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Summary.—The purpose of this study was to examine differences in physical activity patterns of high school graduates in Texas who completed physical education class credit during high school and those who did not but who were varsity athletes. A questionnaire was designed and tested for reliability prior to being administered to 201 college students. Analysis indicated that participants who completed high school physical education class credit do not currently participate in regular physical activity as much as those who were not required to complete such credit. Conversely, athletes who did not participate in physical education reported currently engaging in more cardiovascular exercise and team sports than the physical education students during high school.

Students in extracurricular activities (band, choir, varsity athletics, etc.) often are never required to complete a physical education class for credit during high school (Hastie, Sanders, & Rowland, 1999; Hastie, 2002; NASPE, 2002). Given evidence supporting the need for moderate-to-vigorous physical activity to reduce the risk of cardiovascular-related disease (Blair, 1995; Leon & Norstrom, 1995; Pate, 1995; Pollock, Feingenbaum, & Brechue, 1995; Shephard, 1995; Corbin, 2002), the numbers of sedentary and obese youth continue to increase (Ross & Pate, 1987; USDHHS, 1996; Amster, 2000; Caspersen, Pereira, & Curran, 2000; Corbin, 2002; McKenzie, 2003) primarily because lifestyles of young people are sedentary. Also, researchers reported that older groups are less likely to be physically active (USDHHS, 1996; Kann, Kinchen, Williams, Ross, Lowry, & Hill, 1988; Hastie, 2002).

Researchers (USDHHS, 1991, 1996, 2000a, 2000b; Pate, 1995) and the American Alliance for Health, Physical Education, Recreation, and Dance[2] (NASPE, 2002) suggested that physical education class is an ideal venue for young people to be physically active (Bar-Or, 1987; Simons-Morton,

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[2]American Alliance for Health, Physical Education, Recreation, and Dance. (2002) Legislative News on PEP (http://www.aahperd.org/naspe).

O'Hara, Simons-Morton, & Parcel, 1987; Sallis & McKenzie, 1991; McGinnis, 1992). However, many school systems have not used these research findings and suggestions to strengthen physical education programs.

Many physical education professionals believe physical education programs in schools should promote lifelong physical activity (Centers for Disease Control and Prevention, 1997; Corbin, 2002). While this may already be the main emphasis in many secondary physical education programs (Johnson, 1985; Strand & Reeder, 1993), the most popular activities in high school physical education (football, basketball, volleyball, soccer, softball/baseball) are not listed among the top 10 most popular adult activities (Simons-Morton, Eitel, & Small, 1999; Corbin, 2002). Whether physical educators focus primarily on team sports, social responsibility, or other goals, it is important that physical activity and health-related fitness should be part of all physical education programs.

The number of students required to complete high school physical education in this country has declined dramatically over the last several decades (Lowry, Wechsler, Kann, & Collins, 2001; Hastie, *et al.*, 1999) as substitutions of other activities have been allowed. In the state of Texas, for example, many school districts allow band members, cheerleaders, ROTC students, drivers education students, and school athletes to earn physical education credit without formal class.

Pate, Trost, Levin, and Dowda (2000) reported over 70% of American male students and 53% of American female students participate on one or more sports teams in school or nonschool settings. Were athletes exempt from school physical education, only 30% of the boys and 47% of the girls would receive structured physical education instruction. Without more research, what effect such exemption would have on later health in unknown. It is important to assess the health-related patterns of individuals and how these are related to prior physical education. There is limited research on the differences in nutritional and health-related lifestyles of athletes and other segments of the population.

Thomas (1999) studied the physical activity and nutritional patterns, health-related knowledge, and weight changes in former college football players and nonathlete graduates in the Mid-American Conference universities. The football group was divided further into a group of skilled-position football players weighing less than 100 kg and a group of nonskilled-position players weighing more than 100 kg. Analysis indicated the three groups did not differ significantly in physical activity during work and leisure, but nonathletes reported less sport participation than both groups of football players. Furthermore, unskilled football players reported a significantly greater weight loss of 7.2 kg than the skilled-position players loss of 1.5 kg since graduation. Nonathletes reported a mean weight gain of 3.1 kg. Nutritional

intake and energy expenditure were similar among groups as all reported consuming more fat, saturated fat, and cholesterol than recommended.

Sparling and Snow (2002) studied the relationship between current physical activity patterns of recent college alumni and their physical habits during college. Those who had exercised regularly during college were more active. Further similar research is needed after high school years to assess the effect of physical education experiences on current health-related lifestyles. To do this, an appropriate time-efficient measure is needed. The purpose then was to assess association of high school physical education class enrollment on engagement in physical activity of high school graduates who had enrolled in regular physical education class and those who did not. A second purpose was to compare the physical activity patterns of varsity athletes who did not enroll in physical education with nonathletes who enrolled in physical education.

Method

Questionnaire

Although current questionnaires include appropriate questions related to participating in physical activity, a more time-efficient questionnaire was needed, so a questionnaire was developed to assess the number of days per week individuals participated in different types of moderate-to-vigorous physical activity. To answer each item participants circled the number of days per week in which they engaged for at least 30 min. per day: (a) total physical activity per week, (b) strength training per week, (c) cardiovascular activity per week, (d) team sports per week, (e) aquatic participation per week, (f) and abdominal exercise per week.

Content or face validity was assessed by judging each item's appropriateness. Reliability was assessed by a test-retest procedure with a scale item analysis correlation. Kinesiology majors ($n = 91$) responded on one test version and again two weeks later on another version with modified wording. The coefficients were greater than .8. See Table 1 for the item analysis results for the test-retest process.

TABLE 1
Mean Number of Days Per Week Participation Reported Engaging in Types of Physical Activity Generated by Test-Retest Reliability Item Analysis ($n = 91$)

Variable	Kinesiology Majors				Item Analysis Coefficients
	Test 1		Test 2		
	M	*SD*	*M*	*SD*	
Total Activity	4.1	1.8	4.1	1.5	.80
Strength Training	2.7	1.8	2.6	1.7	.82
Cardiovascular	3.5	1.9	3.5	1.7	.83
Team Sports	1.3	1.9	1.5	2.0	.97
Abdominal	2.7	1.7	2.8	1.6	.84

Administration

The 5-min. questionnaire was administered to 201 students at two institutions of higher learning in a large metropolitan area in the southwest (110 participants in physical education, 91 participants with none, 74 athletes, 69 nonathletes, 33 athletes without). A research assistant recruited participants by asking as many college students as possible on the two campuses to complete the questionnaire. The single criterion for the college students was that participants had to be graduates of Texas high schools. The students were informed their participation was strictly anonymous, and participation would not be disclosed.

Data Analyses

Each item was worded so the higher the response, the more physical activity was engaged in per week. Answers were reported in units of days per week in which the activities were engaged. A multivariate analysis of variance was used to assess significance of differences in physical activity. *Post hoc* testing examined specific differences between (a) individuals who enrolled in physical education class during high school ($n = 110$) and those who did not ($n = 91$), (b) varsity athletes who did not enroll in physical education class during high school ($n = 33$) and nonathletes who did enroll ($n = 69$).

Results

The significant mean differences (see Table 2) were explored in *post hoc* testing ($p = .05$). Individuals who reported they participated in physical education class in high school currently engaged in significantly less physical activity than those who had not enrolled ($F_{1,109} = 138.29$, $p < .0001$). Individuals participating in high school athletics instead of physical education classes indicated that they spend more time than nonathletes enrolled in physical education in cardiovascular workouts ($F_{1,90} = 47.46$, $p < .0001$) and in team sport competition ($F_{1,73} = 18.88$, $p < .0001$).

Interestingly, respondents who took physical education reported they currently engage in more strength training than those who did not take physical education ($F_{1,68} = 68.25$, $p < .0001$). The athletes who also took physical education and those who were physical education students but not athletes reported more abdominal exercise per week than athletes who did not take physical education ($F_{1,32} = 3.28$, $p < .001$).

Discussion

These results from the two colleges should not be generalized to other high school graduates. For those in this study, high school physical education did not have much influence on physical activity after graduation. Individuals who participated in one or more physical education classes in high

TABLE 2
MEAN NUMBER OF DAYS PER WEEK PARTICIPANTS REPORTED ENGAGING IN SPECIFIC TYPES OF PHYSICAL ACTIVITY SINCE HIGH SCHOOL

Group		*n*	Total Physical Activity	Strength Training	Cardiovascular Workouts	Team Sports	Abdominal Workouts	Aquatic Workouts
All Participants								
Had PE	*M*	110	2.0	**3.3**	1.3	.5	1.0	.3
	SD		1.7	1.3	1.3	.7	1.3	.8
No PE	*M*	91	**4.4**	1.3	**3.5**	**1.5**	**3.0**	**.7**
	SD		1.1	1.7	1.5	1.5	1.9	.3
Athletes								
Without PE	*M*	33	4.5	3.2	**3.1**	**1.1**	.3	.5
	SD		1.2	1.3	1.5	.8	1.0	.7
With PE	*M*	41	2.3	1.6	1.5	.7	**1.4**	.3
	SD		1.8	2.0	1.4	.8	1.5	.7
Nonathletes								
With PE	*M*	69	1.7	1.0	1.2	.4	.7	.3
	SD		1.6	1.5	1.2	.6	**1.0**	.8
Athletes	*M*	74	3.3	2.3	2.2	.9	1.9	.4
	SD		1.9	1.9	1.6	.8	1.4	.7
Nonathletes	*M*	127	2.9	2.1	2.4	1.0	.5	.8
	SD		1.9	1.8	1.8	1.5	1.0	2.1

Note.—Means reported in bold face in columns are significantly different at an *a priori* alpha level of .05.

school reported less engagement overall in physical activity than those who did not.

Those who enrolled in physical education also reported significantly lower engagement in each of the specific types of physical activity, with the exception of strength training, than those who did not participate in physical education. Exposure to weight lifting may be a possible reason for this apparent anomaly. This overall lack of physical activity may be associated with exemption from physical education class for different activities (band, cheerleading, choir, etc.) in which direct emphasis on a healthy and physically active lifestyle is not emphasized. Indeed, the data suggest that athletes, with or without participation in high school physical education, reported greater participation in team sports and strength training after high school than those who took physical education and were not athletes. It is interesting to note that athletes who did not take physical education reported fewer days per week of abdominal exercise than physical education students who were and were not athletes, but this is probably spurious.

There may be many reasons why classes did not teach students to lead as active a lifestyle as former high school athletics. One likely reason is that physical education classes may not be vigorous enough. Since objectives in Healthy People 2010 call for more participation by children, adolescents,

and adults in regular physical activity, these participants were oriented toward such objectives. Additionally, Healthy People 2000, Healthy People 2010, the Surgeon General's Report (USDHHS, 1991, 1996, 2000a, 2000b; McKenzie, 2003) and the Physical Education for Progress Act (AAHPERD, 2002) indicate the number of students taking daily physical education should increase, and specifically adolescents should spend at least 50% of their physical education lesson time in moderate-to-vigorous physical activity (Hastie, 2002; McKenzie, 2003). However, if short- and long-term effectiveness of instruction does not provide a basis for increased numbers of students taking school physical education, then it will be difficult to require physical education for all students. Rather, it is more important to identify the effectiveness of physical education instruction in high schools and where necessary to strengthen its quality. Researchers should focus on the relation of physical education classes and regular participation in physical activity after high school graduation.

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