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PEDAGOGY

A Study of Conceptually Based Physical Education in Higher Education

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Abstract

Purpose: *The purpose of this research was to determine whether university students who participated in conceptually based physical education (CPE) would achieve greater positive improvements in their physical fitness level, compared to students in traditional activity- and skills-based physical education (ASPE).* ***Method:*** *This was a pilot study based on an experimental design consisting of 2 intervention groups of CPE (n = 27) and ASPE (n = 29) students who were required to participate in fitness preassessments and postassessments scheduled accordingly during the semester at a medium-sized Midwestern university in the United States.* ***Results:*** *Descriptive and paired samples t test analyses indicated that all students made physical fitness improvements; however, no significant between-group differences were found based on ANOVA analysis.* ***Conclusion:*** *Most of the students showed gains in physical fitness; as a result, students benefited from participating in both types of physical education courses. There is a need for physical education in colleges and universities, and whether in the form of CPE or ASPE, these courses will benefit all students. CPE courses will*

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merely extend further opportunity for the cultivation of physical and health education, as well as potentially improve motivation, attitudes, and behaviors toward exercise during the semester of course enrollment and beyond.

National epidemiological data have indicated that the sharpest decline in physical activity (PA) and exercise participation occurs as adolescents age into young adulthood (Fischer & Bryant, 2008). According to a survey conducted by Calfas et al. (2000), 47% of recent high school graduates reported a decrease in PA, compared to PA levels demonstrated in previous years. School physical education (PE) programs do not always effectively prepare students to transition to optimal self-directed PA and exercise (Sallis & McKenzie, 1991). As the American College Health Association (ACHA) reported in the Spring 2016 National College Health Assessment (NCHA), only 47.2% of college students met the recommended PA and exercise guidelines for moderate or vigorous intensity, or a combination of the two guidelines, as developed for adults by the American College of Sports Medicine (ACSM) and the American Heart Association. Hence, the higher education setting can offer timely opportunities for physical and health education and promotional programming. In addition to providing much needed intervention, higher education institutions can reach large numbers of students at this important transitory stage from young adult to adulthood, and these college and university students are often a captive audience in classes that require them to complete the coursework to earn a grade.

Perhaps now more than ever, the value of PE should be appraised for not only children and adolescents, but also young adult students at the higher education level. Dating back to the early 1800s, colleges and universities in the United States began offering PE to introduce select principles of health education and to foster physical and skill development (Sloane & Sloane, 1986). Activity- or skills-based PE (ASPE) programming was initially focused on the physical development and health needs of the general college student population. Still today, students and faculty recognize these courses as central to the PE programming on most college and university campuses. The status and nature of ASPE has evolved over the years, but continues to be regarded as an important approach to PE.

American colleges and universities began to change the requirements for their courses, PE among those, for many reasons in the early 1960s. Factors included student demand for a wider choice in curriculum; decreased perceived need for fitness for war; large inpouring of students, which made the administration of required courses more difficult; and the newfound movement to make PE more "academic" (Sparling, 2003). Efforts to provide an alternative to traditional ASPE led to the development of conceptually based fitness and wellness courses (Kulinna, Warfield, Jonaitis, Dean, & Corbin, 2009). This new conceptually based PE (CPE) was introduced as a combination of lecture and laboratory. The lecture component provides instruction of concepts related to fitness, wellness, and behavioral change theory; the laboratory serves as a setting in which the learned self-management skills and fitness-related theory can be applied (Corbin & Cardinal, 2008). CPE has grown to educate students about the importance of a healthy lifestyle, including exercise, and its merit to their overall wellness. The significance of this type of course, then and now, is its experiential and intellectual qualities. The lecture assists college students in achieving an appropriate level of health literacy and equips them with the knowledge and analytical skills to navigate through the labyrinth of diet and exercise myths and programs today. Such courses may better enable students to understand concepts such as energy balance and proper nutrition and to exert healthful behavioral change. The associated lab provides students with the opportunity to learn and practice various forms of exercise and to utilize the coinciding concepts being learned in the classroom.

Although trends have fluctuated, colleges and universities have been progressing from providing traditional ASPE to increasing the offering of CPE, along with the requirement of such, into the general education core of courses. The availability of these PE courses indicates that higher education institutions are committing to promoting exercise and healthy living among their students (Kulinna et al., 2009).

All college and university PE courses are beneficial in that they provide instructional programming, increase participation in exercise, and improve physical fitness; however, CPE could more effectively do so by providing an educational rationale for the

importance of such in a person's health and well-being (Wallhead & Buckworth, 2004). In fact, it has been claimed that the higher education curriculum offers a valuable opportunity for improving the level of health-related physical fitness knowledge of students and providing them support to more successfully develop lifestyle wellness behaviors, including exercise (Adams, Graves, & Adams, 2006). Beyond merely providing activity- and skills-related instruction, CPE may also positively cultivate health education, motivation, attitudes, and behaviors toward exercise (Adams et al., 2006).

Research focusing on CPE is limited. Initial programming and research was introduced in the 1960s, showed progress in the 1970s and early 1980s, and plateaued in the 1990s and early 2000s. Aside from recent research focusing on the prevalence and content of regional CPE courses published by this group of authors, one of the latest research studies regarding the progression and effectiveness of CPE was from 2009 and examined earlier work (Kulinna et al., 2009; Williams, Greene, Satinsky, & Neuberger, 2016). However, given the poor state of public health in the United States, it appears that continued CPE (and even ASPE) research efforts need to support and advocate for this type of programming at the higher education level to increase PA and exercise levels and contribute to a healthier culture.

Literature Review

Intervention Efforts for Students in Higher Education

Following public health efforts promoting PA from the U.S. Surgeon General, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS), ACSM, and American Heart Association, ACHA initiated PA and exercise promotion interventions for young college and university students, in particular (CDC, 2009a, 2009b, 2011; HHS, 2008, 2010). These intervention efforts introduced leading health indicators reflecting major public health concerns, including PA. In addition, ACHA (2009) identified a collection of guidelines and over 200 health objectives with baselines and targets for the nation's colleges and universities to achieve over the next decade. A more recent initiative specific to higher education, Healthy Campus 2020, emphasizes

the importance of increasing regular PA for college and university students by advocating ecological health models that attempt to design environments supportive for healthy behaviors (ACHA, 2012). PE, especially concepts based, is one of the most effective, practical options amid these interventions for young (college- and university-aged) adults.

CPE Programming in Higher Education

A variety of PE programs, including ASPE and CPE approaches, are being offered in higher education. This includes a spectrum of CPE programming ranging from a broad offering of lifetime fitness classes to specific programs such as Project GRAD (Graduate Ready for Activity Daily; Sallis, Calfas, Alcaraz, Gehrman, & Johnson, 1999a; Sallis et al., 1999b), ARTEC Project (Active Recreation Tertiary Education Campuses; Leslie, Sparling, & Owen, 2001), Project TEAM (Teaching Exercise/Activity Maintenance; Buckworth, 2001), and Training Interventions and Genetics of Exercise Response (TIGER) Study (Sailors et al., 2010), among similar programming and intervention efforts that have been introduced and studied (Adams, 1992; Brynteson & Adams, 1993; Corbin & Laurie, 1978; Flath & Leigh, 1966; Gibson, 1975; Going, 1984; Hallatt & Koenig, 1967; Laurie, 1981; Pearman et al., 1997; Slava, Laurie, & Corbin, 1984; Terry, Erickson, & Johnson, 1977; Trimble & Hensley, 1990).

The intervention behind Project GRAD integrated concepts and methods from exercise science and behavioral theory into a college-credit course. The purpose of the lecture component was to educate college students about the risks of physical inactivity, recommended PA patterns to promote health and fitness, principles of injury prevention, and concepts and methods of behavioral self-management. Each lecture was divided into two parts: exercise topics discussion and behavioral change methodology. The lab taught physical activities and helped students use self-management techniques to implement their own PA program. The ability of the intervention to increase the adoption and maintenance of PA among young adults transitioning from university to adult roles was evaluated. Results indicated differences between the responses of men and women to the intervention. For men, there were no effects, in general. There were significant effects for women on three PA outcomes: increased total caloric expenditure and improved amounts of both

strength and flexibility exercise. The most significant finding was the effect of the intervention on women's total energy expenditure in leisure time (Sallis et al., 1999b).

The ARTEC Project was a quasi-experimental study designed to promote on-campus and total PA for inactive students at an Australian university campus. The intervention comprised a program of activity classes available to the students for no charge, such as weight training and aerobics. In addition, the interventions included demonstrations of various activities, fitness assessments, swimming passes to a local facility, and on-campus media promotion. This project also attempted to identify determinants of PA. For those insufficiently active, predictors included less social support from family and friends, lower enjoyment of activity, unemployment for women, and (older) age for men. For students who were not active at all, some factors included strong gender preferences for activities and the desire to have greater accessibility to facilities and other similar sources of assistance. Researchers found that males were motivated to be active by weight gain and that females were motivated by weight loss, appearance, and exercising closer to home. From these findings, the intervention was designed to match program offerings to students' preferences for activities, gender-specific motivations to be active, types of assistance perceived to be important, along with social support and enjoyment. The intervention program lasted for 8 weeks and resulted in a significant increase in the proportion of students reporting higher levels of PA. ARTEC demonstrated that matching intervention offerings to students' perceived needs and preferences could influence PA in the university setting (Leslie et al., 2001).

Project TEAM was a 3-year research project on exercise adherence funded by the National Institutes of Health. It began in Fall 1998 at a large Midwestern university. Much like the participants in Project GRAD, its intervention group consisted of students enrolled in a 2-credit academic exercise conditioning course (aerobics, jogging, weight training); however, unlike the other studies, the TEAM Project also included long-term follow-up every 6 months for 2 years. The intervention included a 50-min lecture once a week and 45-min activity three times a week, followed by the periodic testing of outcome variables, including fitness testing. Theoretically based

modifications were implemented in the lecture segment, and then outcome variables were compared between the intervention group and the control group, or traditional PE curriculum. Aside from preliminary results suggesting that participation in the health and PA intervention courses were related to positive physical improvements, health attitudes, and behaviors, overall results were inconclusive. Seasonal effects were also found, as the study took place in the Midwest where there are four distinct weather seasons. Student participants from the fall conditioning course had significantly lower aerobic capacity and higher resting heart rate when retested after the winter. Participants in the course during the spring and retested after the summer had an increased aerobic capacity and decreased resting heart rate (Buckworth, 2001).

The TIGER Study began in 2003, introducing sedentary college students to regular exercise through a 3-day-a-week course taken for credit. The study examined the roles of genes related to adiposity and metabolism regarding body fat, blood pressure, and blood components. The program included 30 weeks of exercise intervention, along with pretesting and posttesting of the variables. While each exercise session lasted a minimum of 40 min, the educational component provided instruction in fitness and physiology relevant to public health including cardiovascular health, body composition, nutrition, genetics, energy balance, exercise program design, stretching, and exercise tracking. An online activity-logging program was also available for students to document exercise performed outside of class. Results from this study indicated that moderate exercise intensity is considered appropriate and achievable for young adults. Most of the study participants complied with the exercise protocol, which allowed for the assessment of exercise adherence and dose. Furthermore, a substantial contingent of the participants persisted in exercise despite encountering barriers such as finances, time, and other obligations. College credit appeared to be a motivating factor for taking course (Sailors et al., 2010).

Additional Associated Research Findings

Other studies have provided similar results and support for these CPE-related program interventions. Slava et al. (1984) conducted a study at Furman University in 1973 on a similar concepts-based PE course. The study revealed significant improvements in health-related

knowledge, attitudes, and behaviors among students taking this required class. Slava et al. reported that students exposed to a CPE course exhibited greater knowledge for making health decisions than did those who did not take the course. In addition, alumni who took the course participated more frequently and had more positive attitudes toward PA. Regarding other physical health characteristics, study participants also weighed significantly less and not only were knowledgeable about but also exhibited normal blood pressure and cholesterol levels. Separate findings from another study supported these results and suggested that cognitive health information was more valuable when provided in conjunction with PA (Powell, 1989).

Additional studies conducted by Adams (1992) and Brynteson and Adams (1993) compared the attitudes and exercise habits of alumni from colleges with varying degrees of PE programs and found not only a correlation between the CPE programs and positive effects on health and behavior, but also a dose–response relationship. The four colleges that were examined possessed different levels of PE requirements or offerings: College A had a general education requirement of one PE course every semester for a full-time student (one foundational PE course the first semester, with a 1-credit activity course every semester thereafter until graduation), plus a 1.5-mile running field test and participation of additional exercise outside of class; College B had a general education requirement of 4 credits of PE; College C had a general education requirement of 2 credits of PE; and College D did not have any general education requirements that specified PE, but rather offered a 1-credit PE activity course that students could elect from a list of art, music, speech, or PE courses to meet an area of general education courses. Statistical analyses indicated that alumni perceived the value of their college PE program in terms of fitness knowledge, attitudes toward fitness, and current exercise habits. College A alumni perceived their college PE program as having a significantly greater relationship to their current fitness knowledge, attitude toward fitness, and exercise habits than did alumni from the other three colleges. For knowledge, College B alumni placed greater value on college PE than did College D alumni and greater impact on exercise habits than did College C alumni. Also, significance was found regarding the value of exercise and its benefits, with Colleges A and B having a higher perceived value

than College D. Alumni from Colleges A, B, and C indicated higher exercise frequency than alumni from College D. Overall results indicated that the more credits required in PE, the more favorably alumni after 2 to 11 years of follow-up perceived their PE program and its contribution to their current knowledge, attitudes, and habits related to exercise and fitness. This suggests that differences in exercise behavior and frequency could originate from the underlying difference in philosophy between ASPE and CPE programs and that a CPE approach to required PE results in more physically active alumni than the ASPE approach.

A similar study by Ermler, Kovar, and Reinders (1993) examined resting heart rate, intent to exercise, and attitude toward exercise. The study examined three types of lifetime fitness courses. All met two times a week for 14 weeks, though the course structure was varied. Group 1 included 1 day of lecture and 1 day of activity each week. Group 2 consisted of three lectures and then one activity day over 2 weeks. Group 3 engaged in 20 min of activity and 20 min of lecture every class meeting. Course objectives, requirements, and activity protocols were identical for all three group sections. Results indicated that all groups experienced significant differences in resting heart rate and intent to exercise, though not in attitude toward exercise. Between-group differences were also significant and post hoc measures further indicated that Group 3 was significantly different from Groups 1 and 2. Group 3 course structure also improved resting heart rate significantly better than the course structures for Groups 1 and 2. Conclusions were made that all three class structures were equally effective in improving intent to exercise, with Group 3, including both activity and lecture each day, demonstrating the most effectiveness in improving cardiorespiratory endurance.

Additional research by Sparling and Snow (2002) investigated the PA patterns in recent college alumni. The alumni reported frequency of participation for three levels of PA: vigorous, moderate, and resistance training exercise. Relative to recommended levels of PA, 32.7% of respondents engaged in vigorous PA on 3 or more days a week, 6.0% participated in moderate-intensity PA on 5 or more days a week, and 21.0% engaged in resistance or calisthenics training on 3 or more days a week. Further, related findings by Sparling (2003) suggested that 84.7% of those who were regular exercisers as

college seniors were as active or more active at the time of the study survey, and 81.3% of the nonexercisers as college seniors reported being about the same or less active at the time of the survey. There was a significant association between exercise behavior as college seniors and exercise behavior as alumni. The participants who were regularly active in college were more likely to participate in recommended levels of PA, vigorous or moderate, after graduation. Logistic regression also identified three significant predictors of current PA level including attitude toward exercise, confidence in setting up an exercise program, and exercise behavior as a college senior.

Despite a lack of current or more recent research studies, the knowledge of theory and application learned through previous work continues to guide and support CPE programming. Since its early implementation in the 1960s, slow evolvement in the 1970s, and growth surge in the 1980s, this type of programming has undergone a significant amount of study and implementation in the 1990–2000s (Corbin & Laurie, 1978). Trimble and Hensley (1990) reported that approximately half of the surveyed colleges and universities offered a concepts-based course, and 33% of all higher education institutions accepted this type of PE course as a general education requirement. Other statistics stated that by 2000, the percentage of higher education institutions offering a lecture–laboratory course increased to 60%. Further growth occurred with 90% of the reporting colleges and universities offering CPE in 2009 (Kulinna et al., 2009). A 2016 study indicated that 77% of randomized institutions in the southeastern United States offered and 46% required CPE (Williams et al., 2016). These were the latest statistics found regarding the study and implementation of this type of programming. Although there seems to have been positive trends in the increased offering and/or requirement of CPE in the last few decades, there has also been the threat of PE being discontinued as a requirement, or even eliminated altogether, because of the lack of financial resources and call to revise or decrease graduation requirements (Naylor, 1997). To further support efforts aimed at preserving and improving CPE (and ASPE) programming, additional research needs to unveil contemporary practices and emerging trends (Hensley, 2013).

Importance of Physical- and Health-Related Knowledge and Practice in Young Adults

CPE targeted at young adults in colleges and universities would be beneficial to their personal health, and public health in general, and higher education institutions offer one of the last collective efforts to intervene. CPE and related programming can reach and influence a large population of young adults, providing education and motivation to encourage healthier behaviors, especially the adoption of PA and exercise into their lifestyle (Fischer & Bryant, 2008). Furthermore, college and university students receiving comprehensive, fundamental CPE will be better prepared to approach health proactively, not only as consumers, but also collectively as future professional and civic leaders (Kupchella, 2009).

The physical health benefits of regular moderate PA and exercise are numerous including a decreased risk of cardiovascular disease, some forms of cancer, non-insulin-dependent diabetes, osteoporosis, and early mortality, as well as improved weight management, performance, stamina, and quality of life (Blair et al., 1996; Blair, Kohl, Barlow, Paffenbarger, & Gibbons, 1989; Blair et al., 1995; Calfas et al., 2000; Leslie et al., 2001; Paffenbarger, Hyde, Wing, & Hsieh, 1986; Sailors et al., 2010; HHS, 1996, 2000, 2008, 2010). Exercise is also associated with improving other aspects of health including psychological, intellectual, and social dimensions (Wankel & Bonnie, 1990; Warburton, Crystal, & Bredin, 2006). In fact, young college and university adults may stand to benefit the most, given their transitional stage of growth and development as they embark on their independent lives.

In addition to physical and health education, CPE may promote a positive attitude toward an active lifestyle and motivate a change in behavior through the adoption of exercise. These characteristics are hypothesized to be positively associated with increased levels of PA and exercise. Consequently, improved overall health is not a short-term benefit—participation in a concepts-based program extends a greater likelihood of a person following such behavior and attributes later in life.

Method

Purpose and Design

The purpose of this study was to determine whether CPE programming would be more effective in improving levels of physical fitness, compared to traditional ASPE programming at the higher education level. This study included two intervention groups. Intervention Group 1 ($n = 27$) participated in a CPE course consisting of a lecture class and laboratory exercise activities. Intervention Group 2 ($n = 29$) participated in only an ASPE activity course.

The study was conducted at a medium-sized Midwestern university. Participants were students selected from a required general studies CPE wellness course and an elective ASPE aerobic fitness course. Research approval was granted from the institutional review boards at the authors' institutions. Study participation was noncompensated and voluntary. The students were ensured that participation would not affect their grade. The study participants recruited from these two courses signed informed consent and health history forms prior to engaging in any activity.

Participation in fitness assessments was a required component for many ASPE courses and for the required CPE course and its associated labs. Each assessment comprised a battery of tests that measured nearly all the health-related components of physical fitness.

Measures

Cardiorespiratory endurance, muscular endurance, body composition, and flexibility were selected as measurements of each student's fitness level; muscular strength was not included in this battery of tests because of the lack of proper equipment and safety. The individual tests included in these courses' fitness assessments were utilized based on several factors. During these fitness assessments, typically several sections of students participated, ranging upwards 50–100 students at a time, in a large gym or arena-type setting. Time and cost efficiencies, including the need for minimal equipment and personnel warranted field tests such as these. To improve validity and reliability, the researchers took various actions, including offering consistent assessment session times at the beginning and end

of the semester so that students could undergo the assessments on approximately the same day of the week at the same time. With equipment and personnel also serving as factors, the only feasible actions the researchers could take were to ensure that the number of personnel assisting with the assessments was adequate to provide proper supervision and monitoring, and to ensure personnel had associated training and preparation in the fitness testing protocols. The assessment sessions were administered by the CPE course and lab instructors, which numbered approximately three assistant professors and two staff members; the ASPE course instructor; and supplementary personnel including adjunct professors, instructors, coaches, and students from the university's health and exercise science degree program. Personnel were properly trained in the testing protocols. The CPE main course and lab instructors and the ASPE course instructor led the entire assessment, including each testing protocol, while the supplementary personnel provided additional monitoring, along with general assistance and supervision. The researchers employed these actions to increase the validity and reliability of the fitness assessment procedures and measures.

Cardiorespiratory endurance was measured through the YMCA 3-Minute Step Test, formerly known as the Rasch Step Test. Though reliability and validity measures for this assessment method are scarce, comparatively the Queens College Step Test (which bears similarity, except for a 16.25-in. bench height) has shown a test–retest reliability for recovery heart rate as $r = 0.92$. Likewise, correlation between recovery heart rate and VO_2 max has measured validity as $r = -0.75$ (McArdle, Katch, Pechar, Jacobson, & Ruck, 1972). Aside from predicting or extrapolating the VO_2 max from the resting heart rate measure, this assessment does not estimate an individual's aerobic functional capacity or VO_2 max data, so its validity is limited (Santo & Golding, 2003). This test involves stepping up and down at a 12-in. bench height at a specified cadence of 24 steps/min for 3 min, followed by a recovering heart rate measurement (ACSM, 2010a). This recovery heart rate was recorded and was used for categorizing physical fitness levels through comparison to established criterion-referenced or normative standards. It should be noted that the lack of control over modifications of environmental and behavioral factors can challenge the outcome. However, the step test is

often used because of its utility with most populations outside of a laboratory setting (ACSM, 2010b).

The abdominal crunch test as specified by the Canadian Society for Exercise Physiology measured muscular endurance. This simple field test demonstrated the maximum number of slow, controlled crunches (curl-ups) that could be performed in 1 min in time with a metronome at a rate of 25 beats/min without rest (ACSM, 2010b; Canadian Society for Exercise Physiology, 2003). Although its validity testing has yielded low correlations and experts often acknowledge—primarily based on the issue of specificity—that interpretation of findings is challenging, this assessment is often used to assess muscular endurance (Sparling, Millard-Stafford, & Snow, 1997).

The YMCA Sit-and-Reach Test measured flexibility. This assessment method was reflective of the hamstrings and lower back flexibility, in particular. At least one source claimed this test was a valid measure of this localized flexibility. In addition, reliability may be dependent on the warm-up that proceeds the test, as well as whether the same procedures are followed each time the test is conducted (Wells & Dillon, 1952). The sit-and-reach test is often used in the field setting (ACSM, 2010b).

Body composition was assessed via bioelectrical impedance by the OMRON Body Fat Monitor. This device and its protocol involved using a properly calibrated monitor and solicited personal data including height, weight, age, and gender. Bioelectrical methods are subject to scrutiny of their validity, though it has been claimed that their accuracy is similar to skinfold measurements if stringent protocols are followed and valid equations are used (ACSM, 2010b).

Procedures

A fitness preassessment at the beginning and a postassessment at the end of the semester were completed for each course. These helped establish the student participants' baseline and progression of their fitness- and physical-health-related measures. Each fitness assessment was administered by the CPE course and lab instructors and the ASPE course instructor, along with supplementary personnel including adjunct professors, instructors, coaches, and health and exercise science degree program students. All underwent training and preparation for proper administration of the fitness testing

protocols. Because of the high number of student participants, students were asked to pair up to assist each other in counting repetitions, tracking time, and recording measurements. Upon the conclusion of the battery of fitness tests, scorecards containing the measures were submitted to the assessment personnel.

Following the fitness preassessment, the courses commenced following their set semester curriculum. After 30 class sessions of participation in both sections of the courses, the students underwent the same battery of tests for the fitness postassessment. Again, the same protocols and procedures were followed as a way of ensuring consistency. After participation in all the individual fitness tests and completion of the recorded fitness measures, students turned in their scorecards for a final time. Postassessment fitness measures were then compared to the preassessment measures.

Intervention Group 1

Intervention Group 1 consisted of 27 students enrolled in a section of a lecture and a lab, which comprised a required CPE course. Throughout the semester, the students followed an approximate 14-week lecture-based wellness curriculum and associated 10-week lab section focusing on aerobic fitness.

Lecture. The lecture component was scheduled for two 50-min class periods a week for the semester. Though taught by several instructors, the lecture sections were required to follow a single fitness- and health-based curriculum including behavioral change, nutrition, body composition and weight management, cardiorespiratory endurance, muscular strength and endurance, flexibility, cardiovascular disease and cancer prevention, stress management, substance use/abuse, and sexually transmitted infections. Like the fitness assessments for the lab course, a cognitive preassessment and postassessment were administered at the beginning and end of each semester in the lecture course. Four written exams were administered during the semester as a method of assessing student understanding of the course material. Attendance was mandatory.

Lab. Although each laboratory section focused on one among a variety of exercises, the lab chosen in this pilot study was aerobic fitness. The lab component focused on a designated curriculum of aerobic exercise activities and met three times a week for 50 min for 10 weeks, for a total of 30 classes or 1,500 min. The fitness preassessment and postassessment were required, as was attendance.

Intervention Group 2

Intervention Group 2 consisted of 29 students enrolled in an elective ASPE aerobic fitness course focused on a designated curriculum of aerobic exercise activities. It met two times a week for 50 min for 15 weeks, for a total of 30 classes or 1,500 min. The fitness preassessment and postassessment were required, as was attendance.

Results

Data from the fitness preassessment and postassessment measures were compared within participant as of way of assessing each student's fitness development, as well as between participants as of way of investigating the difference between the courses. For statistical purposes, the acquired fitness assessment scored data were entered into SPSS, wherein they were analyzed with a paired samples *t* test, independent samples *t* test, and a one-way analysis of variance (ANOVA) with an original significance level of $p < .05$. Though, because groups were being examined comparatively, the level of significance was decreased to $p < .025$ (one-tailed), reflecting the optimal fitness levels, including increased measures for muscular endurance (ME) and flexibility (F) and decreased measures for cardiorespiratory endurance (CRE) and body composition (BC). For each fitness component measure: ME-upper one-tailed, CRE-lower one-tailed, BC-lower one-tailed, F-upper one-tailed.

Data entered into SPSS were defined by each of the fitness components, and an additional variable was created for each based on the differences in the fitness preassessment and postassessment measures. The study began with 56 participants and decreased to 49 after attrition. For students who were absent or unable to complete various tests, those data values were treated as missing and omitted from the data analysis.

Comparison of the health-related fitness component means showed improvements in all categories for both intervention groups. ME and F increased, whereas CRE and BC decreased, all of which are favorable outcomes(see Figure 1). A closer examination of the difference in the health-related fitness component means showed that Intervention Group 1 experienced greater improvements in ME and BC, whereas Intervention Group 2 saw a greater improvement in CRE and modestly greater improvement in F (see Figure 2).

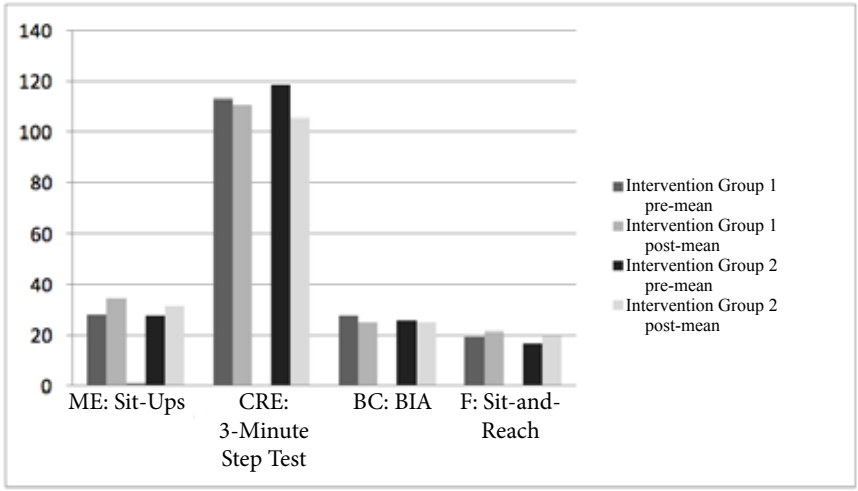

Figure 1. Fitness component means. ME = muscular endurance; CRE = cardiorespiratory endurance; BC = body composition; BIA = bioelectrical impedance analysis; F = flexibility.

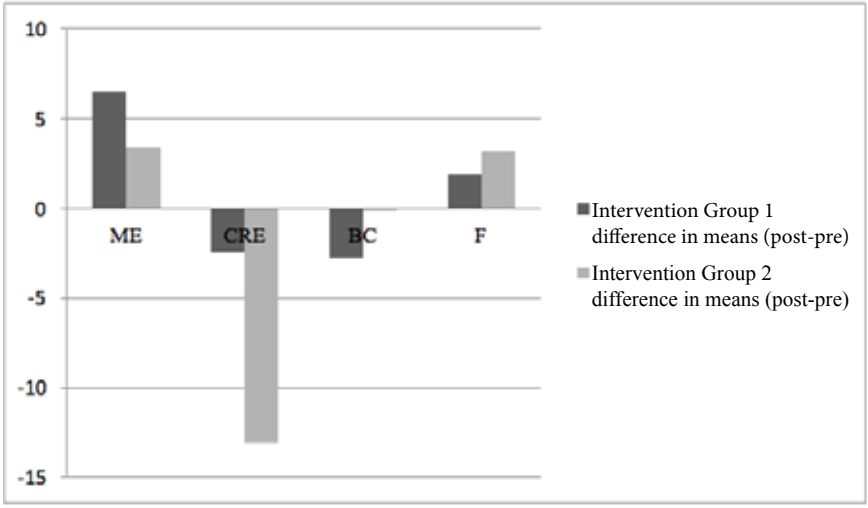

Figure 2. Differences in fitness component means. ME = muscular endurance; CRE = cardiorespiratory endurance; BC = body composition; F = flexibility.

A paired samples *t* test indicated statistically significant effects for all the prefitness and postfitness component measures. With a one-tailed test and *t*(critical) = 2.011, the measures suggest that all students made fitness improvements (see Table 1).

Table 1
Paired Samples t Test Results

	Pair	*df*	*t*	*p***	*p**
ME	pre, post	48	-5.705	.000**	.000*
CRE	pre, post	48	2.242	.030**	.015*
BC	pre, post	48	2.231	.030**	.015*
F	pre, post	48	-6.237	.000**	.000*

Note. ME = muscular endurance; CRE = cardiorespiratory endurance; BC = body composition; F = flexibility.

***p* < .05. **p* < .025.

More within-group differences were examined with Levene's Test for Equality of Variances. It indicated that ME and F were homogeneous, whereas CRE and BC variances were significantly different from the beginning, so equal variances were not assumed in these two latter interpretations. The difference in ME was almost significant at the $p < .025$ level and would have been significant at the $p < .05$ level. The difference in F would have also been nearly significant at the $p < .05$ level; however, none of these measures were significant at the intended level of $p < .025$ (see Table 2).

Table 2
Independent Samples t Test Results

Difference in measures (post–pre)	*df*	*t*	*p***	*p**
ME	47	1.848	.071	.035
CRE	47	1.572	.120	.0615
BC	47	-1.045	.297	.1505
F	47	-1.648	.106	.053

Note. ME = muscular endurance; CRE = cardiorespiratory endurance; BC = body composition; F = flexibility.

***p* < .05. **p* < .025.

No significant effects were found from the ANOVA for any between-group differences for the fitness component measures. Fitness component difference measures indicated that both groups seemed to be comparatively effective in improving the physical fitness components in this study (see Table 3).

Table 3
ANOVA Results

Difference in measures (post–pre)	*df*	*t*	p^{**}	p^{*}
ME	1, 47, 48	3.414	.071	.035
CRE	1, 47, 48	2.471	.120	.0615
BC	1, 47, 48	1.092	.297	.1505
F	1, 47, 48	2.716	.106	.053

Note. ME = muscular endurance; CRE = cardiorespiratory endurance; BC = body composition; F = flexibility.

$^{**}p < .05$. $^{*}p < .025$.

Discussion

Both groups in this study experienced significant gains, though the data did not support the notion that university students who participate in CPE programming would demonstrate greater positive improvements in their physical fitness compared to students who participate in a traditional ASPE course. Significance was found within the groups among the students in each course, but it was not demonstrated as predicted between the two courses. According to the collected data, each group of students experienced gains in their fitness levels. In fact, it appears that nearly all students experienced successful exercise and fitness gains from participating in each of the PE offerings.

The intended intervention (Intervention Group 1) of this pilot study was most similar in theory and design to Project GRAD and the TIGER Study. It also shared some similarities to other research including Project ARTEC, Project TEAM, and that conducted by Adams. Like these, the CPE course examined in this study integrated concepts and methods from exercise science, health, and behavioral change, from which the effectiveness to increase exercise

and physical fitness levels was predicted. It is hoped that like the institutions in the research comparing college PE requirements and offerings by Adams (1992), the institutions requiring PE will more positively influence their alumni exercise participation, through the demonstration of greater levels of exercise adherence after they graduate.

This study and the other studies support CPE programming and the beneficial effects it can have on a person's health behaviors, including exercise and physical fitness, and overall physical health. In addition to fulfilling some of the goals and objectives of Healthy Campus 2010, such programming also fosters the growth of other public health initiatives including Healthy People 2010 and 2020, along with HHS's National Physical Activity Plan. Furthermore, the adoption of CPE programming into the general education requirements could profoundly affect students' lives through enhancing the way they approach their own health, including PA and exercise, as well as broach public health and health-related issues as wiser consumers and leaders in society.

Conclusion

It was hoped that this study would provide additional support for the effects of CPE programming and consequently reinforce the value of such courses at the higher education level. Although the data did not indicate significant differences in physical fitness improvement between the CPE and ASPE groups, nearly all students experienced successful exercise and fitness gains. Some colleges and universities have dropped PE and health courses over the years, but this study seems to validate the need for required PE in the higher education curriculum (Kupchella, 2009). Whether in the form of CPE or ASPE, these courses will benefit all students. However, it is still theorized that CPE programs will provide a greater level of physical and health education, likely producing a stronger foundation, understanding, and appreciation of exercise and health in students during the semester of course enrollment and throughout their lifetime.

Recommendations for Future CPE Research

Much of the available research investigates the value of (required) PE; however, few studies have examined the long-term effects and

value of PE, especially CPE, at the higher education level. A future study could include a control group not participating in an ASPE or CPE course, to indicate more clearly the benefits of each. Regarding research specific to CPE, Project GRAD, along with studies by Adams (1992) and Brynteson and Adams (1993), attempted to look at the attitudes and exercise habits and adherence of alumni. Though, these studies are few. A future direction for research could include following a sample of students from the time of their enrollment in the college or university PE courses and 1 year after, at graduation, or even 5 or 10 years out of school. This time frame could provide a larger window for finding effects, at a later date. Also, future research could examine the cognitive and psychological effects related to intent, attitudes, value, or self-efficacy associated with participation in exercise.

Recommendations for Future CPE Programming

It has been reported that alumni from institutions with more credits of required PE place a greater value on their college or university PE program and exercise more frequently. Among other authors, Terry et al. (1977) and Adams et al. (2006) support the belief that students are more likely to engage in regular PA and exercise when they appreciate its importance more. Furthermore, the findings of this study and other studies suggest that individuals who have been involved in CPE programming possess greater knowledge to make informed decisions regarding PA and are likely to participate in exercise properly and experience improved levels of physical fitness and physical health, in general (Adams, 1992). On behalf of this group of authors, it is recommended that all college and university students be offered either elective or required CPE participation that will benefit their exercise and fitness levels, health, and well-being as they embark on their independent lifelong journeys as more active, healthier, wiser, and productive advocates contributing to society.

References

Adams, T., II. (1992). A comparison of attitudes and exercise behaviors of alumni from universities with varying degrees of physical education programs. *Research Quarterly for Exercise and Sport, 63,* 148–152. https://doi.org/10.1080/02701367.1992.10607574

Adams, T. M., II, Graves, M. M., & Adams, H. J. (2006). The effectiveness of a university level conceptually-based health-related fitness course on health-related fitness knowledge. *Physical Educator*, *63,* 104–112.

American College Health Association. (2009). *Healthy Campus 2010*. Linthicum, MD: Author.

American College Health Association. (2012). *Healthy Campus 2020*. American College Health Association.

American College Health Association. (2016). *American College Health Association-National College Health Assessment II: Reference group executive summary Spring 2016.* Hanover, MD: Author.

American College of Sports Medicine. (2010a). *ACSM's guidelines for exercise testing and prescription* (8th ed.). Philadelphia, PA: Lippincott, Williams, and Wilkins.

American College of Sports Medicine. (2010b). *ACSM's resource manual for guidelines for exercise testing and prescription* (6th ed.). Philadelphia, PA: Lippincott, Williams, and Wilkins.

Blair, S., James, B., Kohl, H., III, Barlow, C., Macera, C., Paffenbarger, R., & Gibbons, L. (1996). Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women. *Journal of American Medical Association, 276*, 205–210. https://doi.org/10.1001/jama.1996.03540030039029

Blair, S., Kohl, H., III, Barlow, C., Paffenbarger, R., & Gibbons, L. (1989). Physical fitness and all-cause mortality: A prospective study of healthy men and women. *Journal of American Medical Association, 262*, 2395–2401. https://doi.org/10.1001/jama.1989.03430170057028

Blair, S., Kohl, H., III, Barlow, C., Paffenbarger, R., Gibbons, L., & Macera, C. (1995). Changes in physical fitness and all-cause mortality: A study of healthy and unhealthy men. *Journal of American Medical Association,* 273, 1093–1098. https://doi.org/10.1001/jama.1995.03520380029031

Brynteson, P., & Adams, T. M., II. (1993). The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2–11 years of follow-up. *Research Quarterly for Exercise and Sport*, *64*, 208–214. https://doi.org/10.1080/02701367.1993.10608798

Buckworth, J. (2001). Exercise adherence in college students: Issues and preliminary results. *Quest*, *53*, 335–345. https://doi.org/10.1080/00336297.2001.10491750

Calfas, K. J., Sallis, J. F., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Caparosa, S., . . . Alcaraz, J. E. (2000). Project GRAD: Two-year outcomes of a randomized controlled physical activity intervention among young adults. *American Journal of Preventive Medicine*, *18*(1), 28–37. https://doi.org/10.1016/S0749-3797(99)00117-8

Canadian Society for Exercise Physiology. (2003). *The Canadian physical activity, fitness, and lifestyle approach: CSEP-Health and Fitness Program's health-related appraisal and counseling strategy* (3rd ed.). Ottawa, Canada: Author.

Centers for Disease Control and Prevention. (2009a). *Healthy People 2000*. Retrieved from http://www.cdc.gov/nchs/healthy_people/hp2000.htm

Centers for Disease Control and Prevention. (2009b). *Healthy People 2020*. Retrieved from http://www.cdc.gov/nchs/healthy_people/hp2020.htm

Centers for Disease Control and Prevention. (2011). *Healthy People 2010*. Retrieved from http://www.cdc.gov/nchs/healthy_people/hp2010.htm

Corbin, C. B., & Cardinal, B. J. (2008). Conceptual physical education: The anatomy of an innovation. *Quest, 60*, 467–487. https://doi.org/10.1080/00336297.2008.10483593

Corbin, C. B., & Laurie, D. (1978). Exercise for a lifetime: An educational effort. *Physician and Sports Medicine, 7*(1), 51–55. https://doi.org/10.1080/00913847.1978.11948358

Ermler, K. L., Kovar, S. K., & Reinders, S. M. (1993). The effect of three different lifetime fitness class structures on various fitness parameters of college students. *Physical Educator, 50*, 52–56.

Fischer, D. V., & Bryant, J. (2008). Effect of certified personal trainer services on stage of exercise behavior and exercise mediators in female college students. *Journal of American College Health, 56*, 369–376.https://doi.org/10.3200/JACH.56.44.369-376

Flath, A., & Leigh, R. D. (1966). "Know why" in basic instruction. *Physical Educator, 23,* 163.

Gibson, B. (1975). *An evaluation of a lecture–laboratory program of physical education* (Unpublished master's thesis). Kansas State University, Manhattan, KS.

Going, W. (1984). *The lifetime participation objective of a required physical education program* (Unpublished master's thesis). University of Georgia, Athens, GA.

Hallatt, D., & Koenig, W. C. (1967). The "hows" or "whys": Which comes first? *Physical Educator, 24,* 171.

Hensley, L. D. (2013). Current status of basic instruction programs in physical education at American colleges and universities. *Journal of Physical Education, Recreation, and Dance, 71*(9), 30–36. https://doi.org/10.1080/07303084.2000.10605719

Kulinna, P. H., Warfield, W. W., Jonaitis, S., Dean, M., & Corbin, C. (2009). The progression and characteristics of conceptually based fitness/wellness courses at American universities and colleges. *Journal of American College Health, 58,* 127–131. https://doi.org/10.1080/07448480903221327

Kupchella, C. E. (2009). Colleges and universities should give more broad-based attention to health and wellness—at all levels. *Journal of American College Health, 58*, 185–186. https://doi.org/10.1080/07448480903375946

Laurie, D. (1981). Knowledge, attitudes, and reported behavior before and after a lecture–laboratory physical fitness class. *Physical Educator, 38,* 50–54.

Leslie, E., Sparling, P. B., & Owen, N. (2001). University campus settings and the promotion of physical activity in young adults: Lessons from research in Australia and the USA. *Health Education*, *101*, 116–125. https://doi.org/10.1108/09654280110387880

McArdle, W. D., Katch, F. I., Pechar, G. S., Jacobson, L., & Ruck, S. (1972). Reliability and interrelationships between maximal oxygen uptake, physical work capacity, and step test scores in college women. *Medicine and Science in Sports, 4,* 182–186.

Naylor, J. H. (1997). Is physical education in trouble at the college level? *Journal of Physical Education, Recreation, and Dance*, *68*(6), 9. https://doi.org/10.1080/07303084.1997.10604956

Paffenbarger, R. S., Hyde, R. T., Wing, A. L., & Hsieh, C. C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine, 314*, 605–613. https://doi.org/10.1056/NEJM198603063141003

Pearman, S. N., III, Valois, R. F., Sargent, R. G., Saunders, R. P., Drane, J. W., & Macera, C. A. (1997). The impact of a required college health and physical education course on the health status of alumni. *Journal of American College Health, 46,* 77–85. https://doi.org/10.1080/07448489709595591

Powell, F. (1989). The origin and impact of the health and physical education 10 course at Furman University. *Furman Studies*, *35,* 22–31.

Sailors, M. H., Jackson, A. S., McFarlin, B. K., Turpin, I., Ellis, K. J., Foreyt, J. P., . . . Bray, M. S. (2010). Exposing college students to exercise: The training interventions and genetics of exercise response (TIGER) study. *Journal of American College Health*, *59*(1), 13–20. https://doi.org/10.1080/07448481.2010.483712

Sallis, J., Calfas, K., Alcaraz, J., Gehrman, C., & Johnson, M. (1999a). Potential mediators of change in physical activity promotion course for university students: Project GRAD. *Annals of Behavioral Medicine*, *21*, 149–158. https://doi.org/10.1007/BF02908296

Sallis, J. F., Calfas, K. J., Nichols, J. F., Sarkin, J. A., Johnson, M. F., Caparosa, S., . . . Alcaraz, J. E. (1999b). Evaluation of a university course to promote physical activity: Project GRAD. *Research Quarterly for Exercise and Sport, 70,* 1–10. https://doi.org/10.1080/02701367.1999.10607725

Sallis, J. F., & McKenzie, T. L. (1991). Physical education's role in public health. *Research Quarterly for Exercise and Sport, 62,* 124–137. https://doi.org/10.1080/02701367.1991.10608701

Santo, A. S., & Golding, L. A. (2003). Predicting maximum oxygen uptake from a modified 3-minute step test. *Research Quarterly for Exercise and Sport, 74*(1), 110–115. https://doi.org/10.1080/02701367.2003.10609070

Slava, S., Laurie, D., & Corbin, C. B. (1984). Long-term effects of a conceptual physical education program. *Research Quarterly for Exercise and Sport, 55,* 161–168. https://doi.org/10.1080/02701367.1984.10608393

Sloane, D. C., & Sloane, B. C. (1986). Changing opportunities: An overview of the history of college health education. *Journal of American College Health, 34*(6), 271–273. https://doi.org/10.1080/07448481.1986.9938949

Sparling, P. (2003). College physical education an unrecognized agent of change in combating inactivity-related diseases. *Perspectives in Biology and Medicine, 46,* 579–587. https://doi.org/10.1353/pbm.2003.0091

Sparling, P. B., Millard-Stafford, M., & Snow, T. K. (1997). Development of a cadence curl-up test for college students. *Research Quarterly for Exercise and Sport, 68*, 309–316. https://doi.org/10.1080/02701367.1997.10608012

Sparling, P. B., & Snow, T. K. (2002). Physical activity patterns in recent college alumni. *Research Quarterly for Exercise and Sport, 73*, 200–205. https://doi.org/10.1080/02701367.2002.10609009

Terry, J. W., Erickson, C., & Johnson, D. J. (1977). Changing habits by changing attitudes. *Journal of Physical Education, Recreation, and Dance, 48*(7), 13.

Trimble, R. T., & Hensley, L. D. (1990). Basic instruction programs at four-year colleges and universities. *Journal of Physical Education, Recreation, and Dance, 61*(6), 64–73. https://doi.org/10.1080/07303084.1990.10604555

U.S. Department of Health and Human Services. (1996). *Physical activity and health: A report of the Surgeon General*. Atlanta, GA: Author.

U.S. Department of Health and Human Services. (2000). *Healthy People 2010*. Washington, DC: Author.

U.S. Department of Health and Human Services. (2008). *2008 physical activity guidelines for Americans.* Washington, DC: Author.

U.S. Department of Health and Human Services. (2010). *U.S. national physical activity plan*. Washington, DC: Author.

Wallhead, T. L., & Buckworth, J. (2004). The role of physical education in the promotion of youth physical activity. *Quest, 56*, 285–301. https://doi.org/10.1080/00336297.2004.10491827

Wankel, L., & Bonnie, G. (1990). The psychological and social benefits of sport and physical activity. *Journal of Leisure Research, 22*, 167–182. https://doi.org/10.1080/00222216.1990.11969823

Warburton, D., Crystal, W., & Bredin, S. (2006). Health benefits of physical activity: The evidence. *Canadian Medical Association Journal, 174*, 801–809. https://doi.org/10.1503/cmaj.051351

Wells, K. F., & Dillon, E. K. (1952). The sit and reach: A test of back and leg flexibility. *Research Quarterly for Exercise and Sport, 23*(17), 115–118. https://doi.org/10.1080/10671188.1952.10761965

Williams, S. E., Greene, L., Satinsky, S., & Neuberger, J. (2016). Content analysis of conceptually based physical education in Southeastern United States universities and colleges. *Physical Educator, 73*, 530–554. https://doi.org/10.18666/TPE-2016-V73-I4-6554