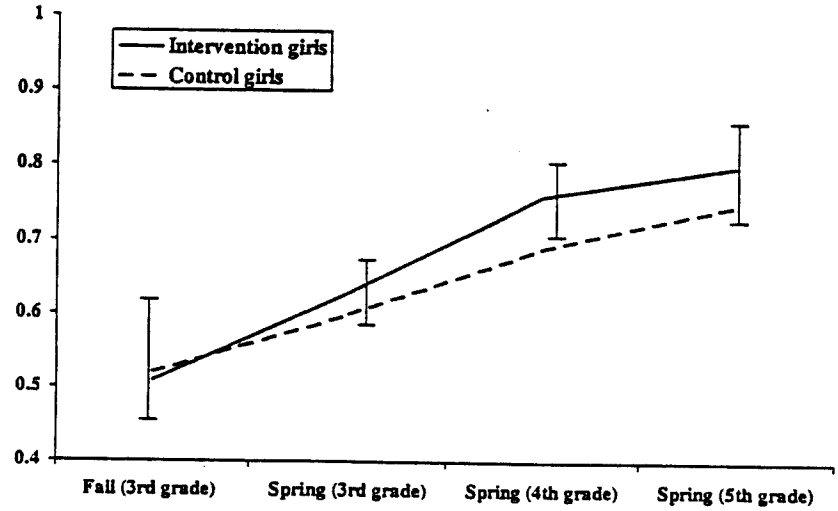


Figure 4a. Physical activity self-efficacy

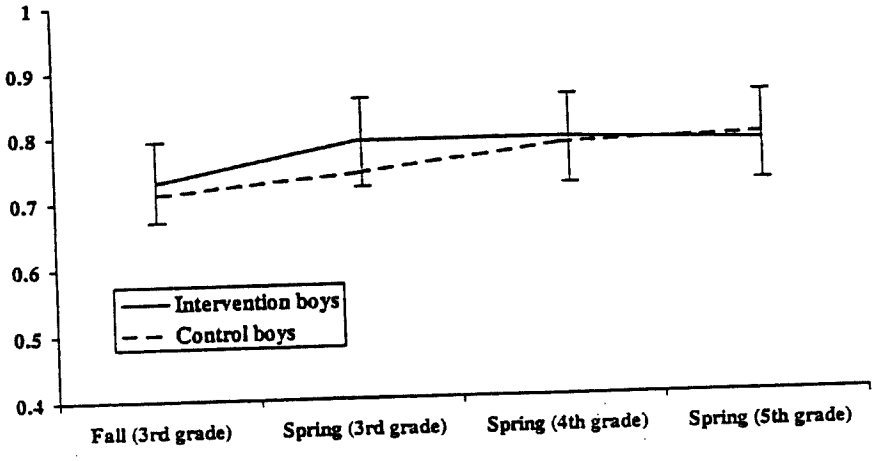


Figure 4b . Physical activity self-efficacy

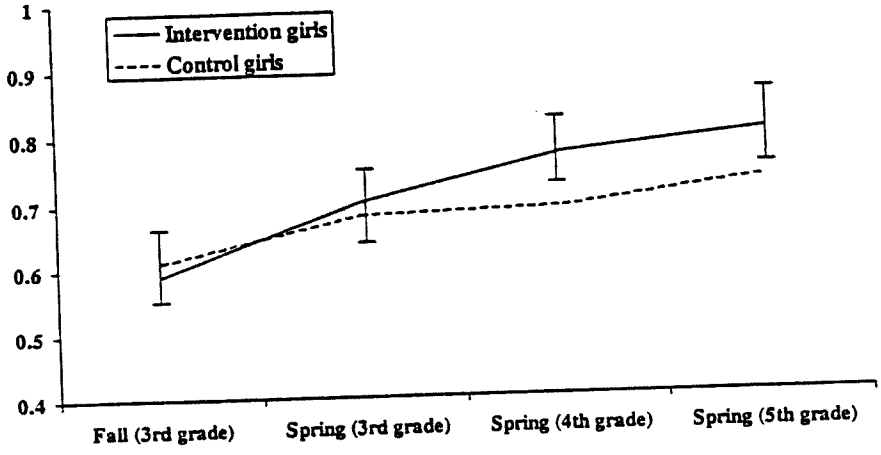


Figure 5a. Physical activity

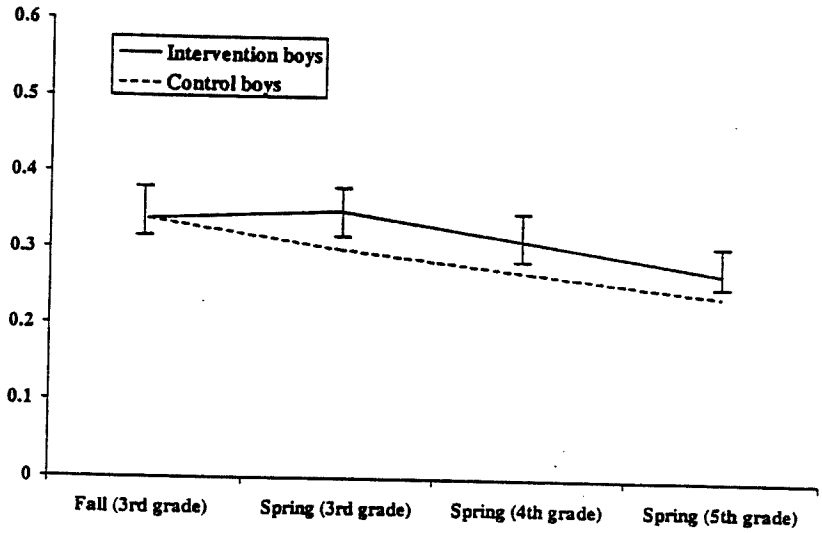


Figure 5b . Physical activity

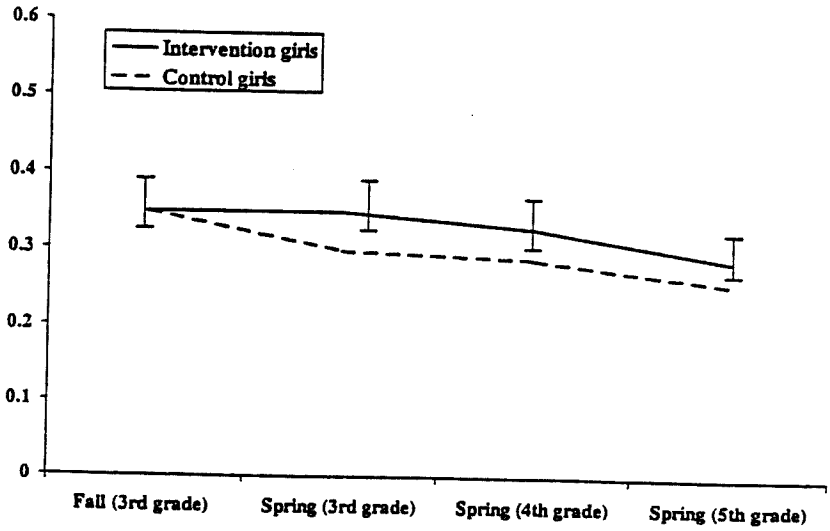


Figure 6a. Attempted weight loss

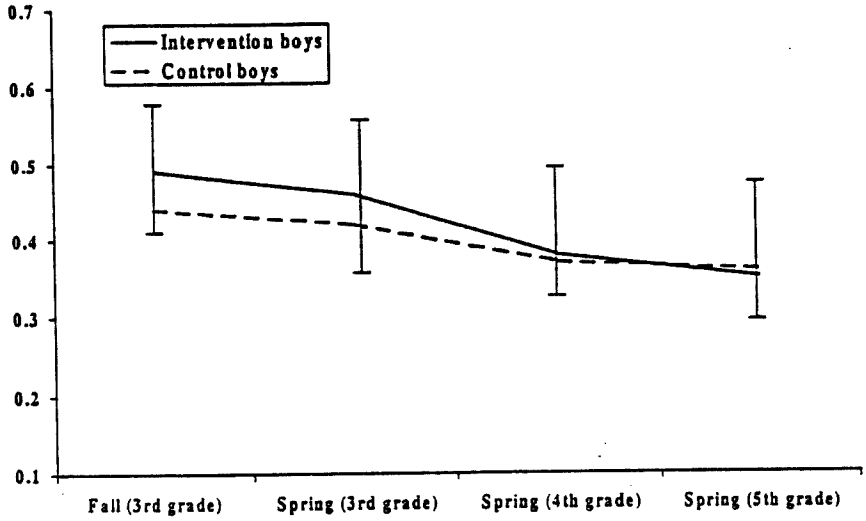
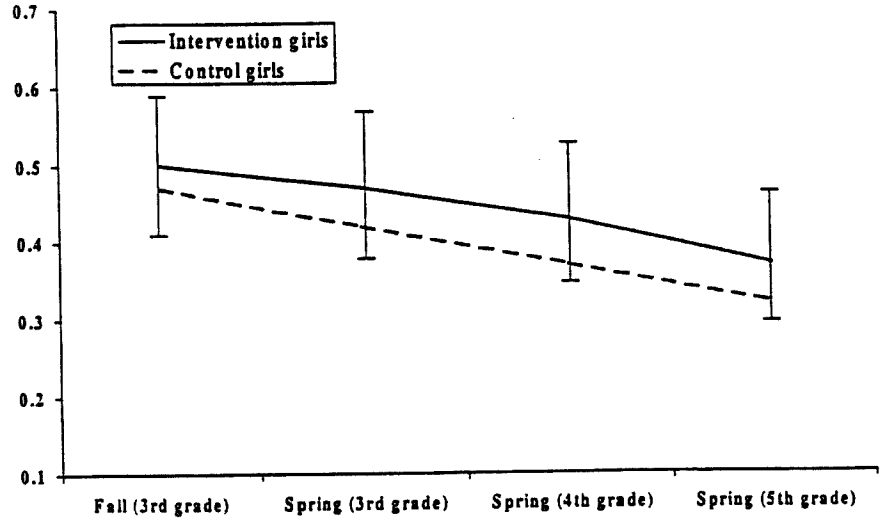


Figure 6b. Attempted weight loss



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