Body Size, Fatness, and Leanness of Mexican American Children in Brownsville, Texas: Changes between 1972 and 1983

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Abstract: Changes in the height, weight, body mass index, triceps skinfold, and arm and estimated midarm muscle circumferences in lower socioeconomic Mexican American children, 6 through 17 years of age, from Brownsville, Texas, were documented on the basis of surveys done in 1972 and 1983. With the exception of height in youths ages 14–17, all parameters show gains at most ages, and in particular an increase in fatness. Brownsville Mexican American youth are similar in height, weight, and the body mass index to Mexican American youth in other areas of Texas. These trends confirm the large proportion of relatively short but heavy children among Mexican Americans. (*Am J Public Health* 1987; 77:573–577.)

Introduction

The growth status of children can be an indicator of the health and nutritional conditions in a community.[1-3] During the 1970s, federal assistance for primary health in the population of the 16 Texas border counties has included funds for health and nutritional supplementation programs.[4] We report changes in the body size, fatness, and leanness of Mexican American school children in Brownsville, Texas, between 1972 and 1983, but do not purport to evaluate program effects.

Methods

The growth status of a cross-sectional sample of 1,269 Mexican American school children in Brownsville, Texas, 619 males and 650 females, 6 through 17 years of age was assessed in 1972.[5] In 1983, the growth status of another cross-sectional sample of 868 Mexican American school children, 403 males and 465 females, 6 through 17 years of age, in attendance at the same Brownsville schools, was assessed. Both surveys were done at the same time of year, late April and early May, and all measurements were taken by the same individual in both surveys.

Although family-specific socioeconomic information was not available, the majority of the sample came from areas of the city classified as lower socioeconomic. Laboring and semiskilled craft occupations make up about 80 per cent of the work force in these communities.

Procedures were the same as in the 1972 survey.[5] Body weight was measured with children wearing ordinary indoor clothing, with shoes, personal ornaments and accessories removed, or in gym clothing (i.e., shorts and a blouse or T-shirt). One pound was subtracted from the weights of children wearing indoor clothing, while one-half pound was subtracted from the weights of children measured in gym clothing in order to estimate nude weights. Stature was taken with an anthropometer with the subject in the standard erect posture and with shoes removed. Left arm circumference was measured with a steel tape at the level midway between the acromial and olecranon processes. The arm was relaxed and the tape applied so as to permit skin contact without compression of the underlying tissues. The triceps skinfold was measured at the same level as the arm circumference over the triceps muscle of the left arm. A Harpenden skinfold caliper was used. Arm circumference was corrected for the thickness of the triceps skinfold to provide an estimate of midarm muscle circumference. In addition, the body mass index (weight/stature^2) was also calculated since this index is related to body fatness.[6]

Intra-observer technical errors of measurement* in the 1972 and 1983 surveys were, respectively, 0.54 and 0.30 cm for stature, 0.37 and 0.26 cm for arm circumference, and 0.51 and 0.58 mm for the triceps skinfold. The estimates of measurement variability were generally smaller than those reported in the US Health Examination Survey.[7,8]

In both surveys, all children in the two elementary, one junior high and one senior high school were measured. Results of the measurements were made available to the classroom teachers and school nurses. In both surveys, the data were then screened, using teachers' rosters and school records. Those with Spanish surnames who were not Mexican American were excluded, e.g., documented and undocumented children born in Mexico, El Salvador, and other Central American countries. All children retained in the two samples were of Mexican American ancestry and were born and raised in the Brownsville area.

The growth status, fatness, and leanness of the Brownsville Mexican American children were first compared across time, 1972 versus 1983. Age- and sex-specific differences between years were tested with the F-test. The overall body size and fatness of Mexican American children in 1972 and 1983 were then compared to reference data for American children and youth using weight and stature data from Cycles II and III of the US Health Examination Survey,[9] and the body mass index and the triceps skinfold data from the first Health and Nutrition Examination Survey.[10]

Results

Sample size per age group and descriptive statistics for all measured and derived variables in the 1983 survey are given in Table 1. Differences between the means for each variable in 1972 and 1983 (1983 minus 1972) are shown in Figures 1 and 2. Mexican American children measured in 1983 are, on the average, taller than those measured in 1972 between ages 6 and 13 years (Figure 1), but there are no differences in the mean statures of youth ages 14 through 17 years. With the exception of 16 year old boys, Mexican American children measured in 1983 are, on the average, heavier and have greater body mass indices than those

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*$e = \sqrt{\Sigma d^2/2n}$ where d is the difference between replicate measurements and n is the number of pairs of measurements.[7,8]

TABLE 1—Sample Size per Age Group, Means (M), Standard Deviations (SD), and Selected Medians (MD) for Age and Anthropometric Dimensions of Mexican American School Children

Sex/Age Group	n	Age (yr)		Stature (cm)		Weight (kg)			Body Mass Index (kg/m²)			Arm Circumference (cm)		Triceps Skinfold (mm)			EMC[a] (cm)	
		M	SD	M	SD	M	SD	MD	M	SD	MD	M	SD	M	SD	MD	M	SD
Males																		
6	36	6.5	0.3	117.3	4.3	22.2	2.1	22.6	16.2	1.1	16.4	18.1	1.5	8.7	3.1	8.3	15.4	0.7
7	27	7.5	0.3	124.2	3.6	25.0	2.5	24.2	16.2	1.3	16.1	18.5	1.5	9.3	2.3	9.3	15.6	1.0
8	22	8.5	0.3	129.4	4.1	30.1	4.5	29.0	17.9	2.2	17.2	20.3	2.2	12.0	6.0	10.5	16.5	1.0
9	30	9.4	0.3	132.9	4.7	33.1	4.2	32.1	18.7	2.2	18.2	20.8	1.9	12.5	4.5	11.5	16.9	1.0
10	32	10.5	0.2	137.6	4.8	35.3	5.2	35.1	18.6	2.3	18.6	21.5	2.1	13.4	5.7	14.1	17.3	1.2
11	28	11.5	0.3	143.2	5.7	38.9	6.1	40.6	18.9	2.5	18.8	22.3	2.5	14.8	5.8	14.6	17.6	1.8
12	30	12.5	0.3	150.1	7.9	44.5	9.5	43.4	19.6	3.0	18.8	23.5	2.8	14.1	7.6	11.5	19.1	1.6
13	41	13.4	0.3	155.6	7.0	49.3	8.4	48.8	20.3	2.7	19.7	24.1	2.7	12.9	7.4	10.5	20.0	2.3
14	53	14.5	0.3	159.5	6.6	51.5	8.5	50.5	20.2	2.9	19.6	24.3	3.3	9.0	4.8	7.6	21.4	2.9
15	46	15.5	0.3	164.1	7.5	58.1	11.2	55.4	21.5	3.2	20.5	25.8	2.6	9.2	4.2	8.5	22.9	2.0
16	29	16.5	0.3	166.9	7.9	59.2	10.1	56.6	21.1	2.3	20.9	26.5	2.6	8.2	2.6	7.5	24.0	2.5
17	29	17.5	0.3	169.0	7.8	65.0	10.6	62.6	22.7	3.0	22.2	27.8	3.2	7.9	3.3	7.5	25.3	2.8
Females																		
6	34	6.5	0.3	116.6	3.3	22.6	2.7	22.4	16.6	1.5	16.6	18.9	2.0	12.0	4.8	12.1	15.2	1.3
7	37	7.5	0.2	121.4	2.6	24.2	2.4	23.6	16.4	1.5	16.1	19.1	1.2	13.3	2.8	13.5	14.9	0.8
8	37	8.5	0.2	126.4	4.9	27.4	3.5	27.2	17.1	1.5	17.2	19.9	1.6	11.9	3.1	12.6	16.2	1.0
9	33	9.6	0.3	131.8	5.7	30.4	5.3	30.1	17.5	2.6	17.1	20.1	2.3	14.5	6.8	12.1	15.5	1.0
10	29	10.5	0.3	139.2	4.8	36.6	4.8	37.2	18.9	2.1	19.0	21.6	2.0	16.1	5.1	16.3	16.6	1.2
11	37	11.4	0.3	145.3	6.5	42.3	9.1	41.7	19.9	3.4	19.4	22.7	2.8	17.7	7.2	17.5	17.1	1.3
12	39	12.5	0.3	150.9	6.5	47.9	10.7	45.3	20.9	3.6	20.1	23.8	3.0	17.9	8.2	15.4	18.1	1.4
13	42	13.5	0.3	153.3	6.2	51.7	5.9	51.8	22.1	3.0	21.6	23.9	2.4	17.7	6.8	16.5	18.3	1.2
14	50	14.5	0.3	154.8	5.1	53.9	9.4	51.5	22.5	3.7	21.2	25.1	2.7	20.9	7.4	20.3	18.5	1.4
15	51	15.4	0.3	155.9	5.5	54.5	8.4	52.0	22.4	3.2	21.8	25.1	2.3	20.2	8.5	17.5	18.7	1.3
16	39	16.5	0.2	156.7	5.8	54.1	8.2	55.1	22.0	2.9	21.3	25.0	2.2	18.8	6.1	18.1	19.1	1.3
17	37	17.5	0.3	156.2	5.1	53.5	7.7	53.4	21.9	3.0	21.7	24.8	2.5	18.1	7.1	16.6	19.2	1.5

[a]Estimated midarm muscle circumference.

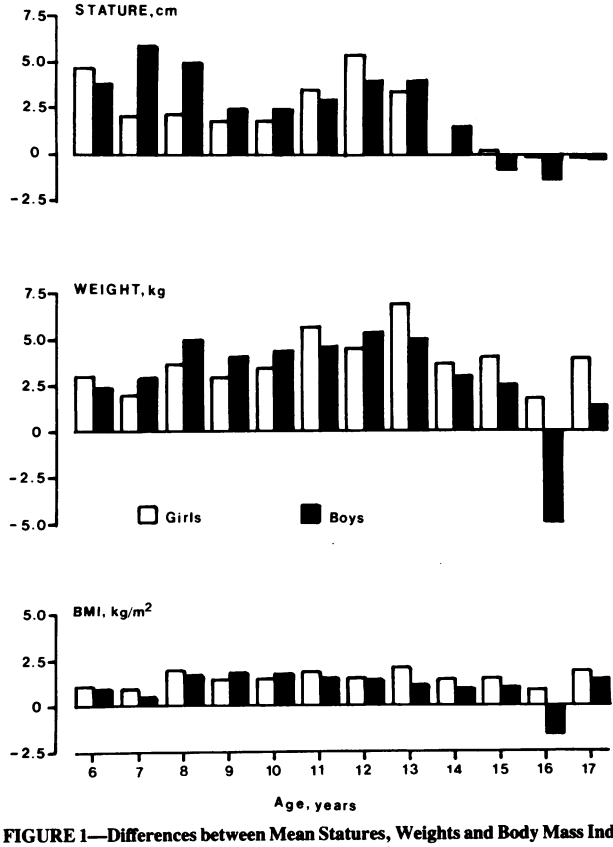

FIGURE 1—Differences between Mean Statures, Weights and Body Mass Indices of Mexican American Children in 1972 and 1983

surveyed in 1972. The differences in body weight between surveys tend to increase with age from 6–7 through 12–13 years in both sexes, while those for the body mass index are reasonably stable from 8 through 13 years.

The pattern of differences in the thickness of the triceps skinfold in Mexican American children in 1972 and 1983 is similar to that for body weight (Figure 2). Arm and estimated midarm muscle circumferences are, on the average, larger at all ages in the 1983 sample.

Compared to US reference data, mean statures of Mexican American children are at or below the 25th percentile at all ages in 1972, but are above the 25th percentile between ages 6 and 13 years in boys and ages 6 and 12 years in girls in 1983. After these ages, statures in 1983 fall below the 25th percentile and remain there. On the other hand, median body weights fluctuate between the 25th and 50th percentiles of the reference data in 1972, but are at or above the 50th percentile in both sexes from age 6 through 13 years in 1983. After 13 years of age, median body weights fluctuate between the 25th and 50th percentiles in females and approximate the 25th percentile in males.

Age- and sex-associated variation in the two indicators of fatness—the body mass index and triceps skinfold—relative to US reference data show a similar pattern as body weight (Figures 3 and 4). In 1972, both indicators fall between the 25th and 50th percentiles at almost all ages in boys and girls. In 1983, both indicators are above the 50th percentile at most ages in girls. Among the 1983 sample of boys, however, the body mass index is consistently above the 50th percentile at all ages, while the triceps skinfold increases from the 50th percentile at 7 years of age to a point above the 75th percentile

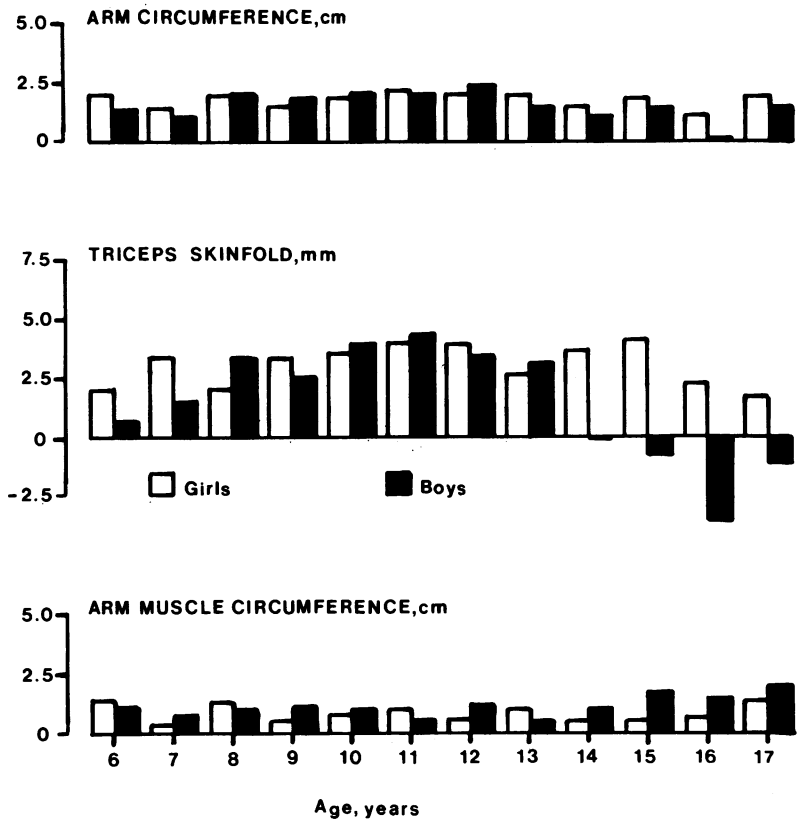

FIGURE 2—Differences between Mean Arm Circumferences, Triceps Skinfold Thicknesses and Estimated Midarm Muscle Circumferences of Mexican American children in 1972 and 1983

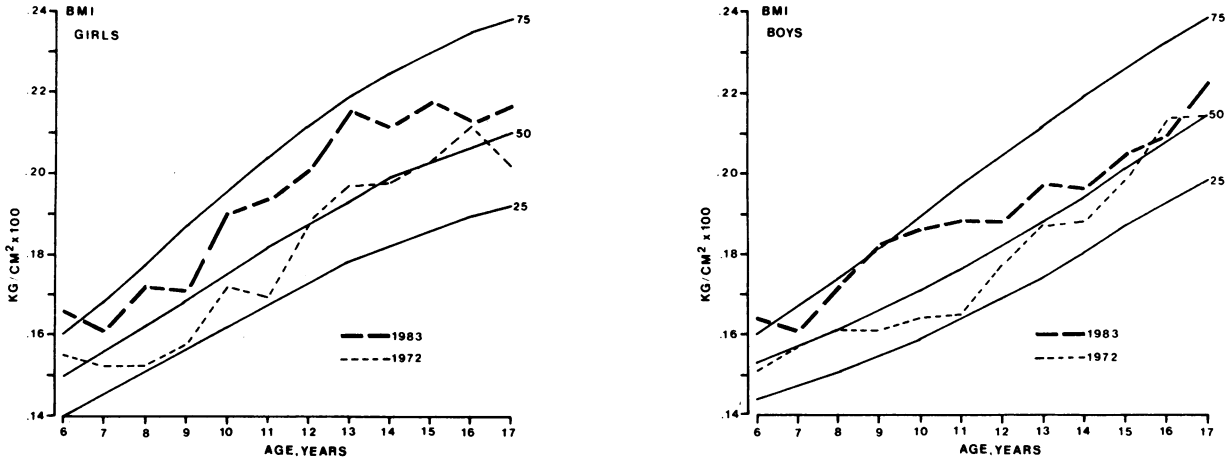

FIGURE 3—Median Body Mass Indices of Mexican American Boys (right) and Girls (left) Relative to US Reference Data

at 11 years of age, and then declines through 14 years of age to a level between the 25th and 50th percentiles. Thus, there is some dissociation between the body mass index and the triceps skinfold in adolescent boys.

Discussion

Comparative data for Mexican American children in Texas measured in the 1980s are limited and comparisons with earlier data are affected by secular changes over the past 10 to 15 years. Nevertheless, the statures and weights of Brownsville children surveyed in 1972 are quite similar to Mexican American children sampled in the Texas phase of the Ten State Nutrition Study.[5] Brownsville Mexican American chidren surveyed in 1983 are, on the average, very similar in stature, the body mass index, and the triceps skinfold to Mexican American children ages 10 through 17 years from Starr Country, Texas (about 100 miles from Brownsville), surveyed in the early 1980s,[11] and in stature and weight to 16 and 17 year old Mexican American youth in Houston surveyed between 1972 and 1975.[12] Hence, the Brownsville sample may be representative of lower socioeconomic status Mexican American children and youth in Texas.

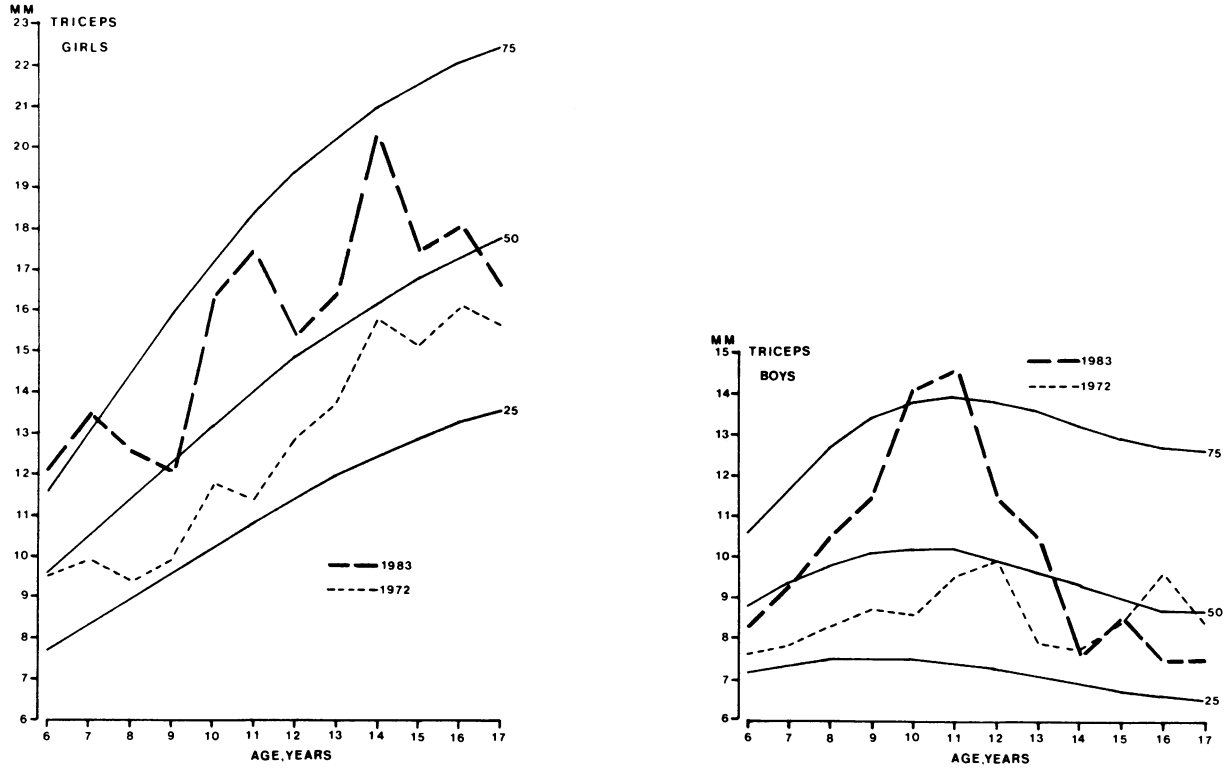

FIGURE 4—Median Triceps Skinfold Thicknesses of Mexican American Boys (right) and Girls (left) Relative to US Reference Data

Although the magnitude of the differences between the 1972 and 1983 samples of Mexican American school children varies by sex, two trends are suggested. From ages 7 through 10 years, boys tend to show greater gains in height and weight than girls. There is no clear pattern in the other variables, although males have slightly greater gains in the two arm circumferences. On the other hand, from ages 11 through 17 years, females tend to show greater gains than males in fat-related variables, i.e., body weight, the body mass index, and the triceps skinfold. This trend is probably related to the earlier maturation of females and the accumulation of fatness during female adolescence.

The increase in stature between 1972 and 1983 in children under age 14 years indicates positive secular changes. These secular gains between 1972 and 1983 are as great as those experienced by Mexican American children in Brownsville between 1928 and 1972[13] and in other Texas cities between approximately 1930 and 1970.[14] Presumably the improved circumstances in the 1970s under which the younger children surveyed in 1983 were born and reared are reflected in their improved growth status. On the other hand, the lack of secular increase in the statures of 14 through 17 year old Mexican American youth between 1972 and 1983, and their short stature relative to United States reference data, should be noted.

The short stature of 16 and 17 year old Mexican American youth may be related to ethnic variation in body size. Mean statures of ages 16 and 17 year old Brownsville Mexican American youth do not differ from those of lower socioeconomic status Mexican American adults, 25–44 years of age, in San Antonio, whose mean heights are 168.4 cm and 155.1 cm for males and females, respectively.[15] Mexican American adults of upper socioeconomic status, although taller than lower socioeconomic status Mexican Americans, are nevertheless shorter than other White adults of the same social background.[15]

The increase in body weight, the body mass index, and the triceps skinfold between 1972 and 1983 in Mexican American children of both sexes between ages 6 and 13 years and in girls through age 17 years indicates a positive energy balance over the 11-year period. In 1983, body weights of Mexican American children approximate or are above the reference medians, while heights are shorter than the reference medians. These trends imply a relatively large number of short but heavy children, a tendency which is also evident in Mexican American preschool children in California[16] and adults in San Antonio, Texas.[15]

Since the body mass index and the triceps skinfold are often used as indicators of fatness,[6] the increase in body weight between 1972 and 1983 would seem to be associated, to a large extent, with an accumulation of fat. But, the interpretation of high body mass indices in Mexican American children and youth as an indicator of fatness has been questioned on the grounds that Mexican Americans have relatively shorter legs for their stature,[17] so that higher indices do not necessarily indicate excessive fatness. However, data for Mexican American boys and girls indicate similar sitting height/stature ratios in Mexican American compared to other White youth in the US Health Examination Survey.[18] The ratios suggest no differences in the proportion of lower extremity length to stature.

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1988 Nursing Practice Symposium Issues Call for Abstracts

The American Academy of Nursing has issued a call for abstracts for presentations at its nursing practice symposium scheduled for January 28–30, 1988, in Atlanta, Georgia. The symposium, titled "Leadership through Practice: The Cutting Edge," will be the fifth in a series of annual symposia sponsored by the Academy.

The purpose of the upcoming symposium is to provide a forum for nurses from academic and service settings to:

- demonstrate leadership through practice by describing the contemporary and future environment for practice;
- disseminate knowledge from the evaluation of clinical practice;
- determine strategies to support practice.

Abstracts are invited on the following areas of nursing practice:

- evaluation of innovative nursing practice models designed to meet contemporary demands for health care;
- analysis of current social, state, and federal policies with regard to health care practice, including the description of strategies to affect policy;
- analysis of the research and evaluation of clinical practice in order to identify gaps in knowledge and directions for practice;
- analysis of the legal, regulatory, and self-regulatory barriers to innovative nursing practice;
- analysis of issues of alliances (i.e., fiscal, consumer, corporate) in the evaluation and support of nursing practice models.

Papers to be presented at the symposium will be selected by the the symposium steering committee. The *deadline* for submitting an abstract for consideration is May 1, 1987. For further information and to obtain a Presentation Application Form, contact the American Academy of Nursing, 2420 Pershing Road, Kansas City, MO 64108, Tel: (816) 474-5720.