A STUDY OF THE INFLUENCE OF KENNETH COOPER'S WORK ON THE TEACHING OF WELLNESS AND FITNESS IN PHYSICAL EDUCATION PROGRAMS IN 2-YEAR COMMUNITY COLLEGES IN THE UNITED STATES

DISSERTATION

Presented to the Graduate Council of the

University of North Texas in Partial

Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Barbara A. Coan, B.S., M.Ed.

Denton, Texas

May, 1997

Major Prof. Dr. Jack Bailey

A STUDY OF THE INFLUENCE OF KENNETH COOPER'S WORK ON THE TEACHING OF WELLNESS AND FITNESS IN PHYSICAL EDUCATION PROGRAMS IN 2-YEAR COMMUNITY COLLEGES IN THE UNITED STATES

DISSERTATION

Presented to the Graduate Council of the

University of North Texas in Partial

Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Barbara A. Coan, B.S., M.Ed.

Denton, Texas

May, 1997

Major Prof. Dr. Jack Bailey

Coan, Barbara A., A study of the influence of Kenneth Cooper's work on the teaching of wellness and fitness in physical education programs in 2-year community colleges in the United States. Doctor of Philosophy (Higher Education), May, 1997, 237 pp., 27 tables, references, 232 titles.

Kenneth H. Cooper is considered to be a noted scholar in the field of wellness and fitness. This study explored his contributions to the preventive medicine and wellness movement in community college physical education programs in the United States. It examined Cooper's influence on the development of preventive medicine and wellness from its inception and growth to its impact on changes and factors affecting curriculum in community college programs.

A random sample of 436 physical education division directors from the nation's 1,400 community colleges yielded a 62% survey response. For purposes of comparison, the sample was stratified into two regions taken from east and west of the Mississippi River. Chi-square analysis at the .01 level of significance found no difference between variables due to geographic region. The findings of this study indicate that Kenneth Cooper's contributions to preventive medicine and wellness in community college physical education curriculum are overshadowed by state and local governing bodies that are the force behind curricular development in the nation's 2-year community colleges. However, as an individual contributor, Cooper ranks highly in influencing the wellness and physical education curriculum primarily in the areas of aerobic exercise, physical

fitness, and cardiovascular disease. The extent of Cooper's impact on community college physical education programs is recognized by the wide utilization of the 1.5 mile run test and 12-minute run test developed by Cooper. Two areas of Cooper's research--antioxidants and spiritual fitness--are not priorities in physical education programming. Changes in physical education programs in the past 10 years show an increased emphasis and popularity in aerobic fitness courses. It was also found that 40% of the community colleges responding to the present study indicated no physical education programming and that credit hours for physical education are decreasing.

ACKNOWLEDGEMENTS

I am indebted to the many individuals from The Aerobics Center in Dallas, Texas, for their assistance in this study. Most notably, I am indebted to Kenneth Cooper, who granted interviews and made documents available to me.

I am grateful to my major professor, Dr. Jack Baier, whose encouragement and guidance led me through the dissertation process. Appreciation is also due to the members of my committee, Professors Robert Patton, Jean Keller, and Jesse Jones, whose suggestions and comments allowed me to produce a scholarly work of research.

I am thankful to Judy Duncan, a true friend, who tirelessly transcribed notes and interviews. Appreciation is due to my colleagues at Weatherford College who supported my efforts in this endeavor. I am grateful to my dear friends Patsy Pearce, Nancy Allen, Jan Vaughn, and Teresa Lawson for their encouragement and words of wisdom that made this process easier.

I am grateful to my mother, Lou Stovall, and my father, Jack Ritter, whose love and discipline taught me the value of diligence and perseverance. I also appreciate the love and support of my sister, Linda Light. Most of all, I owe my gratitude to my husband, Ron Coan, who walked me each step of the way from beginning to end of this manuscript. And I could not have completed the study without the love and support of my children, Christopher and Patrick Coan.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Background of the Problem

The concept of disease prevention instead of disease treatment has evolved in the last 4 decades. Only recently has the term wellness denoted a dimension of health embodied with a characteristic lifestyle that personifies a positive approach to healthy living (Melograno & Klinzing, 1992). Wellness programs teaching a holistic philosophy incorporate the social, intellectual, physical, occupational, spiritual and emotional domains as essential elements necessary in developing an individual's quality of life (Bruess & Richardson, 1994; Seiger, Vanderpool, & Barnes, 1995). The realization of the benefit of wellness programs developed much sooner in the business industry than in higher education. Companies recognizing the cost savings from increased productivity, reduced absenteeism, higher morale, and lower insurance rates embraced the wellness philosophy.

Public schools have become concerned with teaching the wellness philosophy and have begun to revise essential elements in their physical education programs to emphasize the wellness approach. In 1998 the Texas public school system will mark a historic beginning with the new essential elements for physical education that echo the National Goals 2000 objectives (TEKS Committee, 1996). Texas public schools are following the trend toward national and state standards that promote health-related

fitness as necessary for optimal life-long health (TEKS Committee, 1996). As changes occur in public schools, colleges and universities should also be changing to meet the needs of today's students. The changing economy and diminishing financial resources will push these institutions of higher learning toward an increased emphasis on wellness for students as well as for employees. As the high cost of health care programs increases, prevention of disease through health promotion and wellness education will become an increasingly attractive alternative to the high cost of treating disease (Medina, 1993).

A pioneer in the preventive medicine and wellness field is Kenneth H. Cooper. After graduating from the University of Oklahoma School of Medicine, Kenneth Cooper, M.D. began his professional career by entering the military as an Army flight surgeon. In 1960, Cooper transferred directly from the Army to the Air Force and began a training program at the School of Aerospace Medicine in San Antonio, Texas. The influence of a German exercise physiologist who was researching fitness of Air Force personnel, Bruno Balke, M.D., encouraged Cooper to postulate the idea that aerobic exercise is an essential element in preventive medicine (Cooper Aerobics Center, 1995a).

In 1962, Cooper's interest in preventive medicine prompted him to pursue and receive the Harvard School of Public Health master's degree. Returning to full-time duty at Lackland Air Force Base, Cooper developed the Aerobics Point System that led to his first book in 1968, Aerobics. In this book the author promoted a little-known concept of disease prevention instead of disease treatment. Cooper has written 12 additional books, the latest of which is It's Better to Believe, published in 1995. Cooper's books have sold more than 30 million copies in 41 languages and Braille (Cooper Aerobics Center,

1995a).

In 1970 Cooper left military service and founded the Cooper Clinic in Dallas, Texas. In 1971 the Cooper Clinic moved to its present location on Preston Road in Dallas. The Cooper Clinic has emerged into a 30-acre medical and fitness facility known as the Cooper Aerobics Center (Cooper Aerobics Center, 1995a). Since its inception, the internationally known Cooper Clinic has registered over 60,000 patients who have benefitted from the specialization in preventive medicine, cardiology, internal medicine, radiology, cardiac rehabilitation, cholesterol metabolism, and aviation medicine (Cooper Aerobics Center, 1995a). Other services are also available in areas such as stress management and nutrition.

The Cooper Institute for Aerobics Research, recognized worldwide for its research and education programs, is the nonprofit arm of the five divisions of The Cooper Aerobics Center (Cooper Aerobics Center, 1995a). It utilizes the largest computerized exercise data base on record, with an objective measure of fitness–the treadmill stress test (Cooper Aerobics Center, 1995a).

The Cooper Fitness Center, with over 3,000 health club members, has a waiting list for membership. The Guest Lodge is a 63-room European-style hotel that offers luxurious accommodations to individuals and corporate groups. The fifth division of the Cooper Aerobics Center is the Cooper Wellness Program that is custom-tailored with evaluations, live-in accommodations, supervised exercise training, nutritional meals, and wellness lectures (Cooper Aerobics Center, 1995a).

In a 1996 interview, Kenneth Cooper indicated to the researcher that in 1970 his

idea of preventive medicine was not accepted by the Dallas medical community. Disease treatment was the accepted norm, not disease prevention. Physicians at that time believed that running would cause a heart attack for persons over the age of 40. In 1970 Cooper had to go before the board of censorship at the Dallas County Medical Society for doing treadmill stress tests. Cooper was one of the first physicians to recommend exercise for cardiac patients after having a heart attack. In the late 1970s, Cooper was a forerunner in doing mammograms on a regular basis to detect breast cancer (K.H. Cooper personal communication, April 24, 1995).

In the mid 1980s, conflict with the medical community continued as Cooper started doing routine testing for prostate cancer. Cooper has continued through the years to promote his medical research-backed procedures that are now considered a standard of care. In 1994, Kenneth Cooper became embroiled in the latest controversy with the publication of his book Antioxidant Revolution. Promoting vitamin supplements to reduce the risk of cancer and heart disease, Cooper's newest book has evoked more criticism from the medical community.

Labeled as the "father of the fitness boom" (Barbato, 1988), a "national hero" (Hall, 1993), "fitness guru" (Kunde, 1992), and "international fitness expert" (O'Connor, 1992), Kenneth H. Cooper has been awarded at least six honorary degrees (Cooper Aerobics Center, 1995a) and numerous national awards for his work in preventive medicine and wellness. He has lectured in over 50 countries, and his research in preventive medicine has reached 2,000 schools in the United States that promote his wellness philosophy through Cooper's Fitnessgram. Countries such as Japan have

patterned their Aerobics Center after the Cooper Aerobics Center. Bangkok, Thailand's Royal Gyms Limited is a result of Cooper's involvement with international projects.

Statement of the Problem

In light of the foregoing, many people believe that Kenneth Cooper has significantly impacted education programs through his Institute for Aerobics Research and his many publications. However, to date, no other study has been done to determine Cooper's direct effect on the teaching of wellness and fitness in physical education programs in the nation's 1,400 2-year community colleges. Therefore, there was a need to ascertain and document the contributions of Kenneth H. Cooper, M.D. to preventive medicine and wellness education in community college physical education programs in the United States.

Purposes of the Study

This study explored the contributions of Kenneth H. Cooper, M.D. to the preventive medicine and wellness movement in community college physical education programs in the United States. It examined Cooper's influence on the development of preventive medicine and wellness from its inception and growth to its impact on changes in curricula in community college programs. Specifically, the purposes of the study were (a) to ascertain Kenneth H. Cooper's contributions to preventive medicine and wellness in community college physical education curriculum, (b) to investigate the extent to which Cooper's work has been implemented on community college campuses through physical education, (c) to examine changes in physical education programs in community

colleges in the United States over the past 10 years, (d) to determine whether geographic regions have an impact on acceptance of Cooper's research and work in preventive medicine and wellness, and (e) to determine what factors are considered by 2-year community college faculty and staff to have influenced the wellness and fitness movement in physical education.

Research Questions

The following research questions directed the research for this study:

1. What issues that Kenneth H. Cooper has promoted have been emphasized in community college physical education programs?

2. How have Kenneth H. Cooper's work and philosophy of wellness and fitness influenced physical education programs in community colleges?

3. What changes have occurred in physical education curricula in community colleges over the past 10 years?

4. Does geographic region have an impact on acceptance of Cooper's work in community college physical education programs?

5. What factors are considered by 2-year community college faculty and staff to have influenced the wellness and fitness movement in physical education?

Significance of the Study

Earlier research findings of wellness programs in community colleges have shown that the concept of wellness is not completely understood or fully accepted by college administrators in particular and society in general (Vastine, 1984). Of the six

dimensions of wellness (spiritual, emotional, social, intellectual, vocational, and physical), most of the programs are offered in the physical dimension. Despite research pointing to the need for a holistic, balanced lifestyle, community college physical education programs do not seem to be putting research into practice in their curricula. The 1984 study by Vastine anticipated a trend toward preventive health care (wellness) rather than disease treatment. A lack of research exists in the literature concerning community college physical education programming in which wellness is implemented on higher education campuses. No follow-up study has been done to confirm Vastine's theory that a wellness trend exists. No studies have been conducted to determine the effect that Kenneth H. Cooper, a preventive medicine and wellness pioneer, has had on the teaching of a wellness philosophy in community college physical education courses. Although Cooper is recognized as a leader in the fitness and wellness movement, there are no studies linking his theories and ideas to higher education. Beginning with the early years of Cooper's career when he trained astronauts (Fleming, 1989/1990), Cooper's research into aerobic exercise has led to his present status as an international expert in wellness programs (O'Connor, 1992).

Hundreds of articles have been written about Kenneth Cooper. He has been selected as one of the Top 10 Health American Fitness Leaders (Lautenslager, 1992a) and the "father of the aerobics movement" (Wright, 1994). In addition, a review of articles in the Dallas Morning News from 1990-1995 reveals that Cooper is also a very successful businessman heavily involved in local charities and organizations in the Dallas/Ft. Worth metroplex. Articles written by Cooper are found in The Saturday Evening Post, Working

Mother, Health, Modern Maturity, Journal of the Health, Physical Education and Recreation, Research Quarterly, Journal of American Medical Association, and The Ladies Homes Journal.

Cooper has also published 13 books. Sequels to Aerobics followed in 1970, beginning with The New Aerobics, which was geared toward exercisers over the age of 40 and placed an increased emphasis upon safety. In 1972 a book to meet the special needs of women, Aerobics for Women, was co-authored with Cooper's wife Mildred (M. Cooper & K.H. Cooper, 1972). In 1977 Cooper's The Aerobics Way incorporated previous programs with the dissemination of the latest research concerning the need for exercise and good health. The death of Jim Fixx, a well-known marathon runner who died while jogging, prompted Cooper (1985b) to write Running Without Fear. In 1982 Cooper wrote The Aerobics Program for Total Well-being to emphasize the importance of exercise, diet and emotional balance. Kid Fitness was written by Cooper's (1994) attempt to encourage and motivate parents to emphasize exercise and nutrition for children. He wrote a series of books to tailor programs of preventive medicine for individual needs including Controlling Cholesterol in 1988, Preventing Osteoporosis in 1989, and Overcoming Hypertension in 1990 (Cooper, 1988b, 1989d, 1990b). Cooper's (1994a) Antioxidant Revolution promised to delay the signs of aging and reduce the risk of cancer and heart disease with a prevention program that includes antioxidant vitamin therapy. It's Better to Believe is Cooper's (1995) most recent book.

A review of Dissertation Abstracts International revealed a study by Thomas Fleming (1989/1990), who analyzed Kenneth Cooper's promotion of healthy lifestyles.

Fleming's study, while documenting Cooper's early beginnings, does not address the contributions and impact his work has had on corporate, hospital, or school environments in preventive medicine and wellness. This absence of research literature lends credence to the necessity and value of researching Cooper's influence on the teaching of physical education in 2-year colleges.

Kenneth Cooper has left a legacy of innovations in the field of preventive medicine and wellness, but this legacy has not been documented in one singular piece of research exploring the relationship between his work and its impact on physical education programs in community colleges. The existing literature on preventive medicine and wellness provides the groundwork for a more focused study on the specific impact of Kenneth H. Cooper's theories and ideas over the past 35 years. This study provides a basis of comparison with earlier studies to document changes or discover trends in physical education curriculum at the nation's 1,400 two-year colleges.

Definitions of Terms

Aerobics--activities that require oxygen for prolonged periods and place such demands on the body that it is required to improve its capacity to handle oxygen (Cooper, 1982)

Community College--term used as designation for 2-year colleges that grant the associate degree as defined in Peterson's Two-Year Colleges (Dilts, 1994)

Emotional Health Domain--the ability to express emotions comfortably and appropriately (Bruess & Richardson, 1994)

Geographic Region West--States west of the Mississippi River

Geographic Region East--States east of the Mississippi River

Intellectual Health Domain--includes use of the resources available to expand knowledge in improved skills, increases potential for sharing with others, and engages in creative mental activities (Vastine, 1984)

Occupational Health Domain--includes feelings of comfort and accomplishment related to one's daily tasks. According to Eberst, for those employed outside the home, the aspects of a job make up occupational health (as cited in Bruess & Richardson, 1994).

Physical Education Curriculum--program of study that provides the basic instruction toward a particular degree or certification in physical education at the university and/or program that provides activity courses required for many 2-year degree programs at community colleges

Physical Education Division Director--chairman of the department or director who supervises and administers the physical education program

Physical Education Faculty--full-time faculty employee

Physical Education Program--courses that make up the physical education curriculum

Physical Education Staff--non-teaching personnel

Social Health Domain--includes good relations with others, the presence of a supportive culture, and successful adaptation to the environment (Bruess & Richardson, 1994)

Spiritual Health Domain--includes the ability to discover and express one's purpose in life; to experience love, joy, peace, and fulfillment; and to help oneself and others achieve full potential (Chapman, 1987, cited in Bruess & Richardson, 1994)

Wellness--integrated method of functioning that maximizes an individual's potential (Showalter, 1994) in different dimensions (e.g. spiritual, emotional, vocational, social, intellectual, and physical)

Limitations

The results of this study were limited by the subjectivity of the expressed opinions of the respondents and by the limitations that are inherent in the survey approach to research.

Delimitations

The study was delimited to a sample of 2-year community college institutions of higher education in the United States and to responses from physical education division directors or staff.

CHAPTER 1 REFERENCES

Barbato, J. (1988, March 25). The father of the fitness boom. Publishers Weekly, 20-25, (microfiche).

Bruess, C.E. & Richardson, G.E. (1994), Healthy Decisions. Wisconsin: Brown & Benchmark.

Cooper Aerobics Center. (1995a). Kenneth H. Cooper biography. [Brochure]. Dallas, TX: Author.

Cooper Aerobics Center. (1995b). Kenneth H. Cooper information packet. [Brochure]. Dallas, TX: Author.

Cooper Clinic. (1994). Books written by Kenneth H. Cooper, M.D. [Brochure]. Dallas, TX: Author.

Institute for Aerobics Research. (1992, September). The Prudential Fitnessgram [Brochure]. Dallas, TX: Author.

Cooper, K.H. (1968). Aerobics. New York: Bantam Books.

Cooper, K.H. (1969). The role of exercise. Journal of Health, Physical Education and Recreation, 40, 22-25. (University Microfilms No. 5, 0022-1473)

Cooper, K.H. (1970). The new aerobics. New York: Bantam Books.

Cooper, K.H. (1975). An aerobics conditioning program for the Fort Worth, Texas, school district. Research Quarterly, 46, 345-350.

Cooper, K.H. (1977). The aerobics way. New York: Bantam Books.

Bantam Books.

Cooper, K.H. (1984). Physical fitness programming issues for total well being. Journal of Physical Education, Recreation and Dance, 55, 35-36.

Cooper, K.H. (Instructor). (1985). Aerobics. (videotape). (Available from Word, Inc., Horizon Entertainment Group, Burbank, California)

Cooper, K.H. (1985). Running without fear: How to reduce the risk of heart attack and sudden death during aerobic exercise. New York, NY: M. Evans.

Cooper, K.H. (1986, May). Re-shape your body and re-charge your heart. Prevention Magazine, 38, 33-34+.

Cooper, K.H. (1988, January). The lower-your-cholesterol diet. Ladies Home Journal, 105, 48, 58-59 (interlibrary loan from TWU).

Cooper, K.H. (1988, April). How to control your cholesterol. The Saturday Evening Post, 260, 82-83, 86, 96.

Cooper, K.H. (1988, May/June). Cholesterol: be aware of your ratio. The Saturday Evening Post, 260, 102-103, 106-108.

Cooper, K.H. (1988). Controlling cholesterol. New York, NY: Bantam Books.

Cooper, K.H. (1988, November). Controlling cholesterol. The Saturday Evening Post, 260, 90-91, 94.

Cooper, K.H. (1988/1989, December/January). Coronary combat. Modern Maturity, 31, 78-84.

Cooper, K.H. (1989, March). Osteoporosis: Are you at risk. The Ladies Home Journal, 106, 56-58, 60.

Cooper, K.H. (1989). Oxygen and athletes. Journal of American Medical Association, 262, 264.

Cooper, K.H. (1989, April). The basics of bone. Health, 21, 80-82.

Cooper, K.H. (1989). Preventing osteoporosis. New York, NY: Bantam Books.

Cooper, K.H. (1990, April). Confronting cholesterol. The Saturday Evening Post, 262, 40, 92.

Cooper, K.H. (1990). Overcoming hypertension. New York, NY: Bantam Books.

Cooper, K.H. (1991, March). Boning up. The Saturday Evening Post, 263, 18-20, 96.

Cooper, K.H. (1991, September). Countdown to lower blood pressure. Prevention, 43, 37-43+.

Cooper, K.H. (1991). Kid fitness: A complete shape-up program from birth through high school. New York, NY: Bantam books.

Cooper, K.H. (1992, January). Eating for energy. Working Mother, 15, 77-82.

Cooper, K.H. (1992, January/February). Give our kids a healthy lunch. The Saturday Evening Post, 264, 48-49, 74.

Cooper, K.H. (1992, May/June). Time to prevent osteopososis. The Saturday Evening Post, 264, 24, 102-103.

Cooper, K.H. (1994). Antioxidant revolution. Nashville, Tenn.: Thomas Nelson.

Cooper, K.H. (1994). The inventor of aerobics tells all about antioxidants. Health Confidential, 8 (12), 1-2.

Cooper, K.H. (1995). It's better to believe. Nashville, Tenn.: Thomas Nelson.

Cooper, K.H. (1995, December). Dont' rust out too soon: The antioxidant revolution. In S. Johnson (Chair), The sports medicine symposium. Symposium conducted at Institute for Aerobics Research, Dallas, Texas.

Cooper, K.H. & Cooper, M. (1972, 1988). The new aerobics for women. New York, NY: Bantam Books.

Cooper, M. & Cooper, K.H. (1972-1977). Aerobics for women. (13th printing). New York, NY: Bantam Books.

Fleming, T. M. (1990). The aerobic years: An historical analysis of the work of Kenneth H. Cooper and his influence in promoting healthy lifestyles (Doctoral dissertation, Texas A&M University, 1989). Dissertation Abstracts International, 51/01, 84.

Hall, C. (1993, November 21a). Cooper still gets a workout spreading gospel on aerobics. The Dallas Morning News, p. H1.

Kunde, D. (1992, November 4). Telecom center makes fitness fun. The Dallas Morning News, p. D1.

Lautenslager, G. (1992a, April 24). Law student struggles in bid to make trials. The Dallas Morning News, p. B13.

Medina E. (1993). The effect of the Cooper Wellness Program in promoting long-term lifestyle behavior changes. (Doctoral dissertation, Loma Linda University, 1993). Dissertation Abstracts International, 54/11, 5618.

Melograno, V. & Klinzing. J. (1992). An orientation to total fitness. Iowa: Kendall/Hunt.

O'Conner, C. (1992, April 27). The evolution of Euro-fitness. The Dallas Morning News, p. C1.

Seiger, L., Vanderpool, K., & Barnes, D. (1995). Fitness and wellness strategies. Wisconsin: Brown & Benchmark.

Showalter, M. (1994). An assessment of student wellness needs and perceptions as compared with the wellness perceptions of student affairs professionals. (Doctoral dissertation, The University of Mississippi, 1994). Dissertation Abstracts International, 55/07, 1832.

TEKS Committee, (1996). Unpublished report by the State Board of Education Texas Essential Knowledge and Skills Committee, Austin, Texas.

Vastine, P. (1984). A survey of wellness programs in junior and community colleges in the United States. (Doctoral dissertation, 1984). Dissertation Abstracts International.

Wright, J. (1994, March 13). Walk the walk, you can live to talk the talk. The Dallas Morning News, p. J7.

CHAPTER 2

REVIEW OF THE LITERATURE

A review of the literature for the study begins with a historical background of the concept and philosophy of wellness. The focus of this study concerns the impact on community college physical education programs of Kenneth H. Cooper's work in preventive medicine and wellness. In the second section a large portion of the literature review centers on the research issues promulgated by Cooper and his philosophy of preventive medicine and wellness. The research by other noted experts in the field of preventive medicine and wellness is reviewed in the third section. The fourth section is a discussion of the previous wellness studies that have been conducted on college campuses. The fifth section examines the role of governance and the factors that influence the development of physical education curricula in the nation's 2-year colleges.

Historical Background

Historically, the concept of wellness was considered necessary for survival as past civilizations realized the benefit of strength and endurance in military endeavors (Zeigler, 1979). Through the years modern cultures have developed activities to continue the tradition of maintenance of a healthy body. By 1860 formal physical education programs were developed in American colleges such as Harvard, Yale, and Amherst (Zeigler, 1979).

Physical education programs in colleges moved from a military emphasis in the 1800s to recreation, field sports, and athletics in the early 1900s. The first college athletic association was organized at Princeton in 1876. In 1870 the first classes in physical education were offered for men at the University of Wisconsin. A few years earlier, in 1868, Vassar college offered physical activity classwork for women (Lee, 1983). Events during the latter 20th century have affected physical education and its activities. The recreation movement, the civil rights movement, and the physical fitness movement all spread from mainstream America to America's colleges. Disease prevention instead of disease treatment became an important impetus that launched the fitness movement, affecting the curricula and activities that are now taught in community colleges.

Defined as "an enhanced dimension of health involving good physical self-care, using one's mind constructively, expressing one's emotions effectively, interacting creatively with others, and being concerned about one's physical and psychological environment," wellness has become a popular catch phrase in community college physical education programs (Carroll & Miller, 1982, as cited in Melograno & Klinzing, 1992, p. 2). Showalter (1994) defined wellness as an integrated method of functioning that maximizes an individual's potential in different dimensions. Models of wellness components include the spiritual, emotional, intellectual, physical, vocational, and social dimensions (Seiger, 1995).

A review of recently published physical education textbooks revealed an acceptance of the concept of wellness in textbooks available to college physical

education programs. Of the current textbooks reviewed, most are published by leading companies such as Morton, Mosby, Kendall/Hunt, Brown/Benchmark, and Mayfield include wellness as an umbrella over physical fitness and health. Recent research pointing to lifestyle behavior as a leading cause of mortality (Melograno & Klinzing, 1992; Rosato, 1986) has spurred the wellness movement that began as a fitness boom that swept across the country in the 1970s, begun in part by the publication of Kenneth H. Cooper's 1968 bestseller Aerobics.

Kenneth Cooper's Research, Wellness Concept, and Philosophy

In 1970 a relatively unknown doctor began a preventive medicine practice in Dallas, Texas. Kenneth Cooper's (1968) first book, Aerobics, began a controversial career that has spanned 3 decades. In 1971 harsh criticism from the medical community elicited a response from the Dallas County Medical Society challenging Cooper's methods for testing for heart disease (Dallas County Medical Society, personal communication, January 26, 1996). Although Cooper successfully defended the value of treadmill stress testing to the local medical society, it was years before the procedure was accepted as a standard of care for diagnosing heart disease. His decision to treat cardiac patients by recommending aerobic exercise met with additional resistance from the medical community. For the previous 3 decades, "the treatment of ischemic heart disease had been a conservative medical approach utilizing coronary vasodilators, dietotherapy, and cholesterol-lowering agents" (Kemp, Ellestad, Beland, & Allen, 1969, p. 40). Cooper's defense of treadmill stress testing continued through the 1980s as the medical

community at large challenged the accuracy and necessity of the test (Sheffield, 1985).

From 1970 through 1990 Cooper continued promoting preventive medicine and wellness concepts through the Cooper Aerobics Center. The publication of his books and his many speaking engagements have fueled the controversy still surrounding Cooper's research. Aerobics (1968) was followed by The New Aerobics in 1970. It was geared toward exercisers over the age of 40 and had an increased emphasis upon safety. In 1972 Cooper and his wife, Millie, coauthored a book to meet the special needs of women, Aerobics for Women (M. Cooper & K.H. Cooper, 1972). This was followed by Cooper's (1977) The Aerobics Way, which incorporated previous programs with the dissemination of the latest research concerning the need for exercise and good health. In The Aerobics Program for Total Well-being, Cooper (1982) emphasized the importance of exercise, diet, and emotional balance. Then the death of Jim Fixx, a well-known marathon runner who died while jogging, prompted Cooper (1985) to write Running Without Fear. In 1988, Cooper and his wife coauthored their second book, The New Aerobics for Women (K.H. Cooper & M. Cooper, 1988). While Aerobics for Women was written to motivate women to exercise, The New Aerobics for Women was written to bridge the gap between faddism and scientific fact. Information that was considered theoretical in 1972 was later validated as fact through 15 years of scientific research. Cooper's (1991c) Kid Fitness was written to encourage and motivate parents to emphasize exercise and nutrition for children. Cooper published a series of books to tailor programs of preventive medicine for individual needs. These books include Controlling Cholesterol (1988), Preventing Osteoporosis (1989), and Overcoming

Hypertension (1990) (Cooper, 1988b, 1989d, 1990b). Cooper's research that prompted this series resulted in a backlash from the medical profession. Henry Solomon, who, according to Cooper (personal communication, February 5, 1996), was a particularly harsh critic of his cholesterol research, wrote a book titled The Cholesterol Myth.

Cooper's (1994a) Antioxidant Revolution postulated that it is possible to delay the signs of aging and reduce the risk of cancer and heart disease with a prevention program that includes antioxidant vitamin therapy.

In It's Better to Believe Cooper (1995b) provided a scientific focus on the relationship between spiritual and physical fitness. However, his philosophy of spiritual health was overshadowed by the antioxidant debate, which continues to grow through the medical community. Media coverage throughout the United States in newspapers, periodicals, and scientific journals has converged on the antioxidant theory that purports to reduce the signs of aging, heart disease, and cancer.

An in-depth examination of related literature and research data lends insight into the controversial issues of Cooper's research. The issues are discussed in chronological order, beginning with Cooper's philosophy of aerobic exercise, which was challenged by the medical community in the late 1960s and has since proved to be one of the most valuable contributions to preventive medicine (Fleming, 1989/1990). The early 1960s use of the treadmill for stress testing sparked a debate that has surfaced throughout the past 3 decades. Other issues revolve around Cooper's philosophy of the fitness of children, cholesterol, osteoporosis, hypertension, prostate cancer, and mammogram screenings. The primary focus is an examination of related literature and research data concerning

the role of antioxidants in preventive medicine and wellness, Cooper's most controversial philosophy since the publication of Aerobics in 1968. Cooper's promotion of vitamin supplements and his warnings concerning the dangers of overtraining are examined in view of current research.

Aerobic Exercise

Several factors influence optimal wellness. The benefits of aerobic exercise are discussed in relation to (a) reduction in heart disease, (b) change in lifestyle, (c) Cooper's aerobic point system that enables a person to measure his or her aerobic conditioning, and (d) the expansion of aerobic exercise.

Reduction in heart disease. When Cooper began promoting aerobics as exercise that would strengthen the heart and lungs, critics predicted that it was a dangerous fad that would cause a rise in deaths due to heart attacks (Lauerman, 1985). Cardiovascular disease claimed an estimated 987,500 U.S. lives in 1986, although statistics show a steady decline in cardiovascular disease (Fackelmann, 1989). As shown in Table 1, heart

Table 1

Age-Adjusted Death Rates for Selected Causes of Death, United States, 1950-1992

Cause of death	1950	1960	1970	1980	1990	1992
Diseases of the heart	307.2	286.2	253.6	202.0	152.0	144.3

disease decreased from 307 deaths (per 100,000 resident population) in 1970 to 144 deaths in 1992 (National Center for Health Statistics, 1995). The decrease represents a 44% drop in deaths due to heart disease. Heart disease had dropped only 18% in the previous 2 decades, from 1950 to 1970, as shown in Table 1.
1995).

Richard Bohannon, former Surgeon General of the United States Air Force, whose authority allowed Cooper the opportunity to complete his aerobic research while serving in the U.S. Air Force, said in an interview with Fleming(1989/1990) that medical schools did not seriously consider incorporating prevention into clinical medicine prior to 1940. Preventive medicine focused on hygiene and sanitation and the prevention of communicable diseases.

Cooper has admitted that awareness of the concept of wellness has been a factor in declining heart disease, according to Lauerman (1985). Cooper's comments were as follows:

> I wouldn't for a moment say that the remarkable decrease in deaths from heart attacks and increase in longevity is strictly the result in the change in exercise habits and, more specifically, the result of the aerobics book. But I would say people are more aware of the concept of 'wellness' and what they can do for themselves as opposed to relying upon their physician or their government or somebody else for helping them maintain good health. (p. 3)

In his Overcoming Hypertension, Cooper (1990b) cited four reasons for the decrease in heart attacks: fewer smokers, better control of high blood pressure, changes in diets, and changes in exercise habits. As shown in Table 2, in 1965 there were 42 %

of adults 18 years of age and older who were smokers (National Center for Health Statistics, 1995). By 1993 the number of adult smokers had dropped to 25%. Smoking decreased from 51% of male smokers in 1965 to 27% in 1993. Female smokers numbered 34% in 1965, with a slight decrease to 22% in 1993.

Table 2

Current Cigarette Smoking by Persons 18 Years of Age and Over, According to Gender, United States, 1965-1993

Gender	1965	1974	1979	1983	1985	1987	1988	1990	1991	1993
	Percentage of persons 18 years of age and over									
All persons	42.3	37.2	33.5	32.2	30.0	28.7	27.9	25.4	25.4	25.0
All males	51.6	42.9	37.2	34.7	32.1	31.0	30.1	28.0	27.5	27.5
All females	34.0	32.5	30.3	29.9	28.2	26.7	26.0	23.1	23.6	22.7

Note. Data for 1992 and beyond are not strictly comparable with data for earlier years.

Cooper attributed the change in the state of health of individual Americans between 1968 and 1979 to the increased commitment of Americans to aerobic exercise. Between 1968 and 1977, a 23% decrease in deaths occurred from heart attacks, with a 36% decrease in deaths from strokes and a 48% decrease in deaths from hypertensive disease (Cooper, 1982). The age-adjusted death rate for stroke between 1980 and 1992 declined 36%, continuing the downward trend of the 1970s (National Center for Health Statistics, 1995).

Changes in lifestyle. According to Cooper (1982), "the number of adults who

exercise regularly in the United States went up dramatically from 25% prior to 1968 to 47% in 1977" (p. 33). Charles Corbin (1994) of Arizona State University agreed that in 1961 only 24% of adults were active during their free time. By 1994 more than 50% reported to the Gallup Poll that they were active. Only 22% of adults participate in a cardiovascular workout at least 30 minutes a day 5 days a week. Of persons age 6 and older, 24% do not participate in any physical activity.

Changes in lifestyle since the 1960s have resulted in lower serum cholesterol levels among the general population, but there has been an increase in the number of overweight persons. As shown in Table 3, the percentage of the population age 20 and older that is overweight has increased from 24% in 1960 to 33% in 1991 (National Center for Health Statistics, 1995). The 55-64-year-old females were the most overweight group in 1960, increasing from 43% of the population to 48% by 1991. The most overweight male group in 1960 was the 65-74-year-olds, who increased from 21% to 42% by 1991. This 21% increase was the largest of any group.

Table 3

Overweight Persons 20 Years of Age and Over, According to Sex and Age, United States, 1960-62, 1971-74, 1976-80, 1988-91

Sex and age	1960-62	1971-74	1976-80	1988-91
20-74 year, age adjusted	Percentage of population			

(table continues)

Sex and age	1960-62	1971-74	1976-80	1988-91
Both sexes	24.4	24.9	25.4	33.3
Male	22.9	23.6	24.0	31.6
Female	25.6	25.9	26.5	35.0
Male				
20-34 years	19.6	19.2	17.2	22.2
35-44 years	22.8	29.4	28.9	35.3
45-54 years	28.1	27.6	31.0	35.6
55-64 years	26.9	24.8	28.1	40.1
65-74 years	21.8	23.0	25.2	42.9
75 years and over				26.4
Female				
20-34 years	13.2	14.8	16.8	25.1
35-44 years	24.1	27.3	27.0	36.9
45-54 years	30.7	32.3	32.5	41.6
55-64 years	43.2	38.5	37.0	48.5
65-74 years	42.9	38.0	38.4	39.8
65 years and over	- - -	- - -	- - -	30.9

Note. Excludes pregnant women. Overweight is defined for men as body mass index greater than or equal to 27.8 kg/m, and for women as body mass index greater than or

equal to 27.3 kg/m. These cut points were used because they represent the sex-specific 85th percentiles for persons 20-29 years of age in the 1976-80 National Health and Education Examination Survey. Height was measured without shoes; two pounds are deducted from data for 1960-62 to allow for weight of clothing.

The aerobic point system. The aerobic point system on which Cooper based his exercise prescription was developed from studies of thousands of airmen. Cooper had an almost unlimited supply of research subjects, which allowed him to solve the exercise mystery of how much exercise is necessary to produce cardiovascular benefits. He devised a precise system for calibrating levels of cardiovascular fitness and prescribing exercise to improve those levels (Brant, 1987). The point system is an estimate of intensity and duration compared to mets, which are an estimate or measure only of intensity. Cooper developed the point system in the 1960s for only about six different exercises. By 1982 he had expanded the number of exercises to 31.

A change occurred between 1968 and 1982 in the number of points given for a specific exercise and the number of exercises. Running a mile in 8 minutes three times with a rest break between each mile run was different from running 3 miles without a break. Cooper changed the point system to reflect the importance of duration by giving additional points for longer distances in shorter amounts of time. By 1970 Cooper's second book included endurance points. For example, covering 3 miles in less than 24 minutes was changed from 15 to 17 points. The first change from 1968 to 1970 dealt with only two exercises--walking and running. Cooper does not concur with the theory

minutes was changed from 15 to 17 points. The first change from 1968 to 1970 dealt with only two exercises--walking and running. Cooper does not concur with the theory that a person receives the same benefit from exercising for 10 minutes three times a day as that received from exercising for 30 minutes once a day. By 1982 Cooper had added additional exercises to his point system.

How did Cooper decide how much a point was worth? Point values were based upon oxygen consumption. Bruno Balke, Cooper's mentor in the Air Force in the early 1960s, was involved in maximum oxygen consumption research for many years (Fleming, 1989/1990). Balke's 15-minute field test was the foundation for Cooper's development of the 12-minute field test. Realizing that accurate assessment of aerobic fitness and prescription of exercise must be based upon reliable research data, Cooper began to build his aerobic concept. His research conducted at Harvard while he pursued a master's in public health focused on maximum oxygen consumption during exercise, and his basic concept of aerobic training came out of this work. Cooper's research led to the development of the new U.S. Air Force physical fitness program, with approximately 800,000 members of the Air Force participating. Soon the Canadian Armed Forces as well as those of Sweden, Austria, Finland, Korea, and Brazil, were interested in adopting Cooper's conditioning program (Cooper, 1970). One major change in Cooper's philosophy occurred in 1972 when he retracted his earlier statement that cardiovascular fitness would not automatically decrease the risk for heart disease if other behavioral risk factors were not addressed (Fleming, 1989/1990).

promoting aerobic dance through the United States. Drake began aerobic dancing on television in the early 1960s through a program called Dancercise. Her Dancercise was influenced by Sorenson, who was a pom pom girl from UCLA when she met Cooper in 1968. Sorenson, intrigued by Cooper's idea of aerobic exercise, choreographed dances that were set to music. Her aerobic dancing led to the beginning of high-impact aerobics (Sorenson, 1979).

Lauerman (1985) noted that aerobic exercise spread to other countries, such as Brazil. In Brazil the word aerobics does not translate into Portuguese. Brazilians call aerobics coopering. Cooper is a celebrity in Brazil. In Germany, his books are bestsellers, and he is constantly approached by entrepreneurs from Hungry, Poland, Czechosolovakia, Germany, and the former Soviet Union (O'Conner, 1992).

In the early 1970s, as word of aerobic exercise spread to the public, Cooper was a source of inspiration, medical legitimacy, and reassurance (Brant, 1987). He has received many local leadership awards for his role in preventive medicine. The Award for Excellence from the Dallas White Rock Board of Trustees, sponsored by the Staubach Company, was given to Cooper for positive effects of health and fitness through his outstanding personal effort, determination, commitment, and courage (Lautenslager, 1993). A junior high school in Oklahoma City was named after him, which he considers his greatest award (personal communication, April 24, 1995). In 1995 Cooper received an award from the U.S. Navy for his preventive medicine work with the military. Health Trac awarded him $50,000 in recognition of his accomplishments, and Cooper donated the prize money to his research institute (personal communication, April 24, 1995).

Leadership awards have been given to other individuals in honor of Cooper. In 1990 Tom Landry, former Dallas Cowboys football coach, received the annual Kenneth H. Cooper Prize for Aerobics Leadership from the Dallas-based Tyler Corporation (Briefing, 1990). The award is given annually to an individual who has made outstanding contributions to preventive medicine through physical fitness. The prize was a $10,000 donation to the Institute for Aerobics Research in the recipient's name.

Among the national awards given to Cooper is the 1992 Top Ten Healthy American Fitness Leader Award, sponsored by the U.S. Junior Chamber of Commerce (Lautenslager, 1992b). The New York Medical College called Cooper the "leader of the international physical fitness movement who has motivated more people to exercise in pursuit of good health than any other person" (SerVaas, 1989, p. 28). He has received honorary degrees from Oral Roberts University in Tulsa, Oklahoma; Susquehanna University in Pennsylvania; New York Medical College, State University of New York in Syracuse; and Baylor University in Waco, Texas.

In 1989 Cooper spent 3 weeks in Europe, where he met with a physician from Poland, which had a 36% increase in deaths from heart attacks in the previous 10 years. Cooper found that the Polish people were interested in his preventive medicine ideas and concepts (SerVaas, 1989). Speaking engagements all over the world allow Cooper to promote his philosophy and ideas. Also in 1989, in Beijing and Shanghai, China, Cooper spoke at a medical school (SerVaas, 1989).

Cooper's Vision of an Aerobic Prescription

Cooper pointed to the success of his career in preventive medicine as a result of his priorities in life. He said that God is first, then his family, and finally his work. He also said that work has a habit of taking over the number one spot (Moreau, 1989). In 1982, according to Moreau Cooper said, "A large part of my original dream of making Americans more aware of the importance of aerobic-based preventive medicine is in the process of being realized" (p. 33).

As aerobic exercise expanded, resources for aerobics instructors became plentiful. Organizations were formed to provide information and certify instructors for aerobic exercise. The Cooper Aerobics Center has been a source of training for instructors through the institute's continuing education division.

Treadmill Stess Testing

In 1960 the first treadmill stress tests on astronauts were developed with the help of Balke's research at Lackland Air Force Base in San Antonio (Fleming, 1989/1990). Before leaving the military, Cooper had performed over 5,000 maximal stress tests on military personnel. A stress test is an "electrocardiogram taken while a person walks briskly on a treadmill" (Reice, 1985, p. 150). In 1971, with the only treadmill for use in stress testing in Dallas, Cooper was called before the Dallas County Medical Society Board of Censors. The medical community doubted the validity of using the treadmill for stress testing. According to Fleming, after meeting with the board, Cooper was allowed to continue his use of the treadmill, but he was criticized by some in the medical

community for being an internist rather than a board-certified cardiologist.

In 1985 Cooper was quoted in the Chicago Tribune as saying that a treadmill stress test must be administered by a knowledgeable physician (Lauerman, 1985). Cooper said that his clinic's research showed that 39% of the abnormal heart readings are missed if the subject is not brought to a maximum heart rate during a stress test. By 1985 Cooper had performed over 80,000 maximal performance treadmill stress tests, with at least 80% reliability (Lauerman, 1985). He considered the treadmill stress test as a fundamental tool of his trade (Brant, 1987). Cooper has noted that there are many variations in treadmill stress-testing techniques. The problems associated with the administration of the treadmill stress test would improve as new techniques were developed (Weinstock, 1992).

Uly Vlamides was one of Cooper's first patients in Dallas to take a treadmill stress test. Vlamides, after reading Cooper's Aerobics (1968), quit smoking and began a weight-reduction program. He said this:

> No one in Dallas had even heard of treadmills. I supported his program and the byproduct was that I don't have heart trouble, high cholesterol or high blood pressure. If I hadn't read his book, I'd probably be dead by now. (as cited in Jackson, 1990, p. 3C)

Cooper recommends that a stress test be taken when an individual reaches age 35. The second test should be at age 40 and every 3 years after that (Reinhold, 1987). On July 20, 1984, Jim Fixx, the expert marathon runner, died at age 52 while running (Cooper, 1985b). According to Reice (1985), in 1983 Cooper had encouraged Fixx to

have a treadmill stress test, but Fixx had refused. Fixx's autopsy showed three-vessel obstructive coronary artery disease. Cooper (1985b) wrote, "If Jim Fixx had chosen to be tested, there is a very good chance that we would have noticed his coronary artery disease during the examination. Then, we could have prescribed treatment that might well have saved his life" (p. 23).

A review of the literature found that, since the 1960s, treadmill stress testing has improved, with the development of methods that improve the validity and reliability of the test (Weinstock, 1992). A 1969 research study evaluated the medical and surgical treatment of coronary insufficiency using the maximal treadmill stress test (Kemp et al., 1969). Results found that the method of evaluation by treadmill stress testing may be as valid as, or possibly more reliable than, using angiographic changes as an indicator of improvement (Kemp et.al., 1969). Sheffield (1985) reviewed the current research surrounding the use of the treadmill for stress testing and reported the following:

> It is reasonable to expect that a very good test will yield quantitative results concerning the general adequacy of left ventricular perfusion, but beyond that, accurate anatomical prediction of coronary artery disease is either a matter of good fortune or the application of a scientific method not yet generally understood. (p. 534)

According to Weinstock (1992), researchers at Duke University Medical Center in North Carolina have developed a simple formula that can convert test data into a single numerical estimate of a patient's risk of death from heart disease. The formula was based on the treadmill tests of nearly 3,000 people. The Duke researchers tried to

standardize the treadmill test so that physicians with different levels of experience and understanding of the heart could reach similar results (Weinstock, 1992).According to Dallas cardiologist, Joe D. Goldstrich (1994), a treadmill stress test is recommended for individuals over 35 and for those with risk factors for coronary heart disease who are beginning an exercise program.

Kid Fitness

Kenneth Cooper's (1991c) Kid Fitness placed the blame for our children's health problems on the schools and on parents. The lack of daily physical education, the television and video habits, and the fast food diets of our children were identified as the culprits in the decline of "kid fitness."

Children are becoming more unfit each decade, prompting Cooper (1991c) to comment that today's youth are at a higher risk for heart disease than the youth of the previous decade. As shown in Table 4, a 1987 study of 22,000 children that was conducted at the Harvard School of Public Health found a 54% increase in obesity from 1960 to 1987 in children ages 6 to 11 and a 39 % increase in ages 12-17.

Table 4

Increase in Obesity of Children, 1960 and 1987

	percent increase in obesity
Ages 6 to 11	54
Ages 12 to 17	39

Note. Obesity was defined as the child's being 20% above the ideal weight for his or her age, sex, and height.

As shown in Table 5, the 1987 National Children and Youth Fitness Study reported that one third of our youths, ages 10 to 18, did not engage in sufficient physical activity to provide aerobic or endurance benefits (Cooper, 1991c). A study conducted in 1989 by the Amateur Athletic Union and Chrysler Corporation found that only 32% of children ages 6 to 17 met minimum standards for cardiovascular fitness, flexibility, and abdominal and upper-body strength.

Table 5

Minimum Standards Met for Cardiovascular Fitness, Flexibility, and Abdominal and Upper-Body Strength, 1981 and 1989

	Percentage meeting minimum standards	
Age of children	1981	1989
6 to 17	43	32

Forty-three percent of children met the minimum standards in 1981. The 1981 and 1989 studies indicate a downward trend in the fitness levels of children ages 6 to 17. Research at the Cooper Institute revealed that 30 to 35% of school-age children, are at risk for heart or circulatory disease and for premature death as adults (Cooper, 1991c). As shown in Table 6 , studies at the institute indicate that, at age 7, of the girls studied, 86% could pass a basic 1-mile run test and 57% could pass an upper-body strength test.

86% could pass a basic 1-mile run test and 57% could pass an upper-body strength test. By age 15, only 49% could pass the 1-mile run, and 27% could pass the upper-body strength test. Of the male 7-year-olds, 76% passed the 1-mile run test, and 60% passed the upper-body strength test. At age 15, only 62% of the boys met minimum standards for the 1-mile run, and 50% passed the upper-body strength test.

Table 6

1-Mile Run and Upper-Body Strength Test, Boys and Girls Ages 7 and 15

Gender	1-mile run test		Upper-body strength test	
	Percentage passing test			
	Age 7	Age 15	Age 7	Age 15
Girls	86	49	57	27
Boys	76	62	60	50

Preventive Medicine

Through a series of articles and books, Cooper has promoted his philosophy and research directed toward preventing cholesterol problems, osteoporosis, and hypertension. His three-book series was published in 1988, 1989, and 1990, respectively (Cooper, 1988b, 1989d, 1990b).

Controlling Cholesterol. Cooper's involvement with cholesterol research began in the early 1970s when he first established the Aerobics Center in Dallas. In the 1980s he

as a testing site for a cholesterol-lowering drug produced by a major pharmaceutical company, hosting an international conference on cholesterol issues of the 1980s, establishing a Lipid Problems Clinic, and conducting ongoing research at the institute based on the extensive data repositories of patients (Cooper, 1988d).

To promote his cholesterol philosophy, Cooper wrote a number of articles in popular magazines such as Ladies Home Journal , The Saturday Evening Post, and Modern Maturity. He promoted the idea that a change in lifestyle would reduce the risk of coronary heart disease by reducing a person's low density lipids (LDL) cholesterol. One controversial issue regarding Cooper's cholesterol research involved the amount of high density lipids (HDL) produced by aerobic exercise. HDL is considered the good cholesterol, and LDL is the bad cholesterol that causes coronary disease. High levels of HDL are associated with lowered risk of cardiovascular disease. Cooper supported the idea that moderate exercise results in a significant increase in HDL levels. As shown in the research, Cooper promoted the idea that endurance runners may reach a plateau that limits how much their cholesterol will rise with aerobic exercise (Cooper, 1988d).As shown in Table 7, the serum cholesterol level among persons age 20-70 dropped from 31% in 1960 to 19% in 1991. Males dropped 9 percentage points from 28 to 19% during the same time period. The cholesterol level of females dropped 14 percentage points from 34 to 20% during 1960 to 1991.

Cooper noted controversial findings from the Lipid Research Clinics Program Prevalence Study, which reported that fitness levels as measured by treadmill exercise tests were not significantly related to HDL cholesterol levels for either men or women

He challenged the study's results, stating that the findings were based on submaximal

Table 7

Serum Cholesterol Levels Among Persons 20 Years of Age and Over, According to Gender, United States, 1960-62, 1971-74, 1976-80, 1988-91

Gender	1960-62	1971-74	1976-80	1988-91
	Percentage of population with high serum cholesterol			
Both sexes	31.8	27.2	26.3	19.7
Male	28.7	25.8	24.6	19.0
Female	34.5	28.2	27.6	20.2

Note. High serum cholesterol is defined as greater than or equal to 240 mg/dl (6.20 mmol/L). Risk levels have been defined by the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, November 1987

stress testing instead of maximum heart rates. Testing conducted at the Cooper Institute is based on maximal or near-maximal level heart rates. Peter Wood, William Haskell, and Steven Blair's 1988 study reached the conclusion that a threshold at about 8 miles per week would result in a better cholesterol balance (as cited in Cooper, 1988d). When Amby Burfoot (1995), editor of Runner's World, wrote about the cholesterol controversy, he based much of his information on the National Runners' Health Study conducted by epidemiologist Paul Williams. Williams's 1991 study was based on responses to a

questionnaire published in Runner's World. Williams's study showed that runners continue reaping cardiovascular benefits all the way up to 50 miles per week. After reviewing six other research studies, Williams also concluded that benefits such as increased HDL cholesterol levels improved the more one exercises. Williams's study contradicted Cooper's research that showed diminishing returns or at least a plateau effect of increased aerobic exercise. Williams found that, as mileage increased, good HDL cholesterol increased significantly, whereas triglycerides, body mass, and the ratio of total cholesterol to HDL all decreased significantly (Bean, 1995). Comparing Cooper's 8-mile plateau data to his own study, Williams found that persons who ran fewer than 10 miles a week reaped a 15.9% higher level of HDL than nonrunners. One limitation of Williams's study was the use of a written response questionnaire from 7,000 male runners recruited from the readers of Runner's World. Cooper's research was based on actual participant activity from data collected through the Cooper Clinic (Bean, 1995).

Preventing osteoporosis and overcoming hypertension. Cooper's (1989d) second volume in the Preventive Medicine Program, Preventing Osteoporosis, was published with little or no effect on the medical community. A review of the related literature revealed no opposition to Cooper's explanation of the dangers of osteoporosis. He explained how diet, exercise, calcium supplements, hormone replacement therapy, and life-style strengthen bones. He promoted prevention of osteoporosis through his book and a number of articles, such as "Time to Prevent Osteoporosis" (1992c), "The Basics of Bone" (1989a), "Osteoporosis, Are You at Risk?" (1989b), and "Boning Up" (1991a).

Cooper's third book in the preventive series was Overcoming Hypertension (1990b). Cooper presented a medically sound prescription of proper diet, exercise, relaxation, and life-style adjustments to lower one's blood pressure without drugs. In an interview with the researcher, Cooper related the early years of controversy as he began a preventive medicine practice in Dallas. The Preventive Medicine Program series of books marked the least controversial of his career. Cooper said, "It took time to be received, as you can tell from the criticism and the bitterness that we have had here in the Dallas area, but that is past tense now (personal communication, April 24, 1995).

Mammogram screenings. In the late 1970s Cooper started doing mammograms on a regular basis and found that cancer of the breast could be detected long before it caused any major symptoms (Kenneth H. Cooper, personal communication, April 24, 1995). He was criticized by the medical community for doing mammographies; he was told that he was going to cause more breast cancer than he discovered. In 1983 the National Cancer Institute's spokesperson, Richard Costlow, said that mammography is more appropriate for women who are at high risk of developing breast cancer--women over the age of 50 or women with a family history of the disease (Seligmann, 1983) Current evidence indicates that free radicals play a prominent role in the incidence and development of breast cancer, and natural protectors include vitamins C and E (Thangaraju, Vijayalakshmi, & Sachdanandam, 1994).

Breast cancer increased 16% between 1980 and 1992 for black women, and during the same period, cancer of the breast decreased 5% for white women. In 1992 the

age-adjusted death rate for breast cancer for black women was 24% higher than the rate for white women ((National Center for Health Statistics, 1995). In 1950 twenty-two deaths per 100,000 resident population were from breast cancer, as opposed to 21 deaths in 1992. But the rise in breast cancer deaths from 1950 to 1992 was for black females, with from 19 to 27 deaths per 100,000 resident population. One of the factors influencing breast cancer death rates is educational level.

Table 8

Use of Mammography Within Past 2 Years for Women 50 Years of Age and Over by Educational Attainment, 1987-1993

Education	1987	1990	1991	1992	1993
			Percentage of women		
Less than 12 years	18.4	36.0	39.9	40.5	46.9
12 years	30.6	52.6	57.7	59.1	60.1
13 years or more	36.8	63.2	66.3	70.5	72.5

Note. A recent mammogram was defined as within the past 24 months.

As shown in Table 8, between 1987 and 1993 the percentage of women 50 years of age and older who had a mammogram within the past 2 years more than doubled from 28 to 60% (National Center for Health Statistics, 1995). Use of mammography by women of all educational levels more than doubled from 1987 to 1993. In 1993 there was

women of all educational levels more than doubled from 1987 to 1993. In 1993 there was a significant gap in mammography screening levels by education. For women with fewer than 12 years of education, recent mammography was 35% lower than for women of higher educational attainment. Women with a high school education had 17% fewer mammogram screenings than their more educated counterparts.

Health magazine (Long, 1994) reported as follows:

> In 1993 recent clinical breast examinations increased with increasing years of education from 48% of women with less than 12 years of education to 62 percent of women with more than a high school education; and decreased with advancing age, from 61% of women 50-59 years of age to 48% of women 70 years of age and over. (p. 19)

In 1983 the American Cancer Society recommended that women in their 40s should have mammograms at least every 2 years (Seligmann, 1983). Mammograms are safer than in the 1970s when they exposed women to two or more rads of radiation, compared to one rad in 1983. The American Cancer Society changed their recommendation again by 1988 in recommending that women have a baseline screening mammogram between the ages of 35 and 39, a yearly or every 2-year screening between the ages of 40 and 49, and every year after the age of 50 ("Usefulness of PSA Level in Prostate Cancer Screening", 1995).

Prostate cancer screenings. In 1994, according to Tufts University spokesperson Robert Greenberg, an estimated 107,000 Americans were diagnosed with cancer of the

colon. Almost 50,000 persons will die from it, while another 7,000 die from rectal cancer. Early detection can reduce mortality by 30-50%. Although the digital rectal exam is used primarily to detect rectal and colon cancer, it is also the method of choice for detecting prostate cancer. Prostate cancer is the second leading cause of death from cancer among men in the United States (Oliveria, Kohl, Trichopoulos, & Blair, 1996). In the mid-1980s Cooper began doing PSAs, a prostate-specific antigen test for prostate cancer. He was criticized by the medical community for performing PSAs because he was told that he would cause too much apprehension with the many false/positive results. In the last 5 years Cooper discovered 94 cases with the PSA test in healthy men. The U.S. Preventive Services Task Force in Washington, DC has been an opponent of PSA screenings, stating that little evidence exists that early detection of prostate cancer improves outcome ("Screening for Prostate Cancer", 1990). The Canadian Task Force also advises against routine screening for prostate cancer.

Cooper's preoccupation with prevention extends to athletes, who, according to him, appear to have a higher than normal incidence of cancer. One major proponent of Cooper's PSA testing is Will Samples, a masters runner who is alive today, possibly because of a routine PSA screening test Cooper conducted in 1984. Cooper introduced Samples to running in 1971, which led to his developing into Dallas's most versatile masters runner (Lautenslager, 1991). As cited in Shephard (1993), Polednak in 1976 reported the findings of a study that showed a small but statistically significant overall increase of cancer deaths among athletes who lettered in major sports. Minor athletes who did not letter in the sport were at an intermediate level of risk. Shephard reported

that Paffenbarger's study found a reduced risk of rectal cancer and colon cancer among Harvard alumni athletes, but an increased vulnerability to prostatic cancer. According to Paffenbarger's and Polednak's studies, the risk of prostate cancer is higher in U.S. major athletes than in the general population. One factor that may predispose athletes to cancerous conditions may be environmental effects such as ultraviolet light, steroid abuse, and airborne pollutants. Another factor could be the high energy, protein-rich diet that many athletes eat. In a study by Nauss, diet has been suggested as a risk factor for intestinal tumors (as cited in Shephard, 1993).

A major factor associated with prostate and other cancers in athletes is the production of free radicals caused by excessive overtraining. Many noted athletes have died from prostate cancer, including the running guru, George Sheehan (1990). Proponents of Cooper's PSA screening consider the test a major step forward in the fight against prostate cancer. In 1950 only 13.4 deaths per 100,000 residents were due to prostate cancerm compared to 16.6 deaths in 1992 ((National Center for Health Statistics, 1995). Prostate cancer tends to strike men over age 50, and the risk increases with age (Skerrett, 1994); it is the most frequently diagnosed cancer in men. In 1991 the age-adjusted incidence rate for prostate cancer was higher for black men than white men by one third. The survival rate for black men is lower than for white men, due partly to the fact that black men are less likely than white men to be diagnosed at localized or regional stages of the disease (National Center for Health Statistics, 1995). Prostate cancer survival rates improved from 1974 to 1990: 14% for black males and 20% for white males. The number of new cases per 100,000 population for prostate cancer in

Although more incidence of prostate cancer is occurring, the survival chances are improving if there is early discovery. The prostate-specific antigen test can discover tumors that may go unnoticed with a digital rectal exam (Skerrett, 1994). The PSA test, which was originally developed in the 1980s as a forensic tool to identify semen, measures the amount of a prostate-produced protein in the blood. Skerrett noted that the popularity of the PSA test was encouraged by national figures such as Robert Dole, who opened his speech at the 1992 Republican Convention with a plea for men to have a PSA test done. Deaths of celebrities such as Bill Bixby spurred men to have the test. Three powerful medical organizations, the American Cancer Society, the American Urological Association, and the American College of Radiology, all recommend that men over age 50 include the test in their annual physical (Badgett, 1994). The American Family Physician reported in October 1990 that the American Cancer Society and the National Cancer Institute recommend an annual digital rectal examination for both prostate and colorectal cancer beginning at age 40 ("Screening for Prostate Cancer", 1990). Robert Badgett (1994), a physician with the University of Texas Health Science Center at San Antonio, is a critic of the ACS's recommendation. He said that the society had been guilty in the past of retraction of screening guidelines for lung cancer and mammography. Badgett said that it may be a disservice for highly regarded groups such as the American Cancer Society to issue screening guidelines before there is adequate supporting evidence. Support of the American Cancer Society's recommendation came from researchers at the University of Washington, whose study showed that PSA testing is the most powerful single screening test for prostate cancer ("Study Supports PSA Plus

Rectal Exam for Prostate Screening", 1994). Curtis Mettlin, Chief of Epidemiology at the Roswell Park Cancer Institute in Buffalo, New York, said, "The test is largely responsible for the dramatic increase in reported rates of the disease. In fact, the new cases have almost doubled in four years, jumping from 106,000 in 1990 to an estimated 200,000 in 1994" (as cited in Skerrett, 1994, p. 17). Mettlin said that the PSA test is helping to detect prostate tumors earlier, before the disease has spread. According to him, two thirds are diagnosed with prostate-confined tumors.

Robert Lawrence, Chief of Health Sciences at the Rockefeller Foundation in New York, pointed out the other side of the screening issue. Incontinence, impotence, injury, and sometimes death occur either from prostate surgery or from the radiation therapy used to treat prostate tumors that may have been too small to affect a patient's life (Skerrett, 1994). Lawrence and his colleagues on the U.S. Preventive Services Task Force recommended against PSA screening in 1994. Support for Lawrence's viewpoint is reported in a 1993 study by Gerber, Thompson, Thisted, and Chodak (1993). The researchers found that, to date, no prostate cancer screening studies have reported the long-term impact of screening on disease-specific survival. A disturbing fact is that death from prostate cancer occurred in 33% of the men in the Gerber et al. study who had a normal digital rectal exam a year earlier. Only 8% of the men who were diagnosed with prostate cancer died of the disease. An implication of the study is that the digital rectal exam may not detect all tumors at a time when they are still potentially curable (Gerber et al., 1993). Chodak (1994) criticized a study by Krahn et al. (1994), who performed a one-time screen using digital rectal examination and the PSA. Krahn and his colleagues

reported that "we predict that screening will result in net harm rather than net health improvement" (as cited in Adler, 1994, p. 180; Krahn et al., 1994). Chodak criticized the study for several limitations, which included having only one screening instead of several screenings. Chodak said, "The controversies surrounding prostate cancer screening are still far from being resolved" (p. 814).

The National Cancer Institute is sponsoring a prostate study that will track about 74,000 men for 10 years. Half of the men will be regularly examined for early prostate cancer. William Catalona, Chief of Urology at the Washington University School of Medicine in St. Louis, said that the clinical trial is unnecessary and irresponsible and that an estimated 500,000 men will die from prostate cancer during the 10-year period (Skerrett, 1994). Catalona and his colleague over a period of 5 years performed PSA measurements at 6-month intervals on 10,249 men age 50 or older. They concluded that the PSA rate of change can be a useful tool in follow-up assessments for men whose initial screening for prostate cancer does not reveal disease ("Usefulness of PSA Level in Prostate Cancer Screening", 1995). Cooper's prostate cancer screening philosophy is not shared by researchers such as Adami, Baron, and Rothman (1994), who said, "To intervene in healthy people is not ethical without the widespread perception of a net benefit--the evidence for which, in our opinion, is still uncertain" (p. 960).

Research by Other Experts in the Field

Antioxidant Theory

Although many physicians add vitamin supplements to their daily diet, few are

willing to publicly go on record as recommending them to healthy patients as preventive medicine for coronary heart disease and cancer. Due to the enormous amount of related literature research concerning antioxidants, the following discussion is divided into four areas: (a) definition and benefits, (b) dietary versus supplementation, (c) Cooper's theories and ideas compared to other experts, and (d) research studies. The three antioxidants to be discussed are vitamins C and E and beta-carotene. In a search of the database Medline during the period from 1991 to 1995, the researcher found 729 references to vitamins as antioxidants. From 1985 to 1995 Medline referenced antioxidants 6,295 times. Newspaper and periodical abstracts from 1988 to 1995 numbered 330 references to antioxidants.

Definition and benefits. To understand the function of antioxidants, one must begin with the definition of free radicals. They are scavenger atoms that, having lost an electron, become electrically unbalanced (Ostgarden, 1994). They are unstable oxygen molecules in search of their missing electron. Free radicals have been implicated in heart and blood vessel disease, cancer, cataracts, and aging (Cooper, 1994a; Packer & Sullivan, 1995; Pierce, 1994; "Science Update", 1994). Free radicals regain their chemical stability by taking electrons from other molecules, causing oxidative damage (Castleman, 1994).

The English chemist and cleric, Joseph Priestley, who discovered oxygen in 1774, had questioned whether the gas might be harmful, but his lack of scientific training hampered his research. The first independent organic free radical, triphenylmethyl, was

discovered in 1900 by Russian expatriate Moses Gomberg in his laboratory at the University of Michigan (Cooper, 1994a). In 1929 methyl and ethyl free radicals were discovered by Friedrich Adolf Paneth, an Austrian chemist and W. Hofeditz, a German researcher. The destructive power of free radicals was not discovered until 1954 by two American scientists, Rebecca Gershman and Daniel L. Gilbert, who found that most of the damage to living tissue was the result of oxygen radicals. The four free radicals identified in 1954 are the hydroxyl radical, the superoxide radical, the oxygen singlet, and hydrogen peroxide. In 1968 American scientists J.M. McCord and I. Fridovich discovered a natural antioxidant enzyme, superoxide dismutase, whose primary purpose is to remove the destructive free radical superoxide. According to Cooper, the body produces endogenous antioxidants, which neutralize the free radicals to prevent them from damaging your body. When the endogenous antioxidants are overwhelmed with too many free radicals, damage occurs, causing disease. Research continued during the 1970s as Lester Packer, a biochemist at the University of California at Berkeley, identified free radical cell damage as a cause of cancer and antioxidants as the answer (Cooper, 1994a).

Vitamin E was discovered in the Life Sciences Building on the Berkeley campus in 1922 (Packer & Sullivan, 1995). The "big three" vitamins have different areas in which they are most effective as antioxidants. Vitamin E is most effective in membranes and blood lipoproteins, and vitamin C, in water-soluble compartments. Antioxidants work together. When vitamin E neutralizes a free radical and decomposes, vitamin C can recycle and regenerate the vitamin E molecule. Research as to the effectiveness of beta-carotene is continuing.

Free radicals are considered beneficial when kept under control. They fight inflammation, kill bacteria. and control the tone of smooth muscles, which regulate the working of the internal organs and blood vessels. Free radicals are produced as a result of secondhand cigarette smoke (Angier, 1993), environmental pollution, ultraviolet light, and excessive exercise (Cooper, 1994a). Thousands of free radicals are produced each day in the body as byproducts of normal metabolism. Angier wrote that the radicals, seeking an electron, can damage DNA inside cell nucleus, mitochondria, and cell membranes. They activate chain reactions, transforming stable compounds into reactive radicals. According to Angier (1993), Bruce Ames, a biochemist at the University of California at Berkeley, estimated that each cell endures 10,000 oxidative hits every day from free radicals. Ames said that oxidant by-products of normal metabolism cause extensive damage to DNA, protein, and lipids. Ostgarden reported in 1994 that "free radicals can at the very least cause cell damage that will lead to muscle soreness (p. 94).

Antioxidants that neutralize the damage of free radicals can be obtained through diet or supplementation. The three antioxidants that are the subject of this discussion are vitamins E and C and beta-carotene. These antioxidants disarm a free radical by giving it a needed electron without causing the antioxidant to become unstable. The benefits of antioxidants are varied, depending on which research studies one reviews. Benefits range from no significance to great significance in reducing risks from cancer, heart disease, aging, and a host of other diseases. Improved immunity and the slowing of tumor cancers have been linked to the benefits of antioxidants. Block and Langseth (1994) found after reviewing biochemical studies that oxidative damage contributes to several major

diseases of aging–cancer, cardiovascular diseases, and cataracts. Biochemist Earl Stadtman believes that strong evidence in test-tube studies shows that antioxidants can prevent cell damage that occurs in degenerative diseases such as Alzheimer's, arthritis, and muscular dystrophy (Murray, 1994). Researchers reported in Age and Aging that Alzheimer's patients are often deficient in vitamins A and E and the carotenoids, thereby exposing the brain neurons to increased oxidative damage (as cited in Murray, 1993).

Sies, Stahl, and Sundquist (1992) of the Institut fur Physiologische Chemie in Dusseldorf, Germany, reported that antioxidant functions are associated with lowering DNA damage, malignant transformation, and other parameters of cell damage, as well as lowering the incidence of certain cancers and degenerative diseases. The importance of antioxidants in the process of aging and the benefits of vitamin C in enhancing vitamin E's antioxidant activity were also reported. Reviews of the literature by researchers Cameron, Pauling, and Leibowitz (1979) found strong evidence that vitamin C can inhibit invasive tumor enzymes, improve the immune system, and produce measurable benefits in the prevention and treatment of cancer.

Dietary antioxidants. According to Bruce Ames (1983), chairman of the Department of Biochemistry at Berkeley, "Dietary intake of natural antioxidants could be an important aspect of the body's defense mechanism . . . . Many antioxidants are being identified as anticarcinogens" (p. 1256). Lester Packer, of the Department of Molecular and Cell Biology at Berkeley, said that recent studies make it clear that increasing levels of antioxidants in the diet lead to predictable, increasing levels of

increasing levels of antioxidants in the diet lead to predictable, increasing levels of protection against cancer and heart disease (Packer & Sullivan, 1995). Reduced risks of heart attack were found with high dietary intakes or blood levels of beta-carotene in 1993 studies by Rimm and Gey and a 1991 study by Manson (as cited in Block & Langseth, 1994). Castleman (1994) praised Block and Langseth for their significant findings showing the protective effect of diets high in fruits and vegetables. Block and Langseth's recommendations are backed by the National Cancer Institute's "Strive for Five" motto of five servings of fresh fruits and vegetables a day.

According to Packer and Sullivan (1995) , a common problem is the fact that diet alone does not provide enough antioxidant protection. The authors said that only 1 in 10 Americans consume an optimum combination and amount of antioxidants needed on any given day. A recent 1-day analysis of diets of 12,000 persons showed that 41% ate no fruit at all and only 25% ate a fruit or vegetable rich in vitamins A or C (Castleman, 1994). Studies suggest that it takes as much as seven cups of peanuts or nearly 20 cups of spinach every day to get enough vitamin E from your diet (Murray, 1994). Paul Lachance of Rutgers University calculated that an ideal diet that meets the U.S. Department of Agriculture and the National Cancer Institute guidelines would provide about 217-225 mg/day of vitamin C, 5.2-8.0 mg/day of carotene, and 17-20 a-tocopherol equivalents/day of vitamin E. Current intakes of these three antioxidant nutrients are much lower than these ideal amounts (Block & Langseth, 1994). Blood serum levels of vitamins E and C and beta-carotene may be lowered due to smoking, illness, or other stressors. According to Block and Langseth, cigarette smokers have lower vitamin C levels than nonsmokers.

Pelletier's study concurs with Block and Langseth. "Oxidants in cigarette smoke accelerate metabolic turnover of vitamin C" according to Tribble, Guiliano, and Fortmann (1993). To achieve the blood level of nonsmokers, smokers must consume at least 150 mg of vitamin C daily, compared to nonsmokers who consume the RDA of 60mg/day. According to Schectman, Byrd, and Hoffmann (1991), smokers must consume greater than 200 mg of vitamin C. Giraud, Martin,and Driskell (1995) found in their study of tobacco use that participants who smoked cigarettes or chewed tobacco had significantly lower plasma levels of vitamins C and E than non-tobacco users, although the three groups had similar dietary intakes of vitamins C and E. Giraud et al. found that tobacco users must consume 200 mg of vitamin C daily, compared to nonsmokers who consume the RDA of 60 mg/day. This finding is 50 mg higher than the results of Block and Langseth's study.

The traditional view that vitamin supplements are not needed if one eats a variety of foods was formulated at a time when experts were interested in preventing diseases caused by deficiencies, not preventing diseases caused by free radicals (Block & Langseth, 1994). No side effects from long-term ingestion of high doses of common fat-soluble and water-soluble antioxidants have been found in double-blind studies, with few exceptions. The exceptions are vitamin C, which can cause diarrhea in large doses, and beta carotene, which can turn the skin orange (Packer & Sullivan, 1995). Both side effects disappear on cessation of high levels of supplementation and are temporary. Stavric (1994), with the Food Research Division of Oontario, Canada, reviewed current research concerning dietary antioxidants and found that major health benefits for a wide

and vegetables rich in vitamins C and E and beta-carotene. It is recommended that fresh fruits and vegetables are a preferable source to cooked ones, since heat can affect vitamin C and beta-carotene (Pierce, 1994).

According to McCay, King, and Ricans, 1980), studies have shown that dietary antioxidants inhibit tumor incidence by various chemical carcinogens. The dietary fat levels of the average human diet in the United States markedly reduce the effectiveness of antioxidants as inhibitors of chemically-induced tumors. Slaga's (1995) study showed that antioxidants are much more effective inhibitors of skin tumor promotion than inhibitors of skin tumor initiation. Block and Langseth (1994) reviewed over 200 epidemiological studies that examined the relationship between fruit and vegetable intake and cancer risk. They found strong and consistent evidence that dietary antioxidants reduced risks of cancer, cardiovascular disease, and cataracts. The significant protective effects greatly outweighed the significant harmful effects.

Research has indicated that low fruit and vegetable intakes increase risk of cataracts, as shown in a study by Gauchos and Chylack (as cited in Block & Langseth, 1994). Hietanen and Bartsch's study (1994) found that the role of dietary antioxidants such as vitamin E, beta-carotene, and trace elements remains controversial. Another major finding of the study was that low intake of vitamin C and E was found in breast cancer patients. The Basel Prospective Follow-Up Study found that low levels of beta-carotene in plasma increased the risk of bronchus and stomach cancer.

The Basel Study avoided a handicap of other studies that used a blood-bank design of frozen serum which was stored for years. The frozen-serum design resulted in a

loss of carotenoids and vitamin E. The Basel Study showed an increased risk of gastrointestinal cancers at low plasma concentrations of vitamin C (as cited in Gey, 1993). In 1994, Charles Hennekens said that the chief limitation of the over 100 observational epidemiologic studies that have assessed the relationship of dietary antioxidant intake or blood nutrient levels with cancer risk is their inability to control for all factors associated with vitamin intake that might independently affect cancer risk. Hennekens said that antioxidant vitamins present a promising, yet unproven means of reducing risks of chronic diseases, which should be tested in large-scale, randomized trials of sufficient sample size, dose, duration of treatment, and follow-up.

Vitamin supplements. In 1993 about 100 million Americans took vitamins and mineral supplements according to the Council for Responsible Nutrition, a trade association in Washington, DC, that represents vitamin supplement manufacturers (Roffmann, 1995). According to Long (1993), 60 million people take vitamins every day. In 1994 Congress passed the Dietary Supplement Health and Education Act, which establishes regulatory and safety controls for the industry, ensures continued access to products, and allows manufacturers to distribute some limited health and disease prevention information. The U.S. Food and Drug Administration refuses to allow medical claims suggesting that large doses of these vitamins can prevent disease or prolong life.

In the United States, sales of vitamin E and beta-carotene have doubled since 1990, and vitamin C sales are up 60%. Over $500 million are spent a year on the "big

three" supplements (Murray, 1994). In 1993 store sales of vitamin E supplements grew by 39% to $123 million, while beta-carotene sales soared by 31% to $22 million and vitamin C sales rose 10% to $117 million (Cowley, 1994). In 1994 an Austin, Texas, supermarket chain reported selling $32,000 of vitamins at one store location in 1 week (Mangalindan, 1994). Sales were up 57% in 1993 over the $322.3 million sales of 1992. The Council for Responsible Nutrition estimates that the overall 1993 nutritional supplement market was about $4 billion, up 25% from 1992. Vitamin sales rose to $3.5 billion in 1993, almost 30% more than in 1992. Ken Schoppman, director of administration for the council, said, "The entire growth has been led by the surge in antioxidants" (Mangalindan, 1994, p. 1D).

According to Gutteridge (1994), vitamin supplements are not created equal. Natural vitamin E is "isolated from plant oils and has a specific molecular configuration denoted by the letter 'd'. . . . Eight different 'd' vitamin Es exist in nature" (p. 51). Synthetic vitamin E contains only around 13% of d-a-tocopherol.

Linus Pauling, the 1962 Nobel Prize-winning chemist, was a strong advocate for vitamin supplements. In 1976 Pauling promoted vitamins as a cure-all for strokes, mental illness, heart disease, cancer, and infections (Long, 1992). Pauling's claims set off the largest uncontrolled field test ever conducted. Long wrote that, in 1976 Pauling and his colleague, Scottish surgeon Ewan Cameron, treated cancer patients with 10,000 m/day vitamin C. A comparison of the results in 1,000 past patients revealed that the vitamin C group lived four times longer than the control group. Although the results were not conclusive, the study prompted the National Cancer Institute to fund its own study at the

Mayo Clinic. Two studies were completed showing no significant benefit from vitamin C. The tumors did not shrink, and survival time did not increase for the vitamin-treated group. Pauling objected that the researchers failed to follow proper procedures. One explanation is that the cancer progression had increased past the point where vitamin C could be effective. Another explanation, shown from other studies, is that vitamin C can inhibit the effects of some cancer treatments.

Bozidar Stavric (1994) of the Food Research Division Bureau of Chemical Safety in Ontario, said:

> Even without waiting for a clear understanding of the mechanisms involved in cancer etiology, it would appear that major health benefits for a wide segment of the population can be achieved by increasing the daily consumption of fruits and vegetables. (p. 327)

Other investigators agree with Stavric, whose recommendation is supported by the Nutrition Recommendations of the Canadian Health Protection Branch and the U.S. National Research Council.

Supplementation of antioxidant vitamins E and C and beta-carotene has been the subject of many studies. Proponents of supplementation point to the inadequate diet of most Americans as a factor in the need for synthetic or natural vitamin supplements. It did not take long for the vitamin manufacturers to begin promoting vitamins in everything from oral supplements to cosmetic creams as a cure-all for aging, heart disease, and cancer. Schinitsky, ("Forever Young", 1994), a dermal pathologist in Madison, Wisconsin, said, "Soon, it may be considered irresponsible to produce any skin

products that do not contain antioxidants" (p. 56). Elizabeth Arden, Clarins, and Estee Lauder skin care products are relying on the idea that antioxidant vitamins, such as vitamin C and E will improve the skin (Turkington, 1995). The new antioxidant skin products are priced between $10 and $50 an ounce (Marsa, 1995). In 1992 Bristol-Myers spent less than $5 million on Theragran and Theragran-M, but will spend nearly that much just to introduce the new Theragran Antioxidant (DeNitto, 1993). Dermatologist Barbara Gilchrest at the Boston University School of Medicine found that test tube results with vitamin E were different than intervention treatment. In discussing claims that vitamin E can heal scars, prevent stretch marks, or slow aging, Gilchrest said, "But when you try to find the scientific basis for these claims, it isn't there. The literature is terrible, the studies aren't controlled, and they're often misinterpreted" (Long, 1994, p. 100).

The products are a result of the growing consumer sophistication about healthcare as well as a focus on disease prevention as opposed to treatment. One supermarket executive considers antioxidant products the next big wave in retail profit (Denitto, 1993). The vitamin phenomenon has divided the beauty world into two camps: those that add vitamins and minerals to their products and those that market pills with their products (Wood, 1994).

Machlin and Sauberlich (1994), of the Department of Nutrition Sciences at the University of Alabama in Birmingham, reviewed research and reported that "at this time there are inadequate data to determine whether or not the dietary RDA intakes are adequate to fulfill these roles or whether they can be achieved only through higher

intakes" (p. 25).

Not everyone agrees that megadoses of vitamins are beneficial. Stanley Gershoff, (1990), the dean of the Tufts University School of Nutrition, said that even vitamin C, which, like vitamin E and beta-carotene, is being tested for its possible properties in warding off cancer, may cause problems when it is consumed in megadoses. Gutteridge (1994) said,

> At present there appears to be a considerable opportunity in Western societies to reduce the risk of developing life-threatening diseases by modifying dietary habits. This concept should not be confused with unscientific claims by charlatans who proclaim that such diseases can be cured with antioxidants. (p. 294)

The Mayo Clinic Health Letter reported that no benefits of antioxidant supplements have been proven in clinical trials, ("Antioxidants," 1993). The right dose or combination of antioxidants has not been determined, and no one knows the long-term risks of taking supplements.

Cooper's theories and ideas on antioxidants. Cooper's (1994a) Antioxidant Revolution was well received by the public and has been published in four languages--English, Spanish, German, and Portuguese. This work stresses the harmful effects of free radicals from cigarette smoke, air pollution, overexercise, ultraviolet light, or radiation. Cooper's panacea for oxidative stress is the triple antioxidant supplement--vitamins C and E and beta-carotene. Cooper reported over 200 studies that show the benefits of

antioxidant supplements. The benefits include a decrease in the risk of heart disease, lower blood pressure, reduced cholesterol rates, and a strengthened immune system. Antioxidants also fight the lung damage caused by smoking or second-hand smoke. The benefit of a stronger immune system may play a future role in the body's defense against HIV ("Clue Is Reported to Speed of AIDS," 1993). Gregg O. Coodley, of the Oregon Health Sciences University in Portland, said that "beta-carotene supplementation may prove to be a useful complement to treatment with antiviral drugs. Perhaps patients given beta-carotene will not succumb to opportunistic diseases as readily, or the progression from H.I.V. infection to full-blown AIDS may be delayed" (as cited in Murray, 1993, p. 41).

A secondary theory of Cooper's (1994a) book that has unleashed an outpouring of articles centers on the idea that too much exercise can be harmful--so harmful that it can increase the production of free radical damage. Cooper is quoted in Women's Sports and Fitness as saying, "Whether or not you're exercising, you ought to be taking antioxidants. But if you exercise, you must take them" (as cited in Rover, 1995, p. 65). Charles Hennekens of Brigham and Women's College is not convinced that exercisers need more antioxidants. He said that, in the large surveys with doctors and nurses at Harvard, he did not find any modification necessary on the basis of exercise level, noting that Cooper's recommendation is based on blood samples rather than from disease rates (as cited in Rover, 1995). Hennekens also said that taking antioxidants may be a prudent recommendation, but that it is not founded on scientific fact at the current time.

William P. Morgan, a sports psychology pioneer at the University of Wisconsin,

called overtraining the "disease of excellence" (Phinney, 1988, p. 54). According to Hendrickson and Verde (1994), common signs and symptoms of "overtraining syndrome" are anorexia, fatigue, insomnia, weight loss, decreased performance, muscle soreness, overuse injuries, elevated resting pulse, frequent infections, hypothalamic dysfunction, depression, and mood disturbance (p. 58). The problems of overtraining can affect the recreational athlete as well as the elite athlete. According to Dressendorfer, Wade, and Scaff (1985), a valid sign of overtraining is an increased morning heart rate in runners. Levin (1991) said that the athletes most at risk are the Olympic hopefuls for whom training is full-time year-round. Levin said that overtraining syndrome and overtraining do not have identical meanings. Overtraining is "the maladaptive response to the stimulus of training, resulting from an extended period of training overload" (p. 113).

In 1989 the Institute for Aerobics Research published a landmark study that reported the benefits of moderate exercise. Benefits included a reduction in cardiovascular risks and an increase in longevity. With five categories of fitness, ranging from poor to elite, death rates dropped as the subject became more active until he reached the elite category. The study showed a slight increase in death rates for the most active group (as cited in Thompson, 1995). According to Blair et al. (1989), who conducted the study, "attributable risk estimates for all-cause mortality indicated that low physical fitness was an important risk factor in both men and women" (p. 2395). The 1995 study of Blair et al., involving healthy and unhealthy men, showed a reduced risk of mortality through increasing physical activity and improving fitness.

Cooper's 1995 study involving two groups of men that ran 10-20 miles a week, or

over 30 miles a week, was conducted to determine if either group would develop toxic brain syndrome (Thompson, 1995). The results have not yet been released.The preliminary results showed that runners in all categories, whether less than 15 miles or over 30 miles, showed signs of oxidative stress and DNA damage. After taking antioxidant supplements, all of the participants showed improvement, with lowered levels of oxidative stress. The study also showed that participants benefitted from taking any of the antioxidants, vitamins C or E or beta-carotene, in any combination.

According to Roffmann (1995), Cooper charts his vitamin recommendations based on gender, age, and exercise habits. Heavy exercisers or individuals over 200 pounds take the most antioxidants. Cooper recommends 500 mg to 2,000 mg of vitamin C, 200 to 1,200 mg of vitamin E, and 10,000-50,000 IU of beta-carotene. The current RDAs for adults are 60 mg/day vitamin C; 12 IU for women and 15 IU for men for vitamin E; and 4,000 IU for women and 5,000 IU for men of beta carotene/vitamin A. Fat-soluble vitamins such as A, D, and E are measured in international units. Water-soluble vitamins, such as C, are expressed in milligrams or micrograms.

Research studies. Research studies on antioxidants are limited here to those concerning vitamin supplementation. Dietary antioxidants were discussed in an earlier section. The studies are divided into subsections for clarification: intervention studies, epidemiological studies, and laboratory studies. The limitations and strengths of each study are discussed in view of related literature and research.

The first group of studies the researcher reviewed were intervention studies,

which are subdivided into three main groups: (a) studies that measure early biomarkers for cancer risk (immunological response); (b) studies investigating the clinical course of premalignant lesions (leucoplakia); and (c) studies focusing on clinical endpoints of cancer (incidence, mortality) (Schalch & Weber, 1994). The following discussion focuses on human studies, but also reports on several animal studies.

Properly designed population-based intervention studies must take into consideration the differences in healthy subjects at high risk and healthy subjects at low risk or elderly patients. In 1993 twenty primary intervention trials in randomized subjects with high cancer risk (e.g., in smokers) were being conducted by the National Cancer Institute in Bethesda, Maryland (Gey, 1995).

Ehrenkranz, Ablow, and Warshaw's (1982) study of the effect on the development of oxygen-induced lung injury in neonates found that vitamins E and C should help to maximize protection against oxygen-induced injury. This animal study used rats to generalize that sick premature infants would benefit from vitamin E supplementation as a defense against oxygen-induced lung injury.

In 1993 Bjorneboe and Bjorneboe studied alcohol-related diseases and antioxidant status and reported that reduced levels of vitamin E were found in the serum of alcoholics with and without liver disease. More research is needed to discover whether vitamins can provide antioxidant defense in alcoholics.

The National Cancer Institute's study of 29,584 adults aged 40-69 in northern China was conducted from 1986 to 1991. The study was called the Linxian Nutrition Intervention Trial. The four-group random-factorial design had eight intervention groups

that received 5,000 IU retinol, 120 mg vitamin C, 30 mg vitamin E, and 15 mg beta-carotene. Results showed a 9% lower risk of death, an 11% lower risk of gastric cancer, and a 41% lower risk of noncardiac stomach cancer for groups receiving beta-carotene, vitamin E, and selenium (Cowley, 1994; Voelker, 1994). Two limitations of the study were that the participants were from a poorly nourished sample and that the treatments used combinations of the vitamins. According to Voelker, another limitation was that results from Linxian County may not be generalized to the U.S. population because of genetic differences.

The Alpha-Tocopherol/Beta-Carotene Study conducted in Finland, as cited in Roffmann (1995) and Murray (1994) was a 6-year large-scale randomized study of 29,133 Finnish male smokers 50 to 69 years of age. This study is the only large-scale trial conducted thus far in a well-nourished population (Heinonen & Huttunen, (1994). The double-blind placebo-controlled study in a well-nourished population gave participants 20 mg beta-carotene and/or 50 mg synthetic vitamin E or a placebo. Results showing higher levels of vitamin E and beta-carotene in serum reported less lung cancer. Patients receiving only beta-carotene had an 18% higher incident of lung cancer than the placebo group. The group taking vitamin E had less prostate cancer.

What caused the increase in higher lung cancer for beta-carotene recipients? Researchers said that the low dosage of beta-carotene was not enough to counteract the effects of smoking. The short duration and follow-up were limitations of the study. Julie Buring, a research epidemiologist with the Harvard Medical School, said that problems with the study included the fact that participants were smokers who may have already

sustained damage from smoking and that other detrimental factors could have been involved (as cited in Roffmann, 1995). The vitamin E dosage was also very low. Colorado's Kedar N. Prasad argued that, because studies show that naturally derived vitamin E inhibits tumor cells better than synthetic versions, the use of synthetic vitamin E for the study was a limitation (cited in Adler, 1995). Charles Hennekens, professor of medicine at Harvard Medical School, cited a problem of the study as short-duration (cited in Murray, 1994). Hennekens (1994) said that, in regard to lung cancer, which was the primary endpoint,the trial failed to show any significant protective effect of the two vitamins. He added that the results may have been due to chance. According to Roan (1994), smokers in the beta carotene group had a 13% higher risk of stroke and a slightly elevated risk of heart disease. Cooper (1994b) said that antioxidants are thought to have a protective, not a curative, effect.

In 1992, five new studies indicating that certain dietary supplements can help limit or repair muscle damage from oxidants were presented at the American College of Sports Medicine annual meeting in Dallas. One study by Christopher Baldi and his colleagues at Ithaca College, New York, found that vitamin E supplements may actually reverse oxidative stress during exercise. Ian Gillam of the Phillip Institute of Technology in Melbourne, Australia, and his colleagues found in a similar study that, after vitamin supplementation in elite endurance athletes, there was a 25% reduction in tissue oxidation ("Radical Protection for Athletes," 1992). Lester Packer (Packer & Sullivan, 1995), antioxidant specialist of the University of California, cautions that "we don't have hard scientific evidence yet that we can improve athletic performance with antioxidant

supplementation, but there's lots of evidence . . . that supplementation protects against damage during training and competition"(p. 398).

Robert E. Anderson of the Baylor College of Medicine in Houston, Texas, reviewed the Lens Opacities Case-Control study in which 1,380 participants had regular intake of multivitamin supplements vitamins C and E and beta-carotene (Anderson, Kretzer, & Rapp, 1994). The study, conducted by J.M. Robertson, concluded that the consumption of supplemental vitamins C and E reduced the risk of senile cataracts by at least 50% (Robertson, Donner, & Trevithick, 1994 as cited in Anderson et al. 1994). In a study of 50,828 female registered nurses between 45 and 67 years of age, Hankinson found carotene and vitamin A intake inversely associated with cataracts (as cited in Anderson et al. 1994; Hankinson & Stampfer, 1994; Leske, Chylack, & Wu, 1991). Anderson's reviews of over 80 cataract studies were summarized by the recommendation that persons at risk should take precautions, such as ingestion of fruits, vegetables, and antioxidants. A study by Nierenberg, Stukel, and Mott (1994) reported that beta-carotene does not affect serum levels of vitamin E. Jacques, Chylack, McGandy and Stuart (1988) found that persons with high levels of at least two of the three vitamins [vitamin C, E, or carotenoids] are at a reduced risk of cataract.

The Linxian Dysplasia Trial from 1985 to 1991 of 3,318 persons with dysplasia showed a 7% lower risk of mortality, a 4% lower risk for total cancer, and an 8% lower risk for esophageal/gastric cardiac death rates in a group treated with 14 vitamins and 12 mineral supplements (Day, Bingham, Taylor, Li & Blog, 1994; Schalch & Weber, 1994). Researchers concluded that, possibly, a longer follow-up was needed.

A study by Peter Reaven of the University of California at San Diego treated 8 healthy volunteers to 60 mg/day beta-carotene for 3 months; an additional 1,600 mg/day of vitamin E the following 3 months; and 2 g/day of vitamin C for the final 3 months. Results showed a 30-40% decrease in LDL oxidation as a result of vitamin E. Vitamin C enhanced the effectiveness of vitamin E, but no significant reduction in LDL oxidation occurred due to beta-carotene treatment (as cited in Murray, 1993). Murray reported that, in another study by Reaven, 8 healthy people were given 1,600 mg/day of vitamin E for 5 months. The susceptibility of LDL oxidation decreased by 50%.

Ishwarlal Jialal and Scott Grundy conducted several antioxidant tests. In one study, 24 healthy men ages 25-70 were treated with vitamin E. Blood samples before the study and at 6-week and 12-week intervals showed 50% lower oxidative damage in the group receiving vitamin E (as cited by Raloff, 1992).

A study showing that vitamin C protects against the harmful effects of free radical damage from smoking was conducted by Balz Frei at the Boston University School of Medicine. The study's subjects were hamsters injected with vitamin C and exposed to cigarette smoke (Marino,1994). William A. Pryor at Louisiana State University in Baton Rouge believes that the important aspect of the study is that it showed a biological plausibility to explain how antioxidants might work to prevent leukocyte adhesion.

According to Roan (1994) and Fackelmann (1994) a 4-year study of 751 patients in 4 groups were given beta-carotene, vitamin C and E, all three vitamins, or a placebo. No evidence was reported that any of the antioxidants reduced the incident of adnomas,

the precursor of invasive cancer of the colon or rectum. A limitation of the study was the inability to control the amount of dietary antioxidants taken by participants.

Epstein's study (1977) reported the effects of life-long feeding of antioxidants, including vitamin E, on the response of mice to a polycyclic carcinogen. Large amounts of antioxidants were necessary to inhibit small amounts of carcinogens. The results suggested that local antioxidant concentrations may be both limiting and critical in possible vivo interactions between carcinogens and antioxidants.

According to Willett (1984), in a study in which the blood serum of 111 participants was compared to 210 controls, the data did not support the hypothesis relating intake or serum levels of antioxidant vitamins to a reduced cancer risk. The two antioxidants in the study were beta-carotene and vitamin E. Several limitations of the study may account for the results. A single measurement of the blood carotenoid level may not adequately represent the dietary intake of carotene over the time period corresponding to carcinogenesis. Carotene may have a protective effect only against certain cancers.

Future studies should yield results of the beneficial or harmful effects of beta-carotene. The second trial monitoring 40,000 nurses, physicians, and other women in the Women's Health Study who are taking beta-carotene and vitamin E will not be complete until the year 2006. A third experiment of 18,000 smokers and asbestos workers who are taking beta-carotene will be complete in 1998 (Bishop, 1994).

The second type of studies the researcher reviewed were epidemiological studies that are observational in nature; they cannot reveal any causal relationship (Gey, 1993).

Researchers observe groups of people and try to find a link between their lifestyle and disease (Chollar, 1994). Limitations of epidemiological studies include (a) the assessing of dietary intakes, (b) different sample sizes and population, (c) different smoking behavior, (d) different doses of antioxidant nutrients, and (e) different susceptibility to chronic diseases (Voelker, 1994). Hennekens and Buring (1994) said that many observational studies simply compare people's diet with their health. To be accurate,the participants must report what they eat over a period of several years (Hennekens & Buring, 1994; Roan, 1994).

The Edinburgh Case-Control Study on Previously Undiagnosed Angina Pectoris found a 2.6-fold higher risk of IHD due to low plasma levels of vitamins E and C and beta-carotene. The increased risk of low vitamin C and carotene was most likely due to cigarette smoking. According to Greenberg, Dintiman, and Oakes (1994), a limitation of using blood levels to measure vitamin C is that they are not a reliable indicator of intake in persons using oral supplements.

The Nurses Health Study, conducted for 8 years from 1980-1988, found that, when used 2 or more years, vitamin E reduced coronary risks by 40% (Stampfer et al., 1993). Higher beta-carotene intake reduced stroke risk by 40% and heart attacks by 22%. The study was conducted using a dietary questionnaire that estimated the amounts of nutrients ingested by the 87,245 female nurses aged 34 to 59 (Schalch & Weber, 1994). The amount of vitamin E needed to significantly reduce risk of coronary heart disease was 100 IUs per day, according to Meir Stampfer, a professor of epidemiology and nutrition at Harvard (as cited in Schollar, 1994). Stampfer found that taking more than

400 IUs of vitamin E did not produce additional benefits. Mark Bricklin (1993), editor of Prevention, wrote that the Nurses Health Study participants continued to show greater benefits each year from antioxidant supplements.

The Physicians Health Study of 33 physicians with preexisting coronary artery disease or previous coronary bypass was a 5-year case study with a treatment of 50 mg/every other day of beta-carotene. Results showed a reduced number of strokes, heart attacks, and deaths by 50% (Murray, 1993). The Health Professionals Follow-up Study from 1986 to 1990 followed 39,910 male health professionals 40-75 years of age. The dietary intake of vitamins C and E and beta-carotene was estimated from a questionnaire. The results showed maximal reduction in coronary risk for men consuming 100-249 mg/day vitamin E for 2 or more years (Rimm et al., 1993; Schalch, 1994). In 1988, the Edinburg Artery Study surveyed 1,592 men and women age 55-74. Results found that vitamin E intake lowered risk of peripheral artery disease (Schalch, 1994).

According to Schalch (1994), a multicenter case control study from 1991 and 1992 used vitamin E and beta-carotene concentrations measured in adipose tissue samples. The 683 participants had acute myocardial infarction. There were 727 controls. Beta-carotene lowered the risk of myocardial infarction, and the risk for a coronary event among smokers in the lowest quintile was more than two times higher than that to nonsmokers. No significant risk reduction was associated with vitamin E.

A study by Barone, Taioli, Hebert, and Wynder (1992) found a protective effect of vitamins C and E among esophageal cancer cases. The protective effect of vitamin C was significant only among current smokers. Vitamin E exerted a protective effect

among oral cancer cases. A study by Gridley et al. (1992) also found a reduced oral cancer risk with vitamin E use.

The third area of review was of laboratory studies. Joel Swartz of the National Institute of Dental Research in Bethesda, Maryland, said that most research on how antioxidants and retinoids work is in a laboratory using hamsters, human tissue samples, and cell cultures (as cited in Adler, 1995). Swartz and his colleagues have induced oral cancer in hamsters whose diets were enriched with beta-carotene. The researchers found fewer precancerous cells and fewer and smaller tumors than in hamsters that did not receive the beta-carotene. Swartz also found that beta-carotene slowed cancer development by limiting the entry of growth factors into precancerous cells.

Gerald Shklar of the Harvard School of Dental Medicine in Boston said that cancer cells have a leaky cell membrane compared to normal cells that are intact. Shklar said that antioxidants destroy malignant cells but not healthy ones (as cited in Adler, 1995). Shklar and his colleagues found that beta-carotene was effective before a tumor became malignant, but ineffective once malignancy has occurred. Antioxidants vitamin E and beta-carotene boost the immune system by causing immune cells that find and destroy tumors. The ability of antioxidants to enhance the immune system can backfire by exacerbating the onset of other autoimmune diseases such as juvenile diabetes.

The findings of William Orr and R.S. Sohal of Southern Methodist University showed direct support for the free radical hypothesis of aging by using genetically engineered fruit flies ("Science Update," 1994). This finding supports Cooper's theory that free radicals are implicated in the process of aging.

A study by Burton and Ingold (1984) reported a rationale for the possible anticancer activity of beta-carotene insofar as the onset and progress of cancer are affected by free radicals. In a laboratory study, Balz Frei of the University of California at Berkeley found that vitamin C neutralized 100% of the free radicals initiated in isolated plasma from human blood, incubated at body temperature (Raloff, 1989). Important conclusions from this study indicated that vitamin C may have the potential to protect against atherosclerosis.

One test of the research is whether or not governmental agencies support and promote the benefits of antioxidants. In November 1991 the FDA said that significant scientific agreement on a link between antioxidants and cancer doesn't exist (Liebmann, 1992). Scott Grundy of Southwestern Medical School said that the fact that fruits and vegetables are recommended by governmental agencies lends credence to the benefits of antioxidants (personal communication, December 27, 1995). The American Health Foundation recommends a daily vitamin C dose of 250 milligrams, which is about four times the government's recommended daily allowance.The University of California at Berkeley Wellness Letter now advises readers to take 250-500 mg/day vitamin C, 100-800 IU/day vitamin E, and 10,000-25,000 IU/day beta-carotene (Roffmann, 1995).

In 1994 the first national public health agency, the Alliance for Aging Research's expert panel, reported that effective preventive medicine for common age-related diseases included regimens of the antioxidant vitamins C, E, and beta-carotene that are 4 to 16 times the RDA recommended by the FDA ("Aging Panel Endorses," 1994; Voelker,

1994). The panel's recommendation was for 250-1,000 mg/day vitamin C, 100-400 IU/day vitamin E, and 17,000-50,000 IU/day beta-carotene. The Alliance for Aging's recommendation was based on more than 200 clinical and epidemiologic studies. It has called for a revision of the RDAs, which were aimed at preventing deficiency diseases instead of chronic diseases (Voelker, 1994). Jialal of Southwestern Medical School agreed that the RDA pertains to deficiency problems, not coronary risks ("The Virtues of Vitamin E," 1992).

As shown in Table 9, there are several intervention trials in progress. An intervention trial is considered the gold standard of research. Trials do have limitations, but, according to Stampfer, "if we had trial data for some cancers, then we'd be more inclined to trust the observational data for other cancer sites" (as cited in Liebman, 1992, p. 7).

Table 9

Trials in Progress

Location of trial	Cancer sites	Participants	Daily dose of nutrients*
U.S.	all	healthy M.D.s	42,000 IU beta-carotene
U.S.	lung	smokers	50,000 IU beta-carotene 25,000 IU vitamin A

(table continues)

Location of trial	Cancer sites	Participants	Daily dose of nutrients*
Finland	lung	smokers	33,000 IU beta-carotene 50 mg. vitamin E
U.S.	colon	people with precancers	50,000 IU beta-carotene 1,000 mg. vitamin C 365 IU vitamin E
U.S.	colon	previous cancer patients	50,000 IU beta-carotene
U.S.**	cervix	people with precancers	50,000 IU beta-carotene
Tanzania	skin	albinos	167,000 IU beta-carotene
U.S.	skin	previous cancer patients	83,000 IU beta-carotene
Columbia	stomach	people with precancers	50,000 IU beta-carotene 2,000 mg. vitamin C
U.S.	mouth	people with precancers	15,000 IU beta-carotene
China	esophagus	people in high-risk areas	25,000 IU beta-carotene multi-vitamins

Note. *Every-other-day regimens have been converted to daily doses.

**Indicates two trials.

Wellness Studies

Few wellness studies have been conducted on community college campuses to determine which aspects of wellness are being taught in the curriculum. The abundance

of research promoting the wellness philosophy may not in reality be evidenced in the classroom or the gym.

Incorporating Wellness Research into the Curriculum

Vastine (1984) found that community college administrators do not completely understand or accept the concept of wellness. Only 49% of the colleges surveyed by Vastine had a wellness program. Of these, 60% were under the leadership of the campus health center, whereas only 45% were led by the physical education department. The trend in physical education shows an increase in programming in several dimensions. The dimension of physical fitness is expected to have a 35% increase in programming (Vastine, 1984). Trimble and Hensley's (1994) study completed 10 years later shows that fitness activities showed the greatest increase in student popularity from 1989-1994. Individual sports ranked second behind fitness activities. The greatest decrease in student popularity was in gymnastics and team sports (Trimble & Hensley, 1994). According to Trimble and Hensley's study, the top six activities ranked in student popularity were fitness/aerobic activities, weight training, aerobic dance, tennis, racquetball, and golf. Although 32% of the respondents indicated that programming in the emotional dimension was not currently offered, 30% predicted that by 1988 programming would be available. Program participation was not offered in 35% of the cases in the social dimension or the intellectual dimension, while 46% did not offer programs in the spiritual dimension (Vastine, 1984). Vastine's study also indicated that programs in nutrition, obesity, smoking cessation, alcohol and chemical abuse, lack of exercise, hypertension, and physical fitness would increase an average of 10% from 1983 to 1988.

Wellness courses have gained in popularity, with 67% of the colleges reporting a multidimensional course which integrates activity experiences and health-related concepts from a holistic perspective. The conceptual areas most likely to be included are nutrition (96% of such courses), stress management (87%), and exercise science (82%). Fitness activities (87% of such courses) and aquatics (27%) ranked as the top two activities for wellness courses (Trimble and Hensley, 1994).

Impact of Wellness Courses on Students

College physical education courses influence alumnis' value of exercise, how frequently they exercise, and the quantity of physical activity (Brynteson & Adams, 1993). Brynteson and Adams found that "the greater the physical activity requirement of a physical education program, the more positive the relationship to perceived knowledge and attitude" (p. 210). A study done by Adams and Brynteson in 1980 showed a significantly different outcome. The 1980 study found no difference between an elective physical education activity program as compared to a required program. One reason for the difference is that the physical education program underwent a change between the time the two studies were done. The 1993 study analyzed physical education programs at the same schools as the prior study, but failed to account for the changed format. The physical education program adopted a concept-based approach. This led Brynteson and Adams (1993) to believe that the concepts approach to required physical education has a greater relationship to alumni physical activity habits than a skill specific approach. This lends support to current research that wellness education has a greater impact upon

college students' activity levels than the traditional skills teaching that has been popular for so many years.

Research has indicated that lifestyle choices influence longevity and quality of life. Today's killers are a result of unhealthy behaviors such as cigarette smoking, lack of physical activity, alcohol and drug abuse, and high fat diets (Greenberg, Dintiman, & Oakes, 1995). College physical education programs must find ways to influence students' lifestyle behaviors. A study by Burns (1992) found that 23% of the students report making lifestyle changes based on the health promotion program. Burns's study of the impact of the La Crosse Wellness Project on the health promotion involvement of college students was not statistically significant, although there was an increase in wellness behavior. The need for college wellness programs is supported by McGill's (1986) study, which reported a lack of carryover of wellness concepts from public school education.

Female students rate wellness programs as more significant than males (Showalter, 1994). Male students report higher levels of personal wellness while indicating lower levels of need for information and assistance. Spiritual needs were reported higher by females than males. Showalter concluded that female respondents have a better understanding of some of the realities of life and possess a greater level of personal insight (1994).

Required Physical Education

Changes in the physical education requirements have impacted the programs that are offered to students. A 1961 survey of college physical education programs showed

that 84% had a requirement in physical education. Credit hours were given in 76% and 77% of the institutions requiring physical education in the 1961 survey and Trimble and Hensley's 1993 survey, respectively. Sixty-eight percent required 2 years of physical education. Half of the institutions with over 5,000 enrollment required swimming for all students (Lee, 1983). A similar study conducted in 1993 showed that the two-credit hour requirement is still the most prevalent and twothirds of the 4-year institutions require physical education for graduation (Trimble & Hensley, 1993). A major change has occurred in the specific physical education course required for graduation. In 1961 half of the students in larger institutions were required to take swimming, whereas in 1993 a wellness course is required in 52% of the colleges. Exemptions are rare in most colleges, with less than 1% of eligible students excused. Medical reasons constitute the primary basis for exemption. Only 20% of the universities and colleges allow exemptions for varsity sport participation (Trimble & Hensley, 1993).

The Role of Governance, Transfer, and Articulation in Community College Curricula

Two-year community colleges in the United States are governed in various ways. Some 2-year community colleges are governed by state boards that may be responsible for all education in the state, university and college education, or community college education only. Most church-related colleges are governed by a church board. Most public colleges are under the control of a single authority in numerous states. The varying modes of governance are not the only factor affecting community college curriculum. The changing of the transfer function and articulation between community colleges and

universities have also played a part in the development of the nation's community college curricula.

Governance

As shown in Table 10 there is a great variance between states in the governance of each institution (Tollefson & Fountain, 1992). States may be governed by local or district boards with a state board of education or state department of education.

Table 10

Governance of Colleges and Universities in the United States

State	Gov.-state	Gov.-local
Alabama	St. Bd./Chancellor	n/a
Alaska	U AK system	n/a
Arizona	St. Bd. for C.C.	Dist. Bds.
Arkansas	St. Bd./Dept. Ed.	Inst. Bds.
California	St. Bd. Governors	Inst. Bds.
Colorado	St. Bd. for CC	Local (4)
Connecticut	St. Bd.	n/a
Delaware	St. Bd. Trustees	n/a
Florida	St. Bd. of C.C.	Local Bds.
Georgia	Regents-U. Ga.	n/a

(table continues)

State	Gov.-state	Gov.-local
Hawaii	U. Hi Bd. Regents	n/a
Idaho	St. Bd. Ed.	Local C.C. Bd.
Illinois	St. C.C. Bd.	Local Bds.
Indiana	St. Commis. H. Ed.	n/a
Iowa	St. Bd. & Dept.	Dist. Bds.
Kansas	St. Bd. Regents	n/a
Kentucky	U. Ky Bd. Trustees	Loc. Adv. Bds.
Louisiana	St. Bd. (1) U. Bds. (3)	n/a
Maine	St. Bd. Trustees	n/a
Maryland	St. Bd. for C.C.	n/a
Massachusetts	Bd. Regents H. Ed.	Local Bds.
Michigan	St. Bd. C. & Jr. Coll.	Local Bds.
Minnesota	St. Bd. for C.C.	Loc. Adv.Bds.
Mississippi	St. Bd. for C. & Jr. Coll.	local Bds.
Missouri	St. Coord. Bd. H. Ed.	Local Bds.
Nebraska	Coor. Comm. P. P.Ed.	Local Bds
Nevada	U. NV Bd. Regents	n/a
New Hampshire	St. Bd. Governors	n/a

(table continues)

State	Gov.-state	Gov.-local
New Jersey	Dept. of H. Ed.	Local Bds.
New Mexico	Commiss. on H. Ed.	Mixed
New York	U. Bds. Trustees	SUNY-L. Trus.
North Carolina	St. Bd. of C.C.	Local Bds.
North Dakota	St. Bd. of H. Ed.	Mixed
Ohio	St. Bd. Regents	Loc-C.C. & Tech.
Oklahoma	St. Reg. for H. Ed.	Local Bds.
Oregon	St. Bd. Educ.	Local Bds.
Pennsylvania	St. Bd. & PSU	Local Bds.
Rhode Island	Bd. Gov. for H. Ed.	n/a
South Carolina	St. Bd. Techn. & Cmp.	n/a
South Dakota	n/a	local/Univ.
Tennessee	St. Bd. Regents	n/a
Texas	St. Coord. Bd.	Local Bds.
Utah	St. Bd. Regents	Loc. Councils
Vermont	St. Bd. for C.C.	n/a
Virginia	St. Bd. for C.C.	Loc. Adv. Bds.
Washington	St. Bd. for C.C. Ed.	n/a
West Virginia	St. Coll. Sys. Bd. Dir.	Adv. Council

(table continues)

State	Gov.-state	Gov.-local
Wisconsin	Bd. Voc. Techn. Ad.	n/a
Wyoming	C.C. Commission	Local Bds.

Local Authority. Most of the public colleges in the nation are organized within single districts with a board of trustees that establishes policy for the institution (Cohen & Brawer, 1989). Local governing boards usually consist of five to nine members elected from the district, who serve 4-year terms. The districts may be responsible for one college or for several colleges. The multiunit independent districts operate with a central district organization headed by a president or chancellor. These multiunit districts date back to the 1930s when colleges began to open branch campuses. Chicago and Los Angeles are examples of these early multiunit districts (Cohen & Brawer, 1989).

State Authority. In 1965 twenty states were under the governance of a state board of education. Six colleges reported to a state department or superintendent of education (Blocker, Plummer, & Richardson, 1965). By 1980 Kintzer found 15 states that had boards responsible for community colleges only, 5 with a university system that included 2-year colleges, and 10 with boards for all of higher education. Fifteen more states had boards coordinating all levels of education.

Community colleges in states such as Ohio and Wisconsin are affiliated with state universities. All community colleges in Alaska, Hawaii, Kentucky, New York, Rhode Island, Tennessee, Utah, Vermont, West Virginia, and Nevada are under the state

universities. All community colleges in Alaska, Hawaii, Kentucky, New York, Rhode Island, Tennessee, Utah, Vermont, West Virginia, and Nevada are under the state university system. The state of Washington has a state board with 24 district boards. Goverance is also affected in Washington by executive orders from the governor; directives from the Office of Financial Management; and contractual controls from numerous state agencies (Cohen & Brawer, 1989). Although loss of local autonomy is evident, state board control provides better articulation between community colleges and universities and a stronger voice with the state legislature.

Before August 1, 1977, Connecticut public higher education included 12 regional community colleges, four 2-year technical colleges, four state colleges, and the state university. The university also had four 2-year branch campuses (Darnowski, 1978). Each unit had a separate board of trustees, and The Commission for Higher Education coordinated the efforts of the boards. After 1977 the commission changed to the Board for Higher Education and had significantly more power and responsibility. Darnowski noted that "one cannot expect complete autonomy for a single college in a single system with a single board of trustees" (p. 5). Some degree of autonomy is needed to meet local community needs, but state control seems to be diminishing the community college's autonomy with requirements of a common policy, common fical procedures, and basic standards for facilities (Darnowski, 1978).

According to Tollefson and Fountain (1992), 40 states are governed under a state system. The various state systems include a state board for all higher education, a state board or commission for community colleges, a board of governors, a board of trustees, a

system. These states are Arkansas, Louisiana, Nebraska, New Mexico, North Dakota, Pennsylvania, South Dakota, Texas, and Wyoming. These nine states maintain local authority with local boards. Although most of the states have local boards, they maintain much less authority in states with a state system where the funding and operation are centralized.

State Funding

Funding patterns differ among states. Texas community colleges receive more than half of their money from the state and 15% from the local district. In order to offer a course of study, many states such as Texas are funded only on courses that meet certain criteria. In Texas a course must be listed in the common course numbering system to receive state funding (Texas Higher Education Coordinating Board, 1996). Although it is a voluntary function for community colleges in Texas to use the common course numbering system; transfer of courses to the universities is made easier. According to Brad Tibbitts, a committee member involved in the statewide revision of the Community College General Academic Course Guide Manual, a course in Texas must be offered in 50% of the universities in order to receive state funding (personal communication, August 20, 1996). Illinois receives about one-third from the state and one third from the local district. Arizona receives one fourth from the state with one half from local funding. Missouri receives less than half from the state and less than one third from local sources. Eightly percent of the funding in Delaware, Utah, and Washington comes from the state.

Wattenbarger and Starnes (1976) identified four types of state support: negotiated budget, unit-rate formula, minimum foundation, and cost-based program funding. The negotiated budget is based on prior annual expenditures of each college and is negotiated each year with the state legislature or state board. The unit-rate formula is measured by full-time students, the number of students in a certain program, credit hours generated, or a combination of these methods. The state allocates funds to colleges on the basis of one of the formulas. The minimum foundation method is a modified version of the unit-rate formula. The amount of local tax funding affects the amount of state monies received by an institution. The greater the local tax funding available to an institution, the lower the amount appropriated from the state. The cost-based funding is based on actual expenditures. Local tax funds may be factored into the formulas (Cohen & Brawer, 1989).

Curricular Function

Cohen and Brawer (1987) describe the community college's function as providing a general education to students and then passing them to senior institutions. Barry and Barry (1992) consider the fundamental mission of the community college to include the transfer function, which they define as "the movement of students from one institution of higher education to another" (p. 36). The transfer function is not complete without articulation, which is defined as the "systematic coordination between an educational institution and other educational institutions and agencies designed to ensure the efficient and effective movement of students among those institutions and agencies, while

institution and other educational institutions and agencies designed to ensure the efficient and effective movement of students among those institutions and agencies, while guaranteeing the students' continuous advancement in learning" (Ernst, 1978, p. 32).

Hollinshead (1936) wrote that "the junior college should be a community college meeting community needs" (p. 111). In the earliest community colleges, most of the courses were transfer courses in the liberal arts. Koos (1924) found that 53 public and private junior colleges in 1921 and 1922 offered three fourths of their courses in the liberal arts. This trend continued until the 1970s when many community colleges abandoned humanities courses and shifted toward introductory couses for remediation and toward career courses. Articulation agreements between community colleges and universities changed as community colleges encouraged the transfer of special interest and interdisciplinary courses. Private 2-year colleges reported little or no influence on their curriculum from the senior institutions (Cohen & Brawer, 1989).

Community colleges between 1900 and 1940 were often monitored by the universities who regarded the junior colleges as an extension of the high school. The University of Washington did not allow students in engineering, forestry, fine arts, business administration, journalism, and pharmacy to start their educations in the junior colleges because the subjects were considered too technical. Courses in education were not offered in many junior colleges (Frye, 1992). Most junior colleges were seen as offering a terminal education to allow students to enter the work force at a quicker pace than in the university. The ideology of the junior college came from the secondary schools which supplied most of the personnel. It must be remembered that before 1920

only 26% of the junior colleges were public. The greatest increase for opening junior colleges before 1940 was in 1927 when 33 were created in 13 states (Frye, 1992). With rare exceptions, most of these junior colleges were in small town that were far away from colleges and universities. The idea of transfer to a university was not the popular notion before 1940. In 1941 in public junior colleges, 35% of the students were in terminal curricula. Fifty-four percent of the graduates of 1939 continued in higher education (Frye, 1992).

Barry and Barry (1992) reported that the transfer function works best in states where the formal articulation-transfer agreements are mandated. In states where the leadership is weak and the colleges and universities must work out the agreements themselves, the transfer function works poorly. In 1971 state leadership became involved in transfer negotiations in states such as Florida, Illinois, Georgia, and Texas. "By 1973, at least 32 states had articulation-transfer agreements in which state agency policy or legal mandate was the driving force" (Barry & Barry, 1992, p. 37). There are three types of articulation programs sponsored by state governments:

> (1) formal and legally based policies, which are preservative and defined in state law with mandated mechanisms in place to ensure compliance; (2) state system policies, which result from statewide articulation-transfer agreements negotiated between two-year and four-year college representatives and formulated in state policy, with mandatory institutional compliance; and (3) voluntary agreements, which are statewide articulation-transfer agreements negotiated between two-year and four-year college representatives, with voluntary institutional compliance.

(Moore, 1989, as cited in Barry & Barry, 1992, pp. 38-39)

In states such as Florida, Missouri, Texas, Washington, and Rhode Island, the transfer rates are higher because the articulation-transfer agreements have a legislative basis. Illinois, California, Maryland, New Jersey, and Arizona are states with a state system policy. Voluntary agreements are common in Michigan, Pennsylvania, Kentucky, and Minnesota.

In the 1970s the transfer function changed from collegiate to the career education. Kissler (1981) stated that the decline of the transfer function was due to successful efforts to broaden the curriculum for students with basic skill deficiencies, the community education emphasis, and the tremendous increase in vocational programs. The future of the transfer function has been affected by five major trends: (a) a decline in the number of high school graduates which will increase the competition for students, (b) an increase in minority students in public schools, (c) a continued shift toward vocational subjects away from the liberal arts and sciences, (d) a serious decline in the level of academic preparation of students entering colleges and universities, and (e) continuing economic difficulties and budget cuts (Kissler, 1982).

The notion that curricula are driven by the function of transfer does not seem plausible when one considers that fewer than 10% of community college students actually transfer (Friedlander, 1980). Parnell (1985) argued that the average student in a community college does not consider a baccalaureate degree as his or her goal. Parnell stated that, if the current trend continues, less than a third of the community college population will complete the baccalaureate degree. It is more likely that curricula are

driven by the influence of community college administrators. Richardson (1985) and Seidman (1985) noted that community college administrators often have more influence on curriculum and instruction than university administrators. Another aspect of transfer involves funding. If a community college is funded based on the number of students enrolled in classes, there is little encouragement to offer sophomore courses that lead to transfer to the university. Fewer students enroll in sophomore courses. Furthermore, courses that require prerequisites result in smaller classes and less funding (Bernstein, 1986).

The 1980s brought a drive toward enforcing matriculation standards and course prerequisites to enable students to complete a program and transfer successfully to a university (Cohen & Brawer, 1989). The state of Florida is a model of a statewide articulation system that was created in 1971 to provide for a smooth transfer process. All junior and community college courses are accepted at all university institutions in Florida (Zeldman, 1982).

A study of community college curriculum by the Center for the Study of Community Colleges (as cited in Cohen & Ignash, 1994) reported that physical education courses, which make up 90% of the personal skills courses, had the highest transfer rate of any non-liberal course in California. The personal skills courses accounted for 26.5% of the non-liberal arts curriculum for California, with a transfer rate of 76 to 88%. The personal skills subject area accounts for 19.1% of the nation's community college curriculum (Cohen & Ignash, 1994). In Texas personal skills courses, which include the physical education courses, transferred at the rate of 99.8-100%. In Illinois personal

skills courses transferred to Illinois State University at the rate of 89.2% compared to only 49.5% that transferred to the University of Illinois. The study reported that physical education courses transfer at very high percentages (Cohen & Ignash, 1994). They also found that the research universities were more selective in the non-liberal arts courses they accept for transfer.

Summary

The literature review points to state legislation and funding patterns as the force behind curricular development in our nation's 2-year community colleges. Local administrative decisions arise as the second factor in the development of community college curricula. Although the transfer function and articulation appear to be viable factors, in reality they have limited effect on the majority of decisions that shape our nation's community college curriculum. While the choice of course offerings is often made at higher levels of adminstration, physical education division directors guide the direction of the course content through their selection of textbooks. The autonomy of the community college professor allows personal bias in content emphasis of each course. Recent research shows an increase in courses that have a wellness or holistic component. The trend of the 1980s and 1990s continues as aerobic fitness courses remain popular in physical education programs at our nation's community colleges.

CHAPTER 2 REFERENCES

Adami, H.O., Baron, J.A., & Rothman, K.J. (1994, April 16). Ethics of a prostate cancer screening trial. Lancet (North American Edition), 343, 958-960.

Adler, T. (1994, July 17). Just say no to prostate cancer screening. Science News, 146, 180.

Adler, T. (1995, April 22). Power foods: Looking at how nutrients may fight cancer. Science News, 147, 248-249.

Aging panel endorses high-dose antioxidants for disease prevention. (1994, April). Geriatrics, 49, 17.

Ames, B.N. (1983, September 23). Dietary carcinogens and anticarcinogens. Science, 221,U 1249, 1256-1264.

Ames, B.N., Shigenaga, M.K., & Hagen, T.M. (1993). Oxidants, antioxidants, and the degenerative diseases of aging. Procedures of the National Academy of Science, USA, 90, 7915-7922.

Anderson, O. (1994, January). On the edge. Runner's World, 29, 28.

Anderson, R.E., Kretzer, F.L., & Rapp, L.M. (1994). Free radicals and ocular disease. Advances in Experimental Medicine and Biology, 366, 78-86.

Angier, N. (1993, April 25). Free radicals: The price we pay for breathing. The New York Times Magazine, 62-64, 100.

Antioxidants. (1993, August). Mayo Clinic Health Letter, 11 (8), 1-3

Badgett, R.G. (1994, January 20). Screening for prostate cancer. The New England Journal of Medicine, 220.

Barone, J., Taioli, E., Hebert, J.R. & Wynder, E.L. (1992). Vitamin supplement use and risk for oral and esophageal cancer. Nutrition and Cancer, 18, 31-41.

Barry, R.J. & Barry, P.A. (1992). Establishing equality in the articulation process. New Directions for Community Colleges, 78. San Francisco, California: Jossey-Bass.

Bean, A. (Ed.). (1995, May). You get what you run for. Runner's World, 22.

Beil, L. (1993, December 14). Vitamin E helps heart, study finds. The Dallas Morning News, p. A33.

Bernstein, A. (1986). The devaluation of transfer: Current explanations and possible causes. In L.S. Zwerling (Ed.), New Directions for Community Colleges, 54, San Francisco: Jossey-Bass.

Bishop, J.E. (1994, April 14). Beta carotene's power to avert cancer is questioned as more studies continue. Wall Street Journal, p. B8.

Bjorneboe, A., & Bjorneboe, G.E. (1993, January). Antioxidant status and alcohol-related diseases. National Institute of Forensic Toxicology, 28 (1), Oslo, Norway. Alcohol (England), 111-116.

Blair, S.N., Kohl, H.W., Paffenbarger, R.S., Clark, D.G., Cooper, K.H., & Gibbons, L.W. (1989, November 3)). Physical fitness and all-cause mortality. JAMA, 262 (17), 2395-2401.

Blair, S.N., Kohl, H.W., Barlow, C.E., Pffenbarger, R.S., Gibbons, L.W., & Macera, C.A. (1995, April 12). Changes in physical fitness and all-cause mortality. JAMA, 273 (14), 1093-1097.

Block, G., & Langseth, L. (1994, July). Antioxidant vitamins and disease

prevention. Food Technology, 48 (7), 80-84.

Blocker, C.E., Plummer, W., & Richardson, R.C., Jr. (1965). The two-year college: A social synthesis. Englewood Cliffs, NJ: Prentice-Hall.

Brant, J. (1987, May). And the word was aerobics. Runners World, 68-76.

Bricklin, M. (1993, July). Why we're pro-antioxidant. Prevention, 45, 37-39.

Briefing. (1990, November 5). The Dallas Morning News, p. D2.

Briefs. (1995, August 21). The Dallas Morning News, p. 3C.

Burfoot, A. (1995, September). How much should you run? Runners World, 66-67.

Burns, J.A. (1992). The impact of the La Crosse Wellness Project on the health promotion involvement of college students residing on the campus of the University of Wisconsin-La Crosse. (Doctoral dissertation, University of Wisconsin, 1992). Dissertation Abstracts International, 1-77.

Burton, G.W., & Ingold, K.U. (1984, May 11). B-carotene: An unusual type of lipid antioxidant. Science, 224, 569-573.

Brynteson, P., & Adams, T.M., III. (1993). The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2 to 11 years of follow-up. Research Quarterly for Exercise and Sport, 64, 208-212.

Cameron, E., Pauling, L., & Leibowitz, B. (1979). Ascorbic acid and cancer: A review. Cancer Research, 39, 663-681.

Castleman, M. (1994, November). Mother knows best. Sierra, 79 (6), 28-30.

Chodak, G.W. (1994, September 14). Screening for prostate cancer: The debate

continued. JAMA, 272, 813-14.

Chollar, S. (1994, July). Should you take vitamins? McCall's, 121, 102-103, 134, 136.

Clue is reported to speed of AIDS. (1993, November 14). New York Times. p. 27.

Cohen, A.M., & Brawer, F.B. (1987). The collegiate function of community colleges: Fostering higher learning through curriculum and student transfer. San Francisco: Jossey-Bass.

Cohen, A.M., & Brawer, F.B. (1989) The American community college. San Fransciso: Jossey-Bass.

Cohen, A.M., & Ignash, J.M. (1994). An overview of the total credit curriculum. New Directions for Community Colleges, 86, San Francisco: Jossey-Bass.

Cooper Aerobics Center. (1995a). Kenneth H. Cooper biography. [Brochure]. Dallas, TX: Author.

Cooper, K.H. (1968). Aerobics. New York: Bantam Books.

Cooper, K.H. (1970). The new aerobics. New York: Bantam Books.

Cooper, K.H. (1977). The aerobics way, New York: Bantam Books.

Cooper, K.H. (1982). The aerobics program for total well-being. New York: Bantam Books.

Cooper, K.H. (1985b). Running without fear: How to reduce the risk of heart attack and sudden death during aerobic exercise. New York: M. Evans.

Cooper, K.H. (1988a, May/June). Cholesterol: Be aware of your ratio. The Saturday Evening Post, 260, 102-103, 106-108.

Cooper, K.H. (1988b). Controlling cholesterol. New York: Bantam Books.

Cooper, K.H. (1988c, November). Controlling cholesterol. The Saturday Evening Post, 260, 90-91, 94.

Cooper, K.H. (1988d, April). How to control your cholesterol. The Saturday Evening Post, 260, 82-83, 86, 96.

Cooper, K.H. (1988e, January). The lower-your-cholesterol diet. Ladies Home Journal, 105, 48, 58-59.

Cooper, K.H. (1988/1989, December/January). Coronary combat. Modern Maturity, 31, 78-84.

Cooper, K.H. (1989a, April). The basics of bone. Health, 21, 80-82.

Cooper, K.H. (1989b, March). Osteoporosis: Are you at risk. The Ladies Home Journal, 106, 56-58, 60.

Cooper, K.H. (1989d). Preventing osteoporosis. New York, NY: Bantam Books.

Cooper, K.H. (1990a, April). Confronting cholesterol. The Saturday Evening Post, 262, 40, 92.

Cooper, K.H. (1990b). Overcoming hypertension. New York, NY: Bantam Books.

Cooper, K.H. (1991a, March). Boning up. The Saturday Evening Post, 263, 18-20, 96.

Cooper, K.H. (1991c). Kid fitness: A complete shape-up program from birth through high school. New York, NY: Bantam books.

Cooper, K.H. (1992b, January/February). Give our kids a healthy lunch. The Saturday Evening Post, 264, 48-49, 74.

Cooper, K.H. (1992c, May/June). Time to prevent osteopososis. The Saturday Evening Post, 264, 24, 102-103.

Cooper, K.H. (1994a). Antioxidant revolution. Nashville, TN.: Thomas Nelson.

Cooper, K.H. (1995b). It's better to believe. Nashville, TN.: Thomas Nelson.

Cooper, K.H., & Cooper, M. (1988). The new aerobics for women. New York: Bantam Books.

Cooper, M., & Cooper, K.H. (1972). Aerobics for women. New York: Bantam Books.

Corbin, C. (1994). Concepts of fitness and wellness. Wisconsin & Iowa: Brown and Benchmark.

Cowley, G. (1994, April 25). Are supplements still worth taking? Newsweek, 47.

Darnowski, V.S. (1978). The maze in Connecticut. New Directions for Community Colleges, 23. San Francisco: Jossey-Bass.

Day, N.E., Bingham, S.A., Taylor, P. Y., Li, B., & Blog, W.J. (1994, November 2). Nutrition intervention trials in Linxian, supplementation with specific vitamin/mineral combinations, cancer incidence, and disease-specific mortality in the general population. Journal of the National Cancer Institute, 86 (21), 1645-1648.

DeNitto, E. (1993, October 18). New energy for vitamin market. Advertising Age, 64 (44), 50.

Dressendorfer, R.H., Wade, C.E., & Scaff, J.H. (1985). Increased morning heart rate in runners: A valid sign of overtraining? The Physician and Sportsmedicine, 13, (8), 77-86.

Ehrenkranz, R.A., Ablow, R.C., & Warshaw, J.B. (1982). Effect of vitamin E in the development of oxygen-induced lung injury in neonates. Annals New York Academy of Sciences, 452-466.

Epstein, J.H. (1977). Effects of B-carotene on ultraviolet induced cancer formation in the hairless mouse skin. Photochemisty and Photobiology, 25, 211-213.

Ernst, R.J. (1978). Articulation: A working definition. Community College Review, 5 (4), 32-34.

Fackelmann, K.A. (1989, January 28). Progress in the fight against heart disease. Science News, 135, 60.

Fackelmann, K.A. (1994, July 23). Antioxidant vitamins fail to prevent polyps. Science News, 146 (4), 54.

Fleming, T. M. (1990). The aerobic years: An historical analysis of the work of Kenneth H. Cooper and his influence in promoting healthy lifestyles (Doctoral dissertation, Texas A&M University, 1989). Dissertation Abstracts International, 51 (01), 84.

Forever young, (1994, October). Mademoiselle, 56-58.

Friedlander, J. (1980). An ERIC review: Why is transfer education declining? Community College Review, 8, (2), 59-66.

Frye, J.H. (1992). The vision of the public junior college. New York: Greenwood Press.

Gerber, G.S., Thompson, I.M., & Thisted, R. (1993, January 6). Disease-specific survival following routine prostate cancer screening. The Journal of the American

Medical Association, 269 61-4.

Gershoff, S. (1990). The Tufts University guide to total nutrition. New York: Harper Perennial.

Gey, K.F. (1993, July). Prospects for the prevention of free radical disease, regarding cancer and cardiovascular disease. Berne, Switzerland: University of Berne.

Giraud, D.W., Martin, H. D., & Driskell, J.A. (1995, July). Plasma and dietary vitamin C and E levels of tobacco chewers, smokers, and nonusers. Journal of the American Dietetic Association, 95, 798-800.

Goldstrich, J.E. (1994). The cardiologist's painless prescription for a healthy heart and a longer life. Dallas, TX: 9-Heart-9 Publishing.

Greenberg, J.D., Dintiman, G.B., & Oakes, B.M. (1994). Physical fitness and wellness. MA: Allyn & Bacon.

Gridley, G., McLaughlin, J.K., Block, G. Blot, W.J., Gluch, M., & Fraumeni, J.F. (1992). Vitamin supplement use and reduced risk of oral and pharyngeal cancer. American Journal of Epidemiology, 135 (10), 1083-1092.

Gutteridge, J.M. (1994, September). Antioxidants, nutritional supplements and life-threatening diseases. British Journal of Biomedical Science, 51 (3), (Department of Anaesthesia and Intensive Care, Royal Brompton Hospital, London, England, UK), 288-295.

Heinonen, O.P., & Huttunen, J.K. ((1994). The effect of vitamin E and beta carotene on the incidence of lung cancer and other cancers in male smokers. The New England Journal of Medicine, 330 (15), 1029-1035.

Hendrickson, C.D., & Verde, T.J. (1994). Inadequate recovery from vigorous exercise. The Physician and Sportsmedicine, 22 (5), 56-62.

Hennekens, C.H. (1994, September 26). Antioxidant vitamins and cancer. American Journal of Medicine, (Department of Medicine and Ambulatory Care and Prevention, Harvard Medical School, Boston, MA), 97 (3A), 2s-4s.

Hennekens, C.H., & Buring, J.W. (1994, April 14). Antioxidant vitamins-benefits not yet proved. New England Journal of Medicine, 330, 1080-1.

Hietanen, E., & Bartsch, H. (1994, August). Diet and oxidative stress in breast, colon, and prostate cancer patients--A case control study. European Journal of Clinical Nutrition, 48 (8), 575-586.

High vitamin doses for warding off colon cancer. (1994, September). Tufts University Diet and Nutrition Letter, 12, (7), 1.

Hollinshead, B.S. (1936). The community college program. Junior College Journal, (7), 111-116.

Jackson. (1990). The Dallas Morning News, 3C.

Jacques, P.F., Chylack, L.T., McGandy, R.B., & Stuart, C.H. (1988). Antioxidant status in persons with and without senile cataract. Arch Ophthalmol, 106, 337-340.

Kemp, G.L., Ellestad, M.H., Beland, A.J., & Allen, W.H. (1969, May). The maximal treadmill stress test for the evaluation of medical and surgical treatment of coronary insufficiency. The Thoracic Cardiovascular Surgeon, 57 (5), 708-713.

Kintzer, F.C. (1980). Organization and leadership of two-year colleges: Preparing for the eighties. Gainesville: University of Florida, Institute of Higher Education.

Kissler, G.R. (1981, May 19). From junior college to community colleges: The effect on four-year institutions. Presentation to the annual forum of the Association for Institutional Research.

Kissler, G.K. (1982). The decline of the transfer function: Threats or challenges. In Frederick C. Kintzer (Ed.), New Directions for Community Colleges, 39, San Francisco: Jossey-Bass.

Koos, L.V. (1924). The junior college. Minneapolis: University of Minnesota Press.

Krahn, M.D., Mahoney, J.E., Eckman, M.H., Trachtenberg, J., Pauker, S.G., & Detsky, A.S. (1994, September 14). Screening for prostate cancer. Journal of the American Medical Association, 272, 773-780.

Lauerman, C. (1985, June 19). Dr. Aerobics still running with a healthy crowd. The Chicago Tribune, Sec. 5, p. 1-3.

Lautenslager, G. (1991, June 21). Ailing masters runner finds relief, hope in sport he loves. The Dallas Morning News, p. B3.

Lautenslager, G. (1992b, October 2). Coach amazed by performances at Barcelona Paralympics. The Dallas Morning News, p. B15.

Lautenslager, G. (1993, December 3). Samuelson to be honored. The Dallas Morning News, p. 4B.

Lee, M. (1983). A history of physical education and sport in the U.S.A. New York: Wiley.

Leske, M.C., Chylack, L.T., & Wu, S.Y. (1991). The lens opacities case-control

study. Arch Ophthalmol, 109, 244-251.

Levin, S. (1991). Overtraining causes olympic-sized problems. The Physician and Sportsmedicine, 19 (5), 112-118.

Liebman, B. (1992). Antioxidants and cancer. Nutrition Action Healthletter, 5-7.

Long, P. (1992, October). The power of vitamin C. Health, 66-72.

Long, P. (1993, May/June). The vitamin wars. Health, 7 (3), 45-54.

Long, P. (1994, September). Should you believe in it? Vitamin E: Here's all you need to know. Health, 94, 96, 98, 100.

Machlin, L.J., & Sauberlich, H.E. (1994, January/February). New views on the function and health effects of vitamins. Nutrition Today, 29, 25-29.

Mangalindan, M. (1994, April 28). Buying into good health sales of vitamins growing mega-fast. Dallas Morning News, p. 10.

Marino, G. (1994, August 6). Vitamin C helps cigarette-smoking hamsters. Science News, 146, 86.

Marsa, L. (1995, May/June). Can vitamin creams combat wrinkles? Health, 9, 49-51.

McCay, P.B., King, M.M., & Ricans, L.E. (1980). Interactions between dietary fats and antioxidants on DMBA-induced mammary carcinomas and on AAF-induced hyperplastic nodules and hepatomas. Journal of Environmental Pathology and Taxicology, 3, 451-465.

McGill, S.L. (1986). Development of a wellness program model for small liberal arts colleges (Doctoral dissertation, Slippery Rock University, 1986). Dissertation

Abstracts International.

Medina, E. (1993). The effect of the Cooper Wellness Program in promoting long-term lifestyle behavior changes. (Doctoral dissertation, Loma Linda University, 1993). Dissertation Abstracts International, 54 (11), 5618.

Melograno, V.J., & Klinzing, J.E. (1992). An orientation to total fitness. Dubuque, IA: Kendall/Hunt.

Moreau, D. (1989, June). Change agents. Changing Times.

Murray, F. (1993, August). Antioxidants for disease prevention. Better Nutrition for Today's Living, 55 (8), 38-43.

Murray, M. (1994, September). Can these pills make you live longer? Reader's Digest, 145, 19-26.

National Center for Health Statistics (1995). Health United States 1994, (DHHS Pub. No. (PHS) 95-1232). Rockville, MD: U.S. Department of Health and Human Services. Public Health Service. Centers for Disease Control and Prevention. National Center for Health Statistics.

Nierenberg, D.W., Stukel, T.A., & Mott, L. (1994, January 19). Steady-state serum concertration of alpha tocopherol not altered by supplementation with oral beta carotene (vitamin E supplementation). Journal of the National Cancer Institute, 86 (2), 117-120.

O'Conner, C. (1992, April 27). The evolution of Euro-fitness. The Dallas Morning News, p. C1.

Oliveria, S.A., Kohl, H.W., Trichopoulos, D., & Blair, S.N. (1996). The

association between cardiorespiratory fitness and prostate cancer. Medicine and Science in Sports and Exercise, 28, 97-104.

Ostgarden, J. (1994, February). Are free rads eating you alive? Bicycling, 35, 74-75.

Packer, L., & Sullivan, J.L. (1995, January/February). The promise of antioxidants. The Saturday Evening Post, 267, 50-51, 87.

Parnell, D. (1985). The neglected majority. Washington, DC: The Community College Press.

Phinney, C.C. (1988, August). Overtraining. Bicycling, 29, 54-58.

Pierce, K. (1994, April 6). Five-a-Day keeps cancer away. Dallas Morning News, p. F1.

Radical protection for athletes. (1992, June 13). Science News, 141, 398.

Raloff, J. (1989, August 26). Vitamin C protects blood from radicals. Science News, 136, 133.

Raloff, J. (1992, August 1). Hearty vitamins. Science News, 142, 76.

Reice, S. (1985, April). Dr. Kenneth H. Cooper's health and fitness guide. The Ladies Home Journal, 102, 149-156.

Reinhold, R. (1987, March). Has the aerobics movement peaked? An interview with Kenneth Cooper. The Good Health Magazine, 14-17.

Richardson, R.C. (1985). Keynote speech. CUNY Articulation Conference, City University of New York.

Rimm, E.B., Stampfer, M.J., Ascherio, A., Giovannucci, E., Colditz, G.A., &

Willett, W.C. (1993). Vitamin E consumption and the risk of coronary heart disease in men. The New England Journal of Medicine, 328 (20), 1450-1456.

Roan, S. (1994, September 21). Antioxidants: Cancer prevention or a waste of time? Los Angeles Times, p. E1.

Roffmann, A. (1995, March). Vitamins: Health or hype? Better Homes and Gardens, 52, 62-64.

Rosato, F.D. (1986). Fitness and wellness: The physical connection. St. Paul, MN: West Publishing.

Rover, E. (1995, January/February). The great antioxidant debate: Do active women need to take supplements? Women's Sports and Fitness, 17, 65-66.

Schalch, W., & Weber, P. (1994). Vitamins and carotenoids--a promising approach to reducing the risk of coronary heart disease, cancer and eye diseases. Experimental Medicine and Biology, 366, 335-350.

Schectman, G., Byrd, J.C., & Hoffmann, R. (1991). Ascorbic acid requirements for smokers: Analysis of a populations survey. American Journal of Clinical Nutrition, 53, 1466-1470.

Science update. (1994, February 28). The Dallas Morning News, p. F1.

Screening for prostate cancer. (1990, October). America Family Physician, 42, 991-994.

Seidman, E. (1985). In their own words: Perspectives on improving teaching and educational quality in community colleges. San Francisco: Jossey-Bass.

Seiger, L., Vanderpool, K., & Barnes, D. (1995). Fitness and wellness strategies.

Wisconsin: Brown & Benchmark.

Seligmann, J. (1983, August 15). Guidelines: Detecting breast cancer in time. Newsweek, 102, 49.

SerVaas, C. (1989, March). Beating heart disease. The Saturday Evening Post, 261, 20-21, 26-29, 92-96.

Sheehan, G. (1990, May). Life after sex. The Physician and Sportsmedicine, 18, (5),45.

Sheffield, L.T. (1985, September 5). Another perfect treadmill test. New England Journal of Medicine, 313, 533-535.

Shephard, R.J. (1993, April). Exercise in the prevention and treatment of cancer: An update. Sports Medicine, 15 (4), 258-280.

Showalter, M. (1994). An assessment of student wellness needs and perceptions as compared with the wellness perceptions of student affairs professionals. (Doctoral dissertation, University of Mississippi). Dissertation Abstracts International, 55 (07), 1832.

Sies, H., Stahl W., & Sundquist, A.R. (1992, September 30). Antioxidant functions of vitamins, vitamins E and C, beta-carotene, and other carotenoids. Annals New York Academy of Sciences (U.S.), 669 (Institute for Physiologists, Germany), 7-20.

Showalter, M. (1994). An assessment of student wellness needs and perceptions as compared with the wellness perceptions of student affairs professionals. (Doctoral dissertation, University of Mississippi, 1994). Dissertation Abstract International, 55/07, 1832.

Skerrett, P. (1994, August/September). Screening for prostate cancer. Technology Review, 97, 16-17.

Slaga, T.J. (1995). Inhibition of skin tumor initiation, promotion, and progression by antioxidants and related compounds. Critical Reviews in Food Science and Nutrition (U.S.), 35 (1-2), (University of Texas, M.D. Anderson Cancer Center, Science Park--Research Division, USA), 51-7.

Sorensen, J., (1979). Aerobic dancing. New York: Rawson, Wade.

Spaulding, M. (1988, January). Oxygen absorbers keep food fresher. [On-line]. Packaging, 33, (1), 8-10. Abstract from: MEDLINE File: Antioxidants Item: 0746-3820.

Stampfer, M.J., Hennekens, C.H., Manson, J.E., Colditz, G.A., Rosner, B., & Willett, W.C. (1993). Vitamin E consumption and the risk of coronary disease in women. The New England Journal of Medicine, 328 (20), 1444-1449.

Stavric, B. (1994, October). Role of chemopreventers in human diet. Clinical Biochemistry (U.S.), 27 (5), 319-332.

Study supports PSA plus rectal exam for prostate cancer screening. (1994, July). Geriatrics, 49, 18.

TEKS Committee, (1996). Unpublished report by the State Board of Education Texas Essential Knowledge and Skills Committee, Austin, TX.

Texas Higher Education Coordinating Board Community and Technical Colleges Division (1996). Community College General Academic Course Guide Manual. Austin, TX.

Thangaraju, M., Vijayalakshmi, T., & Sachdanandam, P. (1994, July 1). Effect of

tamoxifen on lipid peroxide and antioxidative system in postmenopausal women with breast cancer. Cancer (U.S.), 74, (1), (Department of Medical Biochemistry, University of Madras, India), 78-82.

Thompson, H. (1995, June). Walk, don't run. Texas Monthly, 114, 117, 136.

Tollefson & Fountain, (1992). Forty nine state systems.

Tribble, D.L., Giuliano, L.J., & Fortmann, S.P. (1993). Reduced plasma ascorbic acid concentrations in nonsmokers regularly exposed to environmental tobacco smoke. American Journal of Clinical Nutrition, 58, 886-890.

Trimble, R.T., & Hensley, L.D. (1994). Survey of basic instruction programs in physical education: 1993. Executive summary, University of Northern Iowa.

Turkington, C. (1995, April). Saving face. Vogue, 185, 354-355.

Usefulness of PSA level in prostate cancer screening. (1995, February15). American Family Physician, 51, 662+.

Vastine, P. (1984). A survey of wellness programs in junior and community colleges in the United States. (Doctoral dissertation, 1984). Dissertation Abstracts International.

Vinnedge, M. (1995, January 23). Age erasers for women. The Dallas Morning News, p. C3.

The virtues of vitamin E. (1992, November). Prevention, 44, 10, 12.

Vitamin C attacks the body's worst enemy. (1989, December). Health, 21, 14.

Voelker, R. (1994, April 20). Recommendations for antioxidants: How much evidence is enough? JAMA, 271 (15), 1148-1149.

Wattenbarger, J.L., & Starnes, P.M. (1976). Financial support patterns for community colleges. Gainesville: University of Florida.

Weinstock, C. (1992, June). A tune-up for the treadmill test. American Health, 11, 12+.

Willett, W.C. (1984). Relation of serum vitamins A and E and carotenoids to the risk of cancer. New England Journal of Medicine, 310, 430-434.

Wood, D. (1994, January 12). Vitamins for skin care. Cosmetic firms market ingredients, but does it work. Dallas Morning News, p. E4.

Zeigler, E.F. (1979). History of physical education and sport. Englewood Cliffs, NJ: Prentice-Hall.

Zeldman, D. (1982). Articulation and transfer in Florida. In Frederick C. Kintzer (Ed.), New directions for community colleges, 39. San Francisco: Jossey-Bass.

CHAPTER 3

METHODOLOGY

The perceptions of community college physical education division directors with respect to physical education curricula offered on campus, were the focus for data collection and analysis in this study. The investigation included a survey of 2-year community colleges from the directory of Peterson's Two-Year Colleges (Dilts, 1994).

Population of the Study

A random sample of 400 Physical Education Division Directors from the nation's 1,400 two-year community colleges was surveyed. The random sample (N=400) for the study was taken from the directory of Peterson's Two-Year Colleges (Dilts, 1994). A 50% response rate from the mailed survey was determined to be an adequate sample size for the purposes of this study. For purposes of comparison, the sample was stratified into two regions taken from east (n=200) and west (n=200) of the Mississippi River. An additional 36 surveys were mailed to the east sample due to a large number of unusable responses returned early in the data-gathering process resulting in east (n=236), west (n=200), and total sample (N=436).

Development of the Survey Instrument

The data required for this study were acquired from a survey (see Appendix B) that was specifically designed for this use based on a review of the literature and the recommendations from experts in the field of physical education and wellness. The

survey instrument was composed of a combination of 48 forced-choice items and 3 open-ended questions. The instrument was designed to take approximately 45 minutes. The first part of the survey identified certain institutional demographics and characteristics. The second part of the instrument was used to discover the types of activities, course exemptions, and grading criteria of physical education programs in community colleges. The third part was designed to elicit responses concerning perceptions of the influence of Cooper's work in instructional curricula.

A preliminary draft of the survey instrument was submitted to a panel of eight experts in the field of physical education and wellness. The panel was chosen on the basis of educational and experiential background. The panel critiqued the instrument for face and content validity and ease of understanding. Content validity is defined as "producing a reasonable sample of all possible responses, attitudes, and behaviors" (Rubinson & Neutens, 1987, p. 159). Face validity is defined as "the instrument measures what it purports to measure" (Rubinson & Neutens, 1987, p. 159). Survey items were evaluated for importance by a scale that denotes the categories as important, not important, or uncertain. A second scale for clarity evaluated survey items as clear or unclear. A space for comments was included after each question. After acceptance by the panel of experts and needed revisions were made, a cover letter (Appendix A) and the survey instrument were mailed to the selected population. A follow-up postcard was mailed 1 week later as a reminder.

Procedures for Data Collection

The division director of physical education at the specified institutions (Sample Population, Appendix B) was mailed a packet containing a cover letter, the survey instrument, and a return postage-paid envelope. The cover letter identified the institution, the author of the study, and the purposes of the study. Each survey was coded to allow for follow-up. The coded surveys allowed the researcher to send a follow-up reminder to each institution that did not respond within 1 week. A number placed at the bottom of each survey allowed the researcher to identify nonresponding institutions. A second letter and second copy of the survey were mailed to nonresponding institutions within 4 weeks. A third letter and/or survey were faxed to nonresponding institutions within 8 weeks. Additional follow-up phone calls were made to ensure an adequate return rate.

Procedures for Analyses of Data

Following inspection of the survey instruments for completeness and possible errors, the data were prepared for computer analysis. Part 1 questions 1-13; part two questions 14-22; 24, 26-28, 30-31; and part 3 questions 32-51, were forced-choice questions. Part 2 questions 23, 25, and 29 were open-ended questions. Descriptive statistics (i.e., response frequencies and percentages) were generated to show the current and anticipated prevalence of physical education programs in the nation's 1,400 two-year community colleges. Data in part 1 questions 1-13 were broken down to reveal frequency of response and percentages based on demographic characteristics. Analysis of all forced-choiced survey questions in part 1 through 3 were conducted using the Number

Crunching Statistical Software (NCSS). The NCSS computer program allowed for descriptive analysis of the forced-choice questions in six areas. The six statistical areas were: (a) summary, (b) counts-responses in a given category, (c) mean-average, (d) variation, (e) skewness-if data are normally distributed, and (f) percentages. A two-way Chi-Square test was used to estimate the likelihood that some factor other than chance accounted for a relationship between variables. If a relationship existed between variables, a t-test (if less than 30 responses) or a z-score (if more than 30 responses) was used to further test significance at the .01 level. To guard against a Type I error, the level of significance was set at .01. Because alpha inflates when repeated tests are done on data from the same subjects, one is apt to reject the null hypothesis when it should not be rejected. Open-ended questions were tabulated by hand and prepared for narrative presentation. Narrative summarizations were used for frequently mentioned survey responses. All responses are listed in Appendix C.

CHAPTER 3 REFERENCES

Dilts, S.W. (1994). Peterson's Two-Year Colleges. New Jersey: Peterson's Guides.

Rubinson, L. & Neutens, J.J. (1987). Research Techniques for the Health Sciences. New York: Macmillian.

CHAPTER 4

PRESENTATION AND ANALYSIS OF THE DATA

Introduction

The problem of this study was to determine Kenneth Cooper's influence on the teaching of wellness and fitness in physical education programs in the nation's 1,400 two-year community colleges. The specific purposes of this study in relation to Cooper's influence were as follows: (a) to ascertain Kenneth H. Cooper's contributions to preventive medicine and wellness in community college physical education curriculum; (b) to investigate the extent to which Kenneth H. Cooper's work has been implemented on community college campuses through physical education; (c) to examine changes in physical education programs in U.S. community colleges over the past 10 years; (d) to determine if geographic regions have an impact on acceptance of Cooper's research and work in preventive medicine and wellness; and (e) to determine what factors are considered by 2-year community college faculty and staff to have influenced the wellness and fitness movement in physical education.

The purpose of this chapter is to present and analyze the data that were collected in order to answer the research questions stated in chapter 1. For reader convenience, the research questions are presented in the first part of this chapter. The chapter is then divided into eight sections,including (a) a report of the distribution and rate of return, (b) demographic information on the institutions that responded to the survey, (c) a profile of

the participants, (d) demographic profile of responding institution's physical education program, (e) an analysis of the issues that Cooper has promoted that have been emphasized in community college programs, (f) an examination of how Cooper's work and philosophy of wellness and fitness have influenced the physical education programs in community colleges, (g) an analysis of the changes that have occurred in physical education curriculum over the past 10 years, (h) an analysis of the acceptance of Cooper's work in relation to geographic regions east and west of the Mississippi River, and (i) an examination of the factors that community college division directors consider as influential in developing the physical education curricula at their institution. It is important to note that not all respondents reported information for every item on the survey instrument and may have erroneously failed to complete each item response.

Restatement of the Research Questions

The following research questions were investigated to determine the effect of Kenneth Cooper's research and work in preventive medicine and wellness on the teaching of wellness and fitness in physical education programs in the nation's 1,400 two-year community colleges.

1. What issues that Cooper has promoted have been emphasized in community college physical education programs?

2. How has Kenneth H. Cooper's work and philosophy of wellness and fitness influenced physical education programs in community colleges?

3. What changes have occurred in physical education curriculum in community

colleges over the past 10 years?

4. Does geographic region have an impact on acceptance of Cooper's work in community college physical education programs?

5. What factors are considered by 2-year community college faculty and staff to have influenced the wellness and fitness movement in physical education?

Distribution and Rate of Return

The study population was comprised of 436 2-year community colleges from across the United States. These institutions were identified in the 1994 directory of Peterson's 2-year Colleges (Dilts, 1994). Physical education division directors were considered to be the collegiate representatives most likely to have information associated with the effect of Cooper's work on their institution's physical education programs.

A questionnaire packet containing a cover letter, the survey instrument, and a stamped, addressed, return envelope was mailed in November 1996 to the sample population, which consisted of the physical education division directors at the 436 2-year colleges that were randomly selected from the 1,400 colleges listed in Peterson's directory. One week after the initial mailing, a follow-up postcard was sent to nonrespondents. Additional follow-up procedures were utilized with nonrespondents and included a second and third follow-up letter and survey, telephone calls, and fax communication in an attempt to achieve a greater return rate. Copies of the materials that comprised the questionnaire packet and were mailed to the study participants are presented in Appendix A.

The target response rate for this survey was 50% or at least 218 responses from

the 2-year colleges. A return rate of 62% from 271 institutions was achieved. Of the 271 institutions that returned the survey instrument, only those that indicated they provided physical education programs were included in this study. For purposes of comparison, the sample was stratified into two regions taken from east (n=200) and west (n=200) of the Mississippi River. An additional 36 surveys were mailed to the east sample due to a large number of unusable responses returned early in the data-gathering process, resulting in east (n=236), west (n=200), and total sample (N=436).

Response rate of Group 1 (east group) was 142 of 236 (60.2%), and the response rate of Group 2 (west group) was 129 of 200 (64.5%). The total response rate results by type of college (public or private) and by region (east or west) are presented in Table 11. Of the 164 responding 2-year colleges indicating physical education programs, 157 (95.7%) were from public institutions and 7 (4.3%) were from private institutions. By region, there were 69 respondents from the east and 95 respondents from the west with physical education programs. According to geographic region, 41.5% were from eastern public institutions and less than 1% were from eastern private institutions. From western institutions there were 54.3% from public and 3.7% from private colleges.

Those institutions which responded that they did not provide physical education programs offered some insight as to why programs were not offered on their campuses. Several campuses offered athletics, but not physical education. Several institutions contract their physical education to local organizations such as the YMCA or local health clubs. One respondent stated that their college offers physical education through a neighboring university. They are the only community college out of 12 sampled in the

state of Colorado that has this type of arrangement with the universities to offer physical education credit (coded #45). Comments from all respondents are included in Appendix C.

Table 11

Return Rate by Type of College and by Region (n=271)

Type of college	Physical education program provided	Physical education program not provided	Totals	Percentage
East				
2-year public	68 (41.5%)	27 (25.2%)	95	66.9
2-year private	01 (.006%)	46 (43.0%)	47	33.1
West				
2-year public	89 (54.3%)	12 (11.2%)	101	78.3
2-year private	06 (3.7%)	22 (20.6%)	28	21.7
Total				
Total public	157 (95.7%)	39 (36.4%)	196	72.3
Total private	07 (4.3%)	68 (63.6%)	75	27.7
Totals	164	107 (100.0%)	271	100.0

Institutional Demographic Profile

Religious Affiliation of Responding Institutions

A summary of the pertinent demographic data concerning the institutions that are currently offering physical education programs is presented in Table 12. There were no institutions from the east sample and 4 (4.2%) from the west sample that indicated a religious affiliation. From the total sample only 4 institutions indicated a religious

affilitation and 160, or 97.6%, indicated no religious affiliation.

Table 12

Religious Affiliation of Responding Institutions (n=164)

Affiliation	Frequency	Percentage
East		
Religious affiliation	--	--
No religious affiliation	69	100.0
West		
Religious affiliation	04	4.2
No religious affiliation	91	95.8
Total Sample		
Religious affiliation	04	2.4
No religious affiliation	160	97.6
Totals	164	100.0

Size of Institution

Table 13 illustrates that the majority of respondents were from an institution of less than 2,500 students. The breakdown by size indicates that the least number of respondents from the total sample were from institutions with over 20,000 students.

Table 13

Size of Responding Institutions by Region (n=162)

Size	Frequency	Percentage
East		
Less than 2,500	30	44.8
2,501-5,000	15	22.4
5,001-10,000	09	13.4
10,001-15,000	06	9.0
15,000-20,000	03	4.5
Over 20,000	04	6.0
West		
Less than 2,500	38	40.0
2,501-5,000	25	26.3
5,001-10,000	11	11.6
10,001-15,000	10	10.5
15,000-20,000	05	5.3
Over 20,000	06	6.3
Total Sample		
Less than 2,500	68	42.0
2,501-5,000	40	24.7
5,001-10,000	20	12.3
10,001-15,000	16	19.9
15,000-20,000	08	4.9
Over 20,000	10	6.2
Totals	162	100.0

AAPHERD District of Respondents

Respondents were asked to identity the district in which their institution was located. As shown in Table 14 the majority of respondents were from the southern (21.2%) and southwest (21.2%) districts.

Table 14

AAPHERD District of Respondents by Region, (n=151)

District	Frequency	Percentage
Eastern	25	16.6
Southern	32	21.2
Midwest	38	18.5
Central	14	9.3
Southwest	32	21.2
Northwest	20	13.2
Totals	151	100.0

The least amount of response was from the AAPHERD central district (9.3%).

Profile of the Participants

The respondents were division directors of the physical education department at their institution. Directors who taught at least one class were considered as faculty, whereas those who did not teach were counted as staff. The majority of respondents were faculty members (79.9%), as shown in Table 15.

Table 15

Position Held by Respondent by Region, (n=164)

Position	Frequency	Percentage
East		
Faculty	55	79.7
Staff	14	20.3
West		
Faculty	76	80.0
Staff	19	20.0
Total Sample		
Faculty	131	79.9
Staff	33	20.1
Totals	164	100.0

Only 20.1% indicated that they were staff members of their institutions. By region the east and west samples were comprised of very similar composition, with approximately 80% of the respondents as faculty.

Respondents were asked to indicate an opinion of whether physical education should be offered as a required or elective course for all students. Eighty-six percent responded that physical education should be required. An explanation for their opinion was requested. The most popular reason for requiring physical education for all students was to teach lifetime fitness and health skills. One respondent said, "Students need understanding of how physical activity will relate to the quality of life as they age; the teaching of lifelong activities becomes increasingly important after high school" (coded

answer #113). The second most popular answer was that physical education develops the whole person. "A healthy body is required for best intellectual performance. We subscribe to the ancient Greek idea of mind/body/spirit all being developed simultaneously" (coded answer #153). All comments are included in Appendix C.

The 14% that responded that physical education should be an elective commented that students should be able to decide for themselves if physical education is important. One respondent commented, "Students are too busy with academic and personal responsibilities" (coded #392). Another commented that "the requirement should come earlier in life" (coded #165). All comments are included in Appendix C.

Physical Education Program Profile

Physical Education Requirements

Physical education is required for the general student population at 19.6% of the responding institutions, as shown in Table 16. Sixty-two colleges representing 38% of the sample responded that physical education is required only for students receiving a 2-year degree. Although physical education programs were offered, there was no requirement for physical education at 35.6% of the responding institutions. The west sample that indicated 44.7% required physical education for the 2-year degree compared to 29.0% of the east sample. The requirement for the general student population was higher from the east sample with 24.6% compared to 16.0% from the west sample.

Table 16

Physical Education Requirements for Community Colleges for 2-year Degree and General Student Population, by Region, (n=163)

Requirement	Frequency	Percentage
East		
2-year degree only	20	29.0
Requirement for general student population	17	24.6
No requirement	27	39.1
Other	05	7.2
West		
2-year degree only	42	44.7
Requirement for general student population	15	16.0
No requirement	31	33.0
Other	06	6.4
Total Sample		
2-year degree only	62	38.0
Requirement for general student population	32	19.6
No requirement	58	35.6
Other	11	6.7
Totals	163	100.0

Types of Physical Education Courses Offered

In addition to the basic instruction program of activity classes, the sample population was asked to respond to questions regarding lecture classes, adapted physical

education classes, and physician referrals for adapted classes. Table 17 shows 76.9% of the institutions offered lecture courses.

Table 17

Physical Education Courses Offered in 2-year Community Colleges in the United States by Type and by Physician Referral for Adapted Course, (n=160)

Type of Course Offered	Frequency	Percentage
Lecture course	123	76.9
No lecture course	37	23.1
Totals	160	100.0
Adapted course	46	28.8
No adapted course	114	71.3
Totals	160	100.0
Physician referral for adapted course		
For all individuals	14	31.8
For some individuals	16	36.4
No referral	14	31.8
Totals	44	100.0

A specific section of adapted physical education courses is offered to disabled students in 28.8% of the colleges. Of these, 28.8%, physician's referral for entrance to an adapted physical education class is required 31.8% of the time for all individuals. No referral is required 31.8%, and 36.4% require a referral in some, but not all cases.

Respondents were also asked to name the specific courses that were required in

their physical education program. Although the names differed from Concepts of Fitness and Wellness to Lifetime Wellness, the majority of respondents listed courses that included the word wellness. Healthful Living and courses listing the word health as a component were also mentioned frequently. All responses are listed in Appendix C.

When asked to identify three conceptual areas that were most likely to be included in the nonactivity courses, nutrition was listed in almost all of the responses. Stress management was also rated as one of the top three conceptual areas. Fitness and wellness were ranked highly, as well as first aid and CPR. All responses are listed in Appendix C.

Physical Education Instruction

Responding institutions indicated that part-time faculty teach less than 10% of the activity classes in a third of the institutions and more than 50% of the classes in another third of the institutions, as shown in Table 18. The remaining third of the institutions utilize part-time faculty in 11 to 50% of the activity courses.

Part-time faculty teach fewer than 10 percent of the lecture courses as indicated by two thirds of the respondents. Table 19 shows that the majority of the lecture classes are taught by full-time instructors. Part-time instructors teach less than 10% of the lecture classes in 60.3% of the institutions from the east and 70.7% of the institutions from the west.

Table 18

Percent of Physical Education Activity Courses Taught by Part-Time Faculty, by Region, (n= 160)

Percent of courses taught by part-time faculty	Frequency	Percentage
East		
0-10%	24	36.4
11-20%	5	7.6
21-30%	5	7.6
31-40%	6	9.1
41-50%	4	6.1
More than 50%	22	33.3
West		
0-10%	29	30.9
11-20%	12	12.8
21-30%	9	9.6
31-40%	7	7.4
41-50%	9	9.6
More than 50%	28	29.8
Total Sample		
0-10%	53	33.1
11-20%	17	10.6
21-30%	14	8.8
31-40%	13	8.1
41-50%	13	8.1
More than 50%	50	31.3
Totals	160	100.0

Table 19

Percent of Physical Education Lecture Courses Taught by Part-Time Faculty, by Region, (n= 155)

Percent of courses taught by part-time faculty	Frequency	Percentage
East		
0-10%	38	60.3
11-20%	5	7.9
21-30%	8	12.7
31-40%	1	1.6
41-50%	1	1.6
More than 50%	10	15.9
West		
0-10%	65	70.7
11-20%	6	6.5
21-30%	2	2.2
31-40%	3	3.3
41-50%	3	3.3
More than 50%	13	14.1
Total Sample		
0-10%	103	66.5
11-20%	11	7.1
21-30%	10	6.5
31-40%	4	2.6
41-50%	4	2.6
More than 50%	23	14.8
Totals	155	100.0

Credit Hours for Physical Education Activity Courses

The number of credit hours for physical education activity classes given by responding community colleges in the United States indicates a variation from zero to 3 credit hours, with 139 colleges allowing 1 credit hour for each activity course. Two credit hours are earned in 34 of the institutions, and 3 credit hours in 4 responding colleges. Two institutions reported that no credit was given for activity courses.

Substitutions and Exemptions for Physical Education Courses

Community college respondents indicated that 8% of the colleges in the west and 12% in the east allowed proficiency or competency tests to substitute for physical education courses, as shown in Table 20. Extracurricular activities that substitute for a physical education class include cheerleading, rodeo team, drill team, and athletics. Colleges in the west (34.7%) are more likely to substitute athletics for physical education than colleges in the east (23.2%). It is also more likely that no extracurricular activities will be substituted in colleges in the east (72.5%) than in colleges in the west (60%).

Students may be exempted from physical education classes for medical reasons (28.7%), varsity athletics (9.8%), age (12.2%), or military status (14.6%) as shown in Table 21. Regional differences indicated that responding colleges in the east are more likely to exempt students for military status (17.4%) than colleges in the west (12.6%).

Table 20

Substitutions for Physical Education Courses in Community Colleges, by Region, (n=164)

Substitutions for physical education courses	Frequency	Percentage
East		
Proficiency tests (n=63)	12	19.0
Activities: (n=69)		
Cheerleading	06	8.7
Rodeo team	- -	- -
Drill team	- -	- -
Athletics	16	23.2
Other	- -	- -
No substitutions given	50	72.5
West		
Proficiency tests (n=92)	8	8.7
Activities: (n=95)		
Cheerleading	17	17.9
Rodeo team	8	8.4
Drill team	2	2.1
Athletics	33	34.7
Other	5	5.3
None	57	60.0
Total Sample		
Proficiency tests (n=155)	20	12.9
Activities: (n=164)		
Cheerleading	23	14.0
Rodeo team	8	4.9
Drill team	2	1.2
Athletics	49	29.9
Other	5	3.0
None	107	65.2

Note. Totals will not reflect the sample number of n=164. Respondents chose more than one answer for this question.

Table 21

Exemptions for Physical Education Courses in Community Colleges, by Region, (n=164)

Exemptions	Frequency	Percentage
East (n=69)		
Medical reasons	19	27.5
Varsity athletics	7	10.1
Age	6	8.7
Military status	12	17.4
Other	4	5.8
West (n=95)		
Medical reasons	28	29.5
Varsity athletics	9	9.5
Age	14	14.7
Military status	12	12.6
Other	4	4.2
Total Sample (n=164)		
Medical reasons	47	28.7
Varsity athletics	16	9.8
Age	20	12.2
Military status	24	14.6
Other	8	4.9

Note. Respondents chose more than one answer. Totals will not equal n=164.

Grading Criteria and Promotion of Physical Education Courses

At 96% of the community colleges that responded to the survey, physical

education course grades are included in a student's cumulative grade point average. Grading criteria are consistent in courses with multiple sections and different instructors in 88% of the colleges. Specific efforts are made to promote activity courses in 65% of the colleges, while only 53% promote the lecture courses.

Percent of Activity Courses Taught at Beginner, Intermediate, and Advanced Levels

Activity courses are taught at three levels. Twenty-eight institutions reported that 100% of their courses are for beginners. Twenty-nine colleges indicated that 80% of their courses are for beginners. Another 17 colleges responded that half of their activity courses are for beginners. Twenty-two percent (34) of the colleges do not teach intermediate activity classes. Of the institutions reporting instruction for intermediate classes, 26 colleges indicated that only 20% of their activity classes are for the intermediate level. An additional 21 colleges reported 10% of classes at the intermediate level. Eighty-five colleges (56.7%) do not teach advanced activity courses. The most frequent response of institutions that teach advanced classes was of 20 institutions (13.3%) that reported teaching 10% of their activity classes at the advanced level.

Rationale for Physical Education in 2-year Community Colleges

Respondents rated three purposes of physical education from a selection of five criteria, as shown in Table 22. The five criteria were: (a) to develop a committment to lifelong participation, (b) to develop beginner skills in a sport/activity, (c) to become physically fit and healthy, (d) enjoyment of participation in an exercise activity, and (e) to develop intermediate/advanced skills in a sport/activity. Over half of the respondents

Table 22

Purposes of a Physical Education Program in 2-year Community Colleges, by ranking and by Region (n=164)

Purposes	Frequency and percentage by ranking		
	1	2	3
East			
Develop commitment to lifelong participation	38 (55.1)	15 (21.7)	6 (8.7)
Develop beginner skills	7 (10.1)	11 (15.9)	13 (18.8)
Become fit and healthy	15 (21.7)	19 (27.5)	17 (24.6)
Enjoyment of participation	7 (10.1)	19 (27.5)	20 (29.0)
Develop int./adv. skills	--	4 (5.8)	1 (1.4)
Other	2 (2.9)	1 (1.4)	3 (4.3)
West			
Develop commitment to lifelong participation	45 (47.4)	27 (28.4)	11 (11.6)
Develop beginner skills	5 (5.3)	11 (11.6)	16 (16.8)
Become fit and healthy	25 (26.3)	29 (30.5)	18 (18.9)
Enjoyment of participation	15 (15.8)	24 (25.3)	42 (44.2)
Develop int./adv. skills	--	1 (1.1)	1 (1.1)
Other	2 (2.1)	2 (2.1)	1 (1.1)
Total Sample			
Develop commitment to lifelong participation	83 (50.6)	42 (25.6)	17 (10.4)
Develop beginner skills	12 (7.3)	22 (13.4)	29 (17.7)
Become fit and healthy	40 (24.4)	48 (29.3)	35 (21.3)
Enjoyment of participation	22 (13.4)	43 (26.2)	62 (37.8)
Develop int./adv. skills	--	5 (3.0)	1 (.6)
Other	4 (2.4)	3 (1.8)	4 (2.4)
Totals	164		(100.0)

(50.6%) rated a commitment to lifelong participation as the most important purpose of a physical education program as shown in Table 22. Becoming physically fit and healthy was rated second (24.4%), and enjoyment of participation in an exercise activity was rated third (13.4%). The same three were rated as most important in regard to east and west regions, but the east region rated developing beginner skills and enjoyment of participation equally as their third choice (10.1%).

Analysis of Issues Emphasized in Community Colleges

The following research question was investigated to determine the effect of Kenneth Cooper's research and work in preventive medicine and wellness on the teaching of wellness and fitness in physical education programs in the nation's 1,400 2-year community colleges. The following analysis is in answer to the research question. What issues that Cooper has promoted have been emphasized in community college physical education programs? The issues as shown in Table 23 were selected from the research literature as topics that Cooper has promoted through his research publications, books, and speeches. Respondents were asked to rank each issue as to the extent that Cooper's research and work had affected the content of their curriculum. A ranking of 1 indicated that the respondent strongly agreed that Cooper had significantly affected their curriculum content. A likert scale from 1 to 5 allowed respondents to agree, disagree or indicated indecision in regards to each of the issues. A chi-square was used to compare the respondents answers from the east and west samples. Significant correlations at the

.01 level were not found between any of the variables.

Table 23

Issues Promoted by Cooper and Emphasized in Curriculum Content in 2-year Community College Physical Education Programs, by ranking (n=135)

	Ranking according to extent of Cooper's influence Strongly agree 1	Agree 2	Undecided 3	Disagree 4	Strongly disagree 5	
Issues	Frequency and percentage					Mean
	1	2	3	4	5	
Aerobic exercise	65 (48.1)	46 (34.1)	16 (11.9)	1 (.7)	7 (5.2)	1.80
Physical fitness	59 (43.7)	50 (37.0)	13(9.6)	4 (3.0)	9 (6.7)	1.91
Cardiovascular disease	48 (35.8)	51 (38.1)	18 (13.4)	5 (3.7)	12 (9.0)	2.11
Stress	24 (17.9)	47 (35.1)	35 (26.1)	9 (6.7)	19 (14.2)	2.64
Nutrition	22 (16.3)	49 (36.3)	36 (26.7)	11 (8.1)	17 (12.6)	2.64
Cholesterol	17 (13.2)	52 (40.3)	32 (24.8)	13 (10.1)	15 (11.6)	2.66
Smoking	25 (18.8)	42 (31.6)	34 (25.6)	14 (10.5)	18 (13.5)	2.68
Treadmill stress test	14 (10.5)	46 (34.6)	45 (33.8)	10 (7.5)	18 (13.5)	2.78
Cancer	10 (7.6)	44 (33.3)	43 (32.6)	18 (13.6)	17 (12.9)	2.90
Osteoporosis	5 (3.8)	41 (31.1)	52 (39.4)	16 (12.1)	18 (13.6)	3.00
Occupational fitness	8 (6.0)	34 (25.4)	56 (41.8)	14 (10.4)	22 (16.4)	3.05
Antioxidants	9 (6.8)	28 (21.1)	56 (42.1)	22 (16.5)	18 (13.5)	3.09
Social fitness	9 (6.7)	33 (24.6)	50 (37.3)	20 (14.9)	22 (16.4)	3.09
Emotional fitness	8 (6.0)	32 (23.9)	53 (39.6)	18 (13.4)	23 (17.2)	3.11
Intellectual fitness	8 (6.0)	36 (26.9)	47 (35.1)	17 (12.7)	26 (19.4)	3.12
Spiritual fitness	5 (3.7)	14 (10.4)	60 (44.8)	26 (19.4)	29 (21.6)	3.44

Note. Respondents for each question ranged from 129 to 135. Not every respondent answered every question.

In Table 23 the variables (issues) have been arranged in rank order of significance to show the issues that received the highest mean average. Respondents ranked aerobic exercise as their first choice 48.1% as compared to physical fitness 43.7%. Cardiovascular disease was ranked first 35.8% of the time compared to spiritual fitness, which ranked first 3.7% of the time and is listed as the last issue.

Influence of Cooper's Work and Philosophy of Wellness and Fitness in Community College Physical Education Programs

An examination of the influence of Cooper's work and philosophy of wellness and fitness in community college physical education programs was the focus of research question 2: How has Kenneth H. Cooper's work and philosophy of wellness and fitness influenced physical education programs in community colleges?

Physical Education Courses Related to Aerobic Fitness

Respondents were requested to indicate the percentage of courses in their activity program related to aerobic fitness, as shown in Table 24. The largest majority (21.9%) reported that more than half of their activity courses related to aerobic fitness. Only 12.6% reported that less than 10% of their activity courses related to aerobic fitness. Twenty-four percent of the colleges in the west sample reported more than half of their courses related to aerobic fitness compared to the east sample, who reported 17.7%.

Table 24

Courses in Activity Program Related to Aerobic Fitness (n=150)

Aerobic Fitness Courses Percent	Frequency	Percentage
East		
0-10	12	19.4
11-20	8	12.9
21-30	10	16.1
31-40	9	14.5
41-50	12	19.4
More than 50	11	17.7
West		
0-10	7	7.9
11-20	14	15.7
21-30	20	22.5
31-40	8	9.0
41-50	18	20.2
More than 50	22	24.7
Total sample		
0-10	19	12.6
11-20	22	14.6
21-30	30	19.9
31-40	17	11.3
41-50	30	19.9
More than 50	33	21.9
Totals	150	100.0

Note. East sample n=62. West sample n=77.

Cardiovascular Tests Developed by Cooper and Implemented in Physical Education Programs

Community college respondents (164) indicated their use of cardiovascular tests developed by Cooper. The majority of physical education programs (39.0%) use the 1.5 mile walk/run test developed by Cooper. Thirty-four percent of the respondents do not use any of the cardiovascular tests developed by Cooper. Another 36.6% responded that they use the 12-minute walk/run test which is often referred to as the Cooper test. Respondents from the east sample (42%) were more likely to use the 12-minute test as compared to the west sample (41.1%), whose number-one choice was the 1.5 mile test. Fifteen percent of the respondents indicated the use of other Cooper-developed tests. These other tests included the step test, one-mile walk test, and swim test. Other comments are listed in Appendix C.

Changes in Community College Physical Education Programs

Research question number 3 asked: What changes have occurred in physical education curriculum in community colleges over the past 10 years? Respondents answered questions concerning changes in the emphasis on aerobic fitness courses at institutions, student popularity of activities, activities that have shown the greatest increase in student popularity over the past 10 years, and changes in physical education credit hours for activity courses. A response by 160 colleges indicated that 70.2% of the institutions had an increase in the emphasis on aerobic fitness courses in the last 10 years. Only 5% indicated a decrease. and 24.8% reported no change in the emphasis on

aerobic fitness courses for the previous 10 years. A marked difference by region showed an increased emphasis in aerobic fitness courses from the east sample of 57.4% and from the west sample, 79.6%. Although the decreased emphasis was similar for the east (5.9%) and west (4.3%) samples, the east sample reported no change in emphasis in aerobic fitness courses by 36.8% of the institutions compared to 16.1% of the west sample.

Respondents were asked to rank the top 5 activities that were popular among the student population as shown in Table 25. There were 12 activity choices in addition to a space marked other. Fitness/aerobic activies were chosen as the most popular activity by 31.7% of the institutions. The second most popular choice was weight training (24.4%), with aerobic dance (12.8%) as the third choice. The least popular choices were cycling (0%), aquatic (less than 1%) and softball/baseball (less than 1%). Respondents in the other category indicated that bowling was a popular activity. All responses are listed in Appendix C. Table 25 illustrates the number of times an activity was chosen as the first, second, third, fourth, or fifth choice.

Table 25

Most Popular Activites According to the Student Population, (n=164)

Activity	Popularity According to ranked choices frequency				
	1	2	3	4	5
Fitness/Aerobics	52	22	22	13	8
Weight training	40	38	35	8	1
Aerobic dance	21	32	28	11	6
Basketball	12	7	11	23	9
Tennis	10	8	12	11	25
Golf	9	11	16	9	16
Other	9	10	4	7	8
Volleyball	8	13	21	23	18
Badminton	2	2	5	7	6
Racquetball/handball	3	5	6	7	9
Softball/Baseball	1	8	5	2	6
Aquatics	1	3	10	4	9
Cycling	--	--	1	4	3

Note. Totals do not equal n=164 because respondents may have chosen two answers equally as their first choice.

Type of Activities Increasing in Student Popularity

Respondents ranked the type of activity that had gained the most student popularity in the previous 10 years. The three types were individual sports, team sports, and aerobic/fitness activities. Eighty-three percent of the institutions (123) ranked aerobic/fitness activities as having shown the greatest increase in student popularity in the previous 10 years. Individual sports were ranked by 25% of the institutions as having shown the greatest increase. Only 7.3% of the institutions ranked team sports as the

activity that had increased the most in student popularity.

Changes in Required Physical Education Credit Hours

No change in required physical education credit hours was reported by 105 of the respondents (66.5%). A decrease in the number of required credit hours was reported by 42 (26.6%) of the institutions. Only 11 colleges (7%) indicated an increase in required credit hours.

Acceptance of Cooper's Work According to Geographic Region

Data analysis examined the differences between the responses of the two sub-samples east and west of the Mississippi River. Chi-square analysis showed no significant differences at the .01 level between the two subsamples. Research question 4 examined Cooper's impact based on geographical regions: Does geographic region have an impact on acceptance of Cooper's work in community college physical education programs?

Respondents were asked to indicate the degree of influence of Cooper's work regarding the wellness and physical education curriculum at their institution, as shown in Table 26. When asked to respond to the question, "To what degree of significance do you believe the work of Kenneth H. Cooper has influenced the wellness and physical education curriculum at your institution," respondents rated the significance from 1 to 5 with 1 as highly significant and 5 as no significance. Three indicated undecided. Fifty-four percent of the respondents (73) rated Cooper's influence as significant. Twenty-six percent were undecided and 18% rated his influence as insignificant. By region, 33 of the

east sample (60%) indicated Cooper's work was significant compared to 40 of the west sample (50.6%).

Respondents were given the opportunity to write comments concerning Cooper's influence. Several respondents indicated that they were not familiar with Cooper's name or his research. Other respondents commented that Cooper had a direct influence on the fitness movement in the United States, but not in regards to community college curriculum. Several additional comments stated that their institutions use Cooper's research as background for wellness courses. All responses are listed in Appendix C.

Table 26

Influence of Kenneth H. Cooper's Work Regarding Wellness and Physical Education Curriculum at 2-year Community Colleges, (n=134)

Region	Frequency and percentage of degree of significance				
	Very Significant 1	2	3 undecided	4	5 No Significance
East	11 (20.0)	22 (40.0)	14 (25.5)	2 (3.6)	6 (10.9)
West	11 (13.9)	29 (36.7)	22 (27.8)	9 (11.4)	8 (10.1)
Total Sample	22 (16.4)	51 (38.1)	36 (26.9)	11 (8.2)	14 (10.4)
Totals	col. 1-2	73 (54.9)		col. 4-5	25 (18.6)

Note. East region n=55 and west region n=79.

Examination of Factors Influencing Community College Curricula

Respondents were asked to rank the factors having the most influence on the physical education curricula at their institution, as shown in Table 27. Four factors selected as answers were state governing body, local governing body, Kenneth Cooper's research and work, and research by professionals other than Cooper. Respondents could also answer with their own individual factor listed as other on the survey instrument. The state governing body was ranked by 44 institutions (26.8%) as having the most influence on their physical education curricula. The local governing body was ranked as the first by 23.8% of the respondents and second by 20.1%.

Cooper's research and work were ranked first by 9.8% of the respondents, while other professionals were ranked first by 12.2% of the respondents. By region, the east sample ranked the state governing body as most influential (36.2%) compared to the ranking of the west sample ranking of 20%. Local government was ranked first (26.3%) by the west sample and 20.3% by the east sample. The second highest ranking was other with 17.7% of the respondents indicating individual factors. The majority of the comments listed as other were in relation to the local faculty and/or staff as having the most influence on the physical education curricula. The second most frequently mentioned other was the needs of the local community. All comments are listed in Appendix C.

Table 27

Factors Influencing Physical Education Curricula at 2-year Community Colleges (n=164)

Factors	Influence on physical education curricula, ranked Frequency and Percentage				
	1	2	3	4	5
East					
State governing body	25 (36.2)	3 (4.3)	6 (8.7)	1 (1.4)	1 (1.4)
Local governing body	14 (20.3)	14 (20.3)	6 (8.7)	1 (1.4)	1 (1.4)
Cooper's research	7 (10.1)	8 (11.6)	6 (8.7)	5 (7.2)	--
Research by other professionals	11 (15.9)	7 (10.1)	5 (7.2)	1 (1.4)	--
Other	8 (11.6)	7 (10.1)	3 (7.2)	--	--
West					
State governing body	19 (20.0)	9 (9.5)	9 (9.5)	5 (5.3)	2 (2.1)
Local governing body	25 (26.3)	19 (20.0)	4 (4.2)	5 (5.3)	1 (1.1)
Cooper's research	9 (9.5)	12 (12.6)	12 (12.6)	5 (7.2)	3 (3.2)
Research by other professionals	9 (9.5)	13 (13.7)	18 (18.9)	3 (3.2)	--
Other	21 (22.1)	5 (5.3)	2 (2.1)	1 (1.1)	1 (1.1)
Total sample					
State governing body	44 (26.8)	12 (7.3)	15 (9.1)	6 (3.7)	3 (1.8)
Local governing body	39 (23.8)	33 (20.1)	10 (6.1)	6 (3.7)	2 (1.2)
Cooper's research	16 (9.8)	20 (12.2)	18 (11.0)	10 (6.1)	3 (1.8)
Research by other professionals	20 (12.2)	20 (12.2)	23 (14.0)	4 (2.4)	--
Other	29 (17.7)	12 (7.3)	5 (3.0)	1 (.6)	1 (.6)

Note. Totals do not reflect the total sample of n=164 because some respondents did not rank every item.

CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, AND IMPLICATIONS AND RECOMMENDATIONS

This chapter is organized into five main sections: summary, discussion, conclusions, implications, and recommendations for further research. The summary of the study outlines the rationale and purpose for the study, the research procedures, and the findings. Discussion of the findings is presented and related to the literature review. Implications for the research findings are addressed, and recommendations for additional research are related to the findings.

Summary of the Study

Rationale for the Study

Earlier research findings of wellness programs in community colleges have shown that the concept of wellness is not completely understood or fully accepted by college administrators in particular and society in general (Vastine, 1984). Of the six dimensions of wellness (spiritual, emotional, social, intellectual, vocational, and physical), most of the programs are offered in the physical dimension. Despite research pointing to the need for a holistic, balanced lifestyle, community college physical education programs do not seem to be putting research into practice in their curriculum. A lack of research exists in the literature concerning community college physical

education programming in which wellness is implemented on higher education campuses. No follow-up study has previously been conducted to confirm Vastine's theory that a wellness trend exists. No studies had previously examined the effect that Kenneth H. Cooper, a preventive medicine and wellness pioneer, has had on the teaching of a wellness philosophy in community college physical education courses. Although Cooper is recognized as a leader in the fitness and wellness movement, there are no previous studies linking his theories and ideas to higher education.

Problem and Purposes of the Study

In light of the foregoing, many people believe that Kenneth Cooper has significantly impacted education programs through his Institute for Aerobics Research and his many publications. No other study had been done to determine Cooper's direct effect on the teaching of wellness and fitness in physical education programs in the nation's 1,400 2-year community colleges. Therefore, there was a need to ascertain and document the contributions of Kenneth H. Cooper, M.D. to preventive medicine and wellness education in community college physical education programs in the United States. The specific purposes of this study in relation to the influence of Kenneth Cooper were: (a) to ascertain Kenneth H. Cooper's contributions to preventive medicine and wellness in community college physical education curriculum; (b) to investigate the extent to which Kenneth H. Cooper's work has been implemented on community college campuses through physical education; (c) to examine changes in physical education programs in community colleges in the United States over the past ten years; (d) to

determine if geographic regions have an impact on acceptance of Cooper's research and work in preventive medicine and wellness; and (e) to determine what factors are considered by 2-year community college faculty and staff to have influenced the wellness and fitness movement in physical education.

Method of Procedures

The procedures for this study involved the designing of a descriptive survey instrument based on previous research and a review of the literature. A panel of experts assessed the survey instrument for content validity. The survey questionnaires, along with a cover letter and return envelope, were mailed to 436 2-year community college division directors selected randomly from a list of 1,400 institutions. A return rate of 62% was achieved. Only those respondents who indicated involvement in a physical education program were included in the study (n=164).

The completed survey questionnaires were used to code the data and present the results which were obtained after administration of the statistical procedures. Comments from the respondents were summarized and are included in Appendix C.

Discussion of the Findings

The findings of the study are based on the responses to the five research questions that were investigated to identify the wellness issues emphasized in community colleges and to examine changes in physical education curriculum, the factors influencing the wellness and fitness movement in physical education, and how Cooper's work and philosophy of wellness and fitness have influenced physical education programs in

different regions of 2-year community colleges in the United States. The major findings are presented based on the results of the survey.

Demographic Profile of Respondents

An analysis of the demographic profile of the responding colleges involved in physical education programming revealed a majority of institutions (68%) with fewer than 2,500 students. Institutions were predominantly public, with no religious affiliation. Those persons completing the survey were primarily faculty members from the southern and southwest AAPHERD districts, with slightly more respondents from the west sample than the east sample. The majority of respondents, 86%, believe that physical education should be required, citing the importance of lifetime fitness and health skills. An earlier study by Trimble and Hensley (1993) indicated that 77% of the physical education administrators favored a physical education requirement for students. Of the 271 respondents, 164 offered physical education programs. In 1984 Vastine found that only 49% of the colleges surveyed had a wellness program. Only 45% of these colleges with wellness programs were implemented and administered by the physical education department (Vastine, 1984).

Demographic Profile of Physical Education Programs of Respondents

Physical education is required at 38% of the institutions for a 2-year degree only, but is required for all students at 57% of the institutions. A study by Trimble and Hensley (1993) that reported physical education as a requirement for graduation in two thirds of the 4-year institutions in the United States showed only a slight 9% difference in requirements between community colleges and 4-year universities.

While 100% of the respondents indicated that activity courses are included in physical education programming, lecture courses are offered in 76.9% of the institutions. Part-time faculty teach over 50% of the activity courses in a third of the institutions, and less than 10% of the lecture courses in two thirds of the institutions. The typical activity course carries a 1-credit hour at 85% of the institutions and a 2-hour credit at 34% of the institutions compared to a 2-credit hour requirement at 45% of the four-year institutions in Trimble's study (1993). The majority of institutions (28.8%) do not offer an adapted course. Those that do offer adapted courses require physician referrals for all individuals 33% of the time. Very few specific courses are required in the physical education program. Most frequently mentioned were courses with the term wellness as part of the title, and they consisted of content related to concepts of fitness and wellness. The conceptual areas most likely to be included in nonactivity courses were nutrition, stress management, and fitness/wellness. Trimble and Hensley's study in 1993 found similar results with nutrition and stress management as the top two conceptual areas most likely to be included in nonactivity courses.

Substitutions for physical education courses were more likely to be found in the west sample (40%) than in the east sample (27%). Substitutions were given for athletics in 30% of the institutions. The second most likely substitution was for cheerleading in 14% of the colleges. The west sample substituted rodeo team, drill team, and other activities for physical education, while the east sample did not. Trimble and Hensley's (1993) study cited medical reasons for granting exemptions from physical education. The present study found that 29% of the institutions granted medical exemptions. Military

status earned an exemption in 15% of the colleges. In the west sample, age was an important factor in 15% of the college exemptions compared to 9% in the east sample.

Grading criteria for community colleges were consistent in courses with multiple sections and different instructors in 88% of the institutions. A much lower percentage was found in Trimble and Hensley's (1993) study of 4-year colleges, which reported 27%. A student's physical education course grade was included in the cumulative grade point average at 97% of the community colleges compared to 77% of the 4-year universities (Trimble & Hensley, 1993). Fifty-seven percent of the institutions reported that they do not teach advanced activity courses. Seventeen percent of the colleges teach only beginner classes. Respondents (72.28%) indicated that a majority of the activity classes are for beginners. with 18.45% for intermediate and 7.39% for advanced. The three purposes of physical education rated most often were (a) a commitment to lifelong participation (50.6%), (b) becoming physically fit and healthy (24.4%), and (c) enjoyment of participation in an exercise activity.

Analysis of Issues Emphasized in Community Colleges

Issues selected from the research literature as topics that Cooper has promoted through his research publications, books, and speeches were examined to determine the extent that Cooper's research and work affected the content of the curriculum in community college physical education programs. Chi-square analysis revealed no significant differences for each issue for the west sample and east sample at the .01 level of significance. Aerobic exercise was ranked the issue promoted by Cooper that had most significantly affected their curriculum. Ranked second was physical fitness, and third,

cardiovascular disease. These three topics correspond to the primary topics covered in Cooper's first several books, beginning with the publication of his bestseller in 1968, Aerobics. Sequels to Aerobics followed in 1970, beginning with The New Aerobics, which was geared toward exercisers over the age of 40 and having an increased emphasis on safety. In 1972 a book to meet the special needs of women, Aerobics for Women, was coauthored with Cooper's wife Mildred (M. Cooper & K.H. Cooper, 1972). In 1977 Cooper's The Aerobics Way incorporated previous programs with the dissemination of the latest research concerning the need for exercise and good health. The death of Jim Fixx, a well-known marathon runner who died while jogging, prompted Cooper (1985b) to write Running Without Fear. In 1982 Cooper wrote The Aerobics Program for Total Well-being to emphasize the importance of exercise, diet, and emotional balance. Cooper (1991c) wrote Kid Fitness to encourage and motivate parents to emphasize exercise and nutrition for children. He wrote a series of books to tailor programs of preventive medicine for individual needs including Controlling Cholesterol (1988), Preventing Osteoporosis (1989), and Overcoming Hypertension in 1990 (Cooper, 1988b, 1989d, 1990b). Cooper's (1994a) Antioxidant Revolution promised to delay the signs of aging and reduce the risk of cancer and heart disease with a prevention program that included antioxidant vitamin therapy. Cooper's 1995 book It's Better to Believe, related spiritual fitness to health and longevity.

Ranked last as least significantly impacting community college physical education programs was spiritual fitness (3.7%). Vastine (1984) found that 46% of the community colleges did not offer physical education programs in the spiritual dimension.

Program participation was not offered in 35% of the cases in the social dimension or intellectual dimension, according to Vastine. Both social fitness (6.7%) and intellectual fitness (6.0%) ranked as insignicantly impacting physical education curriculum, according to respondents in the present study.

Influence of Cooper's Work and Philosophy of Wellness and Fitness in Community College Physical Education Programs

Since the 1968 publication of Aerobics, national media attention has attracted the general public's interest in fitness and wellness. Twenty-one percent of the respondents reported that more than half of their activity courses are related to aerobic fitness. Nineteen percent indicated that 41-50% of the courses are related to aerobic fitness. The majority of physical education programs (39.0%) use the 1.5 mile walk/run test developed by Cooper. Thirty-four percent of the respondents do not use any of the cardiovascular tests developed by Cooper. Another 36.6% responded that they use the 12- minute walk/run test that is often referred to as the Cooper test. Respondents from the east sample (42%) were more likely to use the 12-minute test as compared to the west sample (41.1%), whose number-one choice was the 1.5 mile test. Fifteen percent of the respondents indicated the use of other Cooper-developed tests. These other tests included the step test, one-mile walk test, and swim test.

Changes in Community College Physical Education Programs

In 1984 Vastine's study predicted a 35% increase in programming in the dimension of physical fitness. A response by 160 colleges in the present study indicated that 70.2% had an increase in the emphasis on aerobic fitness courses in the last 10 years.

Only 5 percent indicated a decrease, and 24.8% reported no change. Respondents from the west sample (79.6%) reported a greater increase than the east sample (57.4%). The top five activities were ranked by respondents. The present study parallel Trimble and Hensley's study (1993), with the exception of one activity. Fitness/aerobic activities were chosen as the most popular activity by 31.7% of the institutions. The second most popular choice was weight training (24.4%), with aerobic dance (12.8%) as the third choice. The least popular choices were cycling (0%), aquatic (less than 1%), and softball/baseball (fewer than 1%). Trimble and Hensley's study listed racquetball instead of basketball as one of the six most popular activites.

The activity that has gained the most student popularity in the past 10 years was aerobic/fitness activities, ranked first by 83% of the institutions. Individual sports were ranked by 25% of the institutions as having shown the greatest increase in student popularity. Team sports were ranked last by 7.3% of the institutions. Trimble and Hensley's study (1993) reported fitness activities as showing the greatest increase in student popularity, at 78% of the 4-year universities.

No change in physical education credit hours were reported by 105 of the respondents (66.5%). A decrease in the number of required credit hours were reported by 26.6%. An increase in credit hours was reported by only 7%. Trimble and Hensley's (1993) study for 4-year universities reported no change by 84% of the respondents, with only 12% citing a decrease in credit hours.

Acceptance of Cooper's Work in Relation to Geographic Regions East and West of the Mississippi River

Statistical analysis using Chi-square to determine the relationship between variables for the east sample and the west sample revealed no significant differences at the .01 level of significance. Sixteen wellness issues that Cooper has promoted, such as aerobic exercise, received similar responses from both the east and west samples. An examination of the responses from the two samples regarding the degree of influence of Cooper's work on their institution's physical education program showed no significant differences. The respondents (54%) rated Cooper's influence as significant. Eighteen percent rated his influence as insignificant. Several respondents commented that, although Cooper has had a significant impact on the fitness and wellness movement in the United States, he has had a less significant impact on community college physical education programs.

Factors Influencing Physical Education Curricula

Two-year community colleges are governed in various ways: state boards, church boards, single state authority, or commissions. Local authority may consist of a board of five to nine members governing one community college or a board that works as a central district organization operating independent districts of several community colleges. A community college may be affiliated with a state university or be governed under a state board with many local district boards. The advantages of state authority for the transfer function and articulation between community colleges and universities may be offset by the loss of local autonomy for a community college. Common policies, fiscal

procedures, and basic standards for facilities do not always meet the needs of an individual community college. A 1992 study by Tollefson and Fountain reported that 40 states are governed under a state system. Nine states were identified as not having a state system. The present study indicated that respondents considered the state governing body as the most important factor influencing physical education curricula at 2-year colleges. Forty-four percent of the total sample ranked state authority as the number-one factor. Differences existed between regions, as 36% of the east sample reported state authority as the most important factor,whereas 20% of the west sample chose the state governing body as their second choice. Twenty-six percent of the west sample chose local authority as the most important factor influencing physical education curricula at their institutions. Funding patterns differ greatly from state to state. Four types of state support are (a) negotiated budget based on prior annual expenditures, (b) unit-rate formula measured by student contact hours, (c) minimum foundation affected by local tax funding, and (d) cost-based program funding measured by actual expenditures, with local tax funds as a factor. The present study indicated that 17.7% of the respondents considered other factors not preselected by the survey as the third most important factor influencing the curricula. Responses fell into two categories: (a) the influence of local administration, faculty, and staff and (b) the influence of meeting student needs. Research by other professionals was cited by 12.2% of the respondents as an influencing factor, whereas Cooper's research and work ranked last with 9.8%. The literature review points to state legislation and funding patterns as the force behind curricular development in our nation's 2-year community colleges, with local administrative decisions as the second

factor.

Conclusions

Based on the findings from the analysis of the data, as well as from the review of the literature, the following conclusions are derived as they relate to the purposes of the study:

1. Kenneth H. Cooper's contributions to preventive medicine and wellness in community college physical education curriculum are overshadowed by state and local governing bodies, which appear to be the main force behind curricular development in the nation's 2-year community colleges. Cooper's research and work is wellknown by the majority of community college physical education division directors. As an individual contributor, therefore, Cooper is regarded by physical education division directors as having influenced the wellness and physical education curriculum in community college physical education programs in the areas of aerobic exercise, physical fitness, and cardiovascular disease. However, other research professionals and organizations are also considered as significant contributors to the content of physical education curriculum. Although it is recognized that Cooper has significantly impacted the fitness and wellness movement in the United States, his influence in higher education physical education programs ranks behind state and local governing authorities and other research professionals.

2. Evidence of Cooper's impact on community college physical education programs is the use of the 1.5 mile run test and 12-minute run test to measure cardiovascular fitness. Cooper's research in the early 1960s in aerobic exercise and

subsequent public promotion may also have contributed to the popularity of aerobic exercise classes and the emphasis on cardiovascular fitness in activity classes. The increase in student popularity of fitness-related activity classes in community colleges cannot be directly linked to Cooper's research and work, although his research has contributed to the wellness movement that continues to increase in popularity in physical education programs. Earlier research studies support the present study, indicating that Cooper's research on antioxidants and spiritual fitness are not priorities in physical education programming. Although Cooper's preventive medicine and wellness research and work have been considered a significant factor in the wellness and fitness movement throughout the United States and although his work is wellknown by physical education professionals, the extent of his influence is limited to the use of cardiovascular testing and the promotion of aerobic exercise concepts in community college physical education programs.

3. The changes in physical education programs in community colleges in the United States in the past 10 years show an increased emphasis on aerobic fitness courses. Fitness and aerobic activities continue to increase in student popularity. Credit hours for physical education are decreasing in institutions with physical education programs. Due to a lack of research in this area, no comparisons could be drawn concerning the number of community colleges that have dropped physical education; although it should be noted that 40% of the community colleges responding to the present study indicated no physical education programming.

4. Geographic regions do not appear to have an impact on the acceptance of

Kenneth Cooper's research and work in preventive medicine and wellness. Cooper is wellknown throughout the United States by community college physical education professionals, primarily for his contributions to the fitness and wellness movement.

5. State legislation and funding patterns is the main force behind curricular development in community colleges, as supported by the literature review and the present study. Local authority is the next most important factor. Community college physical education division directors consider local student needs and their institution's administration as the third most important factor influencing community college physical education curricula. Research by professionals other than Kenneth Cooper has had more influence than Cooper's research and work.

Implications

Physical education in community colleges will continue to change as legislation and funding affect the future of higher education. Local administrative decisions will determine the direction or demise of physical education curriculum. The trend toward aerobic fitness and wellness will continue to influence the type of activity and lecture courses taught on community college campuses.

Based on the review of the literature and the study findings, physical education programs in community colleges must capitalize on students' continued interest in aerobic exercise and fitness activities. The Surgeon General's July 1996 report citing inactivity as a major risk factor in disease and early death should provide a foundation for community college physical education programs to support their contention that all students need a holistic wellness course to achieve an opportunity for life-long health and

wellness.

The decrease in requirements and credits and the continued substitutions and exemptions for physical education in community college programming should serve as a warning signal to administrators that the importance of a balanced lifestyle that includes physical activity should be taught to all students and is in jeopardy as state legislation and funding patterns force curricular changes. Part-time faculty continue to teach a majority of activity courses as full-time faculty are limited to fewer and fewer classes in an effort for community colleges to reduce their expenditures for instruction. An increase in lecture courses that teach a wellness component will justify and possibly save physical education departments from a reduction in faculty or programming.

Recommendations

The current research investigation has revealed suggestions for further study in the following areas:

1. The baseline data developed in this study can be used for a longitudinal study in 5 to 10 years to determine the changes and status of physical education programs in community colleges in the United States.

2. A revised survey instrument citing other research and research professionals in the wellness and preventive medicine field could be developed to assess the extent of acceptance by community college physical education professionals to implement current research in their curriculum.

3. A study involving 4-year universities as well as community colleges to investigate the trends that occur in physical education programming from the community

college level to the university would reveal characteristics that could impact the future of physical education in higher education.

4. Further study involving community college administrators as well as physical education directors would be beneficial in establishing perceptions and goals in relating the physical education curriculum to the collegiate mission.

5. Additional research is needed to establish the effect that state legislation and local authority will have on the future of physical education curriculum.

CHAPTER 5 REFERENCES

Cooper, K.H. (1968). Aerobics. New York: Bantam Books.

Cooper, K.H. (1970). The new aerobics. New York: Bantam Books.

Cooper, K.H. (1977). The aerobics way. New York: Bantam Books.

Cooper, K.H. (1982). The aerobics program for total well-being. New York: Bantam Books.

Cooper, K.H. (1988b). Controlling cholesterol. New York: Bantam Books.

Cooper, K.H. (1989d). Preventing osteoporosis. New York: Bantam Books.

Cooper, K.H. (1990b). Overcoming hypertension. New York: Bantam Books.

Cooper, K.H. (1991c). Kid fitness: A complete shape-up program from birth through high school. New York: Bantam Books.

Cooper, K.H. (1994a). Antioxidant revolution. Nashville, TN.: Thomas Nelson.

Cooper, K.H. (1995b). It's better to believe. Nashville, TN.: Thomas Nelson.

Cooper, M. ,& Cooper, K.H. (1972). Aerobics for women. New York: Bantam Books.

Trimble, R.T., & Hensley, L.D. (1994). Survey of basic instruction programs in physical education: 1993. Executive summary, University of Northern Iowa.

Vastine, P. (1984). A survey of wellness programs in junior and community colleges in the United States. (Doctoral dissertation, 1984). Dissertation Abstracts International.

APPENDIX A

SURVEY COVER LETTER

SURVEY

SURVEY FOLLOW-UP CORRESPONDENCE

SURVEY COVER LETTER

Dear Colleague,

I would like to encourage your participation in a research study that I believe will be valuable to you and your physical education program. Your institution has been selected as one of 400 community colleges nationwide to be involved in this project. Should you choose to participate, as I hope you will, you will need to complete the enclosed survey and return it to me by December 15, 1996.

As a physical education faculty member at Weatherford College and as a doctoral student in the Higher Education program at the University of North Texas, I am interested in answers to the following questions:

- What is the current status of community college physical education curricula and programs?
- What changes have occurred in community college physical education curricula and programs over the past 10 years?
- What individuals and influences have been responsible for those changes?

I am confident that these questions are also of interest to you. Please provide a profile of your program and your professional perspectives on the enclosed survey. Your responses will contribute to the nationwide profile gathered from all participating community colleges. My research should provide answers to the questions stated above.

The instrument will take approximately 45 minutes to complete, and your coded responses will be confidential. I will provide you an executive summary of the research highlights and conclusions along with a list of the community colleges participating in the study. Please complete the survey and return it to me by December 15, 1996.

Sincerely,

Barbara Coan, M.Ed.
Weatherford College

November 1996

FOLLOW-UP POSTCARD

The postcard was mailed one week after the first survey mailing to all non-respondents.

Recently you were requested to complete a survey instrument.

A Survey of Physical Education Programs in Two-Year Colleges in the U.S.	The purpose of the research project is to determine the perceptions of physical education division directors as to the influence of Kenneth Cooper's work on the teaching of wellness and fitness in physical education programs and the changes that have occurred in the past ten years in physical education curricula.

If you have any questions or need another survey, please contact:
Barbara Coan, 113 Southfork Dr., Weatherford, Tx. 76087 or (817) 599 3800.

Please take a few minutes and respond by returning the completed questionnaire within the week. Your comments are invited. Thank you!

FOLLOW-UP LETTER

December 12, 1996

TO: PHYSICAL EDUCATION DIVISION DIRECTOR OR ACADEMIC DEAN

THE FOLLOWING LETTER WAS MAILED TO YOU IN NOVEMBER. I AM ENCLOSING A COPY OF THE LETTER AND ANOTHER COPY OF THE SURVEY. AS YOU PROBABLY KNOW, MY DOCTORAL DISSERTATION MUST HAVE AN ADEQUATE RESPONSE FOR DATA ANALYSIS. IF YOU DO NOT HAVE A PHYSICAL EDUCATION PROGRAM, PLEASE CALL AND LET ME KNOW. THANK YOU FOR YOUR HELP!

Dear Colleague,

I would like to encourage your participation in a research study that I believe will be valuable to you and your physical education program. Your institution has been selected as one of 400 community colleges nationwide to be involved in this project. As a physical education faculty member at Weatherford College in Weatherford, Texas and as a doctoral student in the Higher Education program at the University of North Texas, I am interested in answers to the following questions:

- What is the current status of community college physical education curricula and programs?
- What changes have occurred in community college physical education curricula and programs over the past 10 years?
- What individuals and influences have been responsible for those changes?

I am confident that these questions are also of interest to you. Please provide a profile of your program and your professional perspectives on the enclosed survey. Your responses will contribute to the nationwide profile gathered from all participating community colleges. My research should provide answers to the questions stated above.

The instrument will take approximately 45 minutes to complete, and your coded responses will be confidential. I will provide you an executive summary of the research highlights and conclusions along with a list of the community colleges participating in the study. Please complete the survey and return it to me by December 25, 1996.

Sincerely,

Barbara Coan M.Ed.
Weatherford College
817 599 3800
113 Southfork Drive
Weatherford, Tx. 76087

THIS PROJECT HAS BEEN REVIEWED BY THE U.N.T. COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (PHONE: 817-565-3940)

Survey of Physical Education Programs

Part One

1. What is your professional position?	☐ Faculty ☐ Staff
2. What is the status of your institution?	☐ Public ☐ Private
3. Does your institution have a religious affiliation?	☐ Yes ☐ No
4. What is the size of your institution?	☐ Less than 2,500 ☐ 2,501-5,000 ☐ 5,001-10,000 ☐ 10,001-15,000 ☐ 15,001-20,000 ☐ over 20,000
5. Geographically, is your institution on the east or west side of the Mississippi River?	☐ East ☐ West
6. Geographically, in which AAPHERD district is your institution located?	☐ Eastern ☐ Southern ☐ Midwest ☐ Central ☐ Southwest ☐ Northwest
7. Are physical education activity courses required for students at your institution?	☐ Yes, for 2-year degrees only ☐ No ☐ Yes, for general student population ☐ Other
8. Have the number of credit hours required for physical education activity courses at your present institution changed in the last ten years?	☐ No change ☐ Increased ☐ Decreased
9. Do you offer (nonactivity) lecture/discussion courses in the Basic Instruction Program?	☐ Yes ☐ No
10. Do you offer a specific section of adapted physical education for disabled students?	☐ Yes ☐ No
11. If answer to question #10 is yes, are physician referrals required for entrance to an adapted physical education course for disabled students?	☐ Yes, in all cases ☐ No ☐ Yes, in some cases
12. What percent of physical education activity courses are taught by part-time faculty?	☐ 0-10 % ☐ 11-20 % ☐ 21-30% ☐ 31-40 % ☐ 41-50% ☐ More than 50%
13. What percent of physical education (nonactivity) lecture/discussion courses are taught by part-time faculty?	☐ 0-10 % ☐ 11-20 % ☐ 21-30% ☐ 31-40 % ☐ 41-50% ☐ More than 50%

Part Two

14. Has the emphasis on aerobic fitness courses at your institution changed in the last ten years?	☐ No change ☐ Increased emphasis ☐ Decreased emphasis
15. How many hours of credit does an activity course carry?	☐ One ☐ Two ☐ Three ☐ None
16. Do you allow proficiency or competency tests to substitute for physical education courses?	☐ Yes ☐ No

17. Which extracurricular activities substitute for a physical education class?	☐ Cheerleading ☐ Rodeo team ☐ Drill team ☐ Athletics ☐ Other _____ ☐ None
18. Are physical education course grades included in a student's cumulative grade point average?	☐ Yes ☐ No
19. Is the grading criteria consistent in courses that have multiple sections and different instuctors?	☐ Yes ☐ No
20. Are specific efforts made to promote the activity courses?	☐ Yes ☐ No
21. Are specific efforts made to promote the (non-activity) lecture/discussion courses?	☐ Yes ☐ No
22. At the college level, should physical education be required for all students or offered as an elective?	☐ Required ☐ Elective
23. Explain the reason for your answer to question #22.	_____ _____ _____ _____
24. At your institution what are the specific number of hours required for physical education?	☐ Semester hours _____ ☐ Quarter hours _____ ☐ None
25. What specific courses are required, if any?	Name ☐ _____ ☐ _____ ☐ _____
26. What percent of students are exempted from physical education classes for the following reasons?	☐ Medical _____ ☐ Varsity Athletics _____ ☐ Age _____ ☐ Military ☐ Other _____
27. What type of activity has shown the greatest increase in student popularity over the past ten years? Rank the following 1-3 with #1 as the highest.	☐ Individual sports ___ ☐ Team sports ___ ☐ Fitness/Aerobic activities ___
28. Rank from 1 to 5 with #1 as the highest the activities that are the most popular among the student population.	☐ Tennis ___ ☐ Basketball ___ ☐ Volleyball ___ ☐ Weight Training ___ ☐ Softball/Baseball ___ ☐ Golf ___ ☐ Aerobic Dance ___ ☐ Badminton ___ ☐ Cycling ___ ☐ Aquatics ___ ☐ Racquetball/Handball/Squash ___ ☐ Fitness/Aerobic activities (jogging, walking) ___ ☐ Other _____

29. Name three conceptual areas that are most likely to be included in the nonactivity courses (such as nutrition, stress management)	☐ _____ ☐ _____ ☐ _____
30. What is the percent of activity courses taught at the beginner, intermediate and advanced levels?	☐ Beginner level _____ ☐ Intermediate level_____ ☐ Advanced level _____
31. Rank the three most important purposes of the physical education program 1-3 with #1 as the most important.	☐ Develop a committment to lifelong participation ___ ☐ Develop beginner skills in a sport/activity ___ ☐ Become physically fit and healthy ___ ☐ Enjoyment of participation in an exercise activity ___ ☐ Develop intermediate/advanced skills in a sport/activity ___ ☐ Other _____

Part Three

Definition of Terms

Aerobics-the term aerobic means "with oxygen" (Websters dictionary). Aerobic exercise refers to any activity that produces a cardiovascular benefit

Emotional Health Domain- (emotional fitness)the ability to express emotions comfortably and appropriately (Bruess and Richardson, 1994)

Intellectual Health Domain- (intellectual fitness) a person who uses the resources available to expand knowledge in improved skills, increases potential for sharing with others, and engages in creative mental activities (Vastine, 1984)

Occupational Health Domain- (occupational fitness) includes feelings of comfort and accomplishment related to one's daily tasks. For those employed outside the home, the aspects of a job make up occupational health (Eberst, 1985, cited in Bruess and Richardson, 1994)

Physical Health Domain- (physical fitness) includes health-related and skill-related fitness

Social Health Domain- (social fitness) includes good relations with others, the presence of a supportive culture, and successful adaptation to the environment (Bruess and Richardson, 1994)

Spiritual Health - (spriritual fitness) includes the ability to discover and express your purpose in life; to experience love, joy, peace, and fulfilment; and to help yourself and others achieve full potential (Chapman, 1987, cited in Bruess and Richardson, 1994).

Wellness-integrated method of functioning that maximizes an individual's potential (Showalter, 1994) in different dimensions (e.g. spiritual, emotional, vocational, social, intellectual, and physical)

32. What factors have had the most influence on the physical education curricula at your institution? Rank in order with #1 as having the most influence.	☐ State governing body ___ ☐ Local governing body ___ ☐ Kenneth Cooper's research and work ___ ☐ Research by professionals other than Cooper ___ ☐ Other _____
33. What percent of courses offered in your activity program are related to aerobic fitness?	☐ 0-10 % ☐ 11-20 % ☐ 21-30% ☐ 31-40 % ☐ 41-50% ☐ more than 50%
34. Which of the following activities that Cooper developed have you used in your courses?	☐ 1.5 mile run test ☐ other _____ ☐ 12 minute run test ☐ none

To what extent has Cooper's research and work affected the content of your curriculum regarding the following issues? Rate each issue by marking a number 1 to 5 using the following scale in response to the statement: Kenneth Cooper has significantly affected the content of my curriculum regarding the following issues.	1 Strongly Agree	2 Agree	3 Undecided	4 Disagree	5 Strongly Disagree
35. Cholesterol	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
36. Nutrition	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
37. Osteoporosis	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
38. Aerobic Exercise	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
39. Spiritual Fitness	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
40. Emotional Fitness	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
41. Physical Fitness	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
42. Social Fitness	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
43. Intellectual Fitness	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
44. Occupational Fitness	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
45. Treadmill Stress Test	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
46. Cancer risks	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
47. Cardiovascular disease	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
48. Antioxidants	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
49. Smoking	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
50. Stress management	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
51. To what degree of significance do you believe the work of Kenneth H. Cooper has influenced the wellness and physical education curriculum at your institution?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
	very significantly				none

Thank you for completing this survey. Please return it in the pre-addressed envelope provided.

_____ Check here if you would like to receive a summary of the final report.

Barbara Coan Hm. 817 599 3800
Weatherford College Wk. 817 594 5471 (258)
113 Southfork Drive Fax 817 598 6210
Weatherford, TX 76087

THIS PROJECT HAS BEEN REVIEWED BY THE U.N.T. COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS
(PHONE: 817-565-3940) November 1996 Code: _____

APPENDIX B

SAMPLE POPULATION

SAMPLE POPULATION

The sample population which was randomly selected from a list of 1,400 t2-yearyear colleges (Dilts, (Ed.), Peterson's Guides, 1995) is listed in the appendix with the name of the institution and address. All 1,400 colleges were entered into a computer database after being stratified into two sub-samples from the west and east side of the Mississippi River. They were stratified based on their zip codes which identify each state with an individualized national number. They were randomly assigned numbers by a computer-generated program in Microsoft Works. The numbers were sorted to provide a random list of colleges. Two-hundred colleges from each sub-sample were selected for the study population for colleges east and west of the Mississippi. An additional 36 colleges from the east were added to the sub-sample after early returns showed a high number of unusable responses with a resulting total sample (N=436) of east (n=236) and west (n=200).

East Respondents

Aiken Technical College	Aiken, SC 29802-0600
Alamance Community College	Graham, NC 27253-8000
American Academy Mcallister, 450 West 56th St.	New York, NY 10019-3602
Aquinas College at Milton	Milton, MA 02186-4253
Art Institute of Atlanta, 3376 Peachtree Rd, N.E.	Atlanta, GA 30326-1018
Atlantic Community College	Mays Landing, NJ 08330-2699
Bay De Noc C. C.	Escanaba, MI 49829-2511
Bay Path College	Long Meadow, MA 01106-2292

Berkshire Community College	Pittsfield, MA 01201-5786
Black Hawk College, 6600 34th Ave.	Moline, IL 61265
Bramson Technical Institute	Forest Hills, NY 11375-4239
Briarcliffe Business School	Woodbury, NY 11797-2015
Broward C. College, 225 E. Las Olas Blvd.	Ft. Lauderdale, FL 33301
Bryant & Stratton Bus. Institute	Albany, NY 12205-5230
Bryant & Stratton Bus. Institute	Richmond Heights, OH 44143-2900
Cazenovia College	Cazenovia, NY 13035
Central City Bus. Institute, 224 Harrison St.	Syracuse, NY 13202-3052
Central Florida C. C.	Ocala, FL 34478-1388
Central Penn. Business School	Summerdale, PA 7093-0309
Champlain College, 163 South Willard St.	Burlington, VT 05401-3950
Chattahoochee Valley State C.C.	Phoenix City, AL 36869-7928
Chesapeake College	Wye Mills, MD 21679-0008
Cincinnati State Tech., 3520 Central Pkwy.	Cincinnati, OH 45223-2612
City Colleges of Chicago, 30 E. Lake St.	Chicago, IL 60601-2420
City Colleges of Chicago, 7500 South Pulaski Rd.	Chicago, IL 60652-1242
Cleveland Community College	Shelby, NC 28150
Cochran School of Nursing, St. Johns Riverside	Yonkers, NY 10701
College of Lake County	Grayslake, IL 60030-1198
Columbus State Ohio C.C., Box 1609	Columbus, OH 43216-1609
Commonwealth Bus. College	LaPort, IN 46350

Craven Community College, 800 College Ct. New Bern, NC 28562-4984

Delaware Tech. and C.C., Box 610 Georgetown, DE 19947

Delaware Tech C.C., 1832 N. Dupont Pkwy. Dover, DE 19901-2221

Duff's Business Institute, 110 9th St. Pittsburgh, PA 15222-3618

Dutchess C.C. Poughkeepsie, NY 12601-1595

Dyersburg State C.C., P.O. Box 648 Dyersburg, TN 38025-0648

East Georgia College Swainsboro, CA 30401-0369

Edison Community College, P.O. Box 06210 Ft. Meyers, FL 33906-6210

Electronic Institute Middletown, PA 17057-4851

Electronic Institute Pittsburg, PA 15217-2919

Essex County College, 303 University Avenue Newark, NJ 07102-1798

Eugenio Maria De Hostos C.C., 475 Grand Consourse, Bronx, NY 10451-5307

Floyd College Rome, GA 30162-1864

Forsyth Technical Comm. College Winston Salem, NC 27103-5197

Frederick C. College, 7932 Opossumtown Plaza Frederick, MD 21702

Fugazzi College, 406 Lafayette Ave. Lexington, KY 40502-2140

Gadsden State C. College, P.O. Box 227 Gadsden, AL 35902-0227

Gogebic C. College, E4946 Jackson Rd. Ironwood, MI 49938

Gupton Jones College Decatur, GA 30035-4022

Hagerstown Jr. College, 11400 Robinwood Dr. Hagerstown, MD 21742

Herkimer County C.C. Herkimer, NY 13350

Hesser College, 3 Sundial Avenue Manchesler, NH 03103-7245

Hillsborough C. College, P.O. Box 31127	Tampa, FL 33631-3127
Holyoke Community College	Holyoke, MA 01040-1099
Hussian School of Art, 1118 Market St.	Philadelphia, PA 9107-3679
ICS Center for Degree Studies	Scranton, PA 18515
Illinois Eastern Community College	Olney, IL 62450-1043
Indiana Voc. Tech. College	Evansville, IN 47710-3398
Interboro Institute, 450 West 56th St.	NY 10019-3602
International Business College	Fort Wayne, IN 46804-1217
ITT, Fort Wayne	Ft. Wayne, IN 46825-5532
ITT, Greenfield	Greenfield, WI 53220-4612
ITT, Knoxville	Knoxville, TN 37919-1637
ITT, Nashville, P.O. Box 148029	Nashville, TN 37214-8029
ITT, Tampa	Tampa, FL 33634-7350
J.F. Drake State Tech. College, 3421 Meridian St. North, Huntsville, AL 35811-1584	
Jackson State Comm. College	Jackson, TN 38301-3797
Jefferson Community College	Watertown, NY 13601
John A. Logan College	Carterville, IL 62918
Joliet Junior College	Joliet, IL 60436-9352
Jones County Junior College	Ellisville, MS 39437-3901
Katharine Gibbs, Boston	Boston, MA
Kent State University	Ashtabula, OH 44004-2299
Kent State Univ. Stark Campus	Canton, OH 44720-7599

Kent State, East Liverpool	East Liverpool, OH 43920-3497
Kent State University	Warren, OH 44483-1998
Keystone Junior College	LaPlume, PA 18440-0200
Kirkland C. College, 10775 N. St. Helen Rd.	Roscommon, MI 48653
Lake Michigan College, 2755 E. Napier Ave.	Benton Harbor, MI 49022
Lansing C. College, P.O. Box 400101	Lansing MI 48901-7210
Lenoir Community College	Kinston, N.C. 28501
Lexington Community College, 10840 South Westan Ave., Chicago, IL 60643-3294	
Lima Technical College	Lima, OH 45804-3597
Lincoln Technical	Philadelphia, PA 19136-1595
Long Island College, Hospital School of Nursing	Brooklyn, NY 11201-5940
Lord Fairfax Community College	Middletown, VA 22645-0047
Macon College, 100 College Station Dr.	Macon, GA 31297
Madison Junior College of Bus.	Madison, WI 53705-1399
Martin Community College	Williamston, NC 27892
Massasoit Community College	Brockton, MA 02402-3996
Maysville C. College, U.S. 68 South	Maysville, KY 41056
McCann School of Business, Main and Pine Streets	Mahanoy City, PA 17948
Mid-America College	Jeffersonville, IN 47130-9630
Middle George College	Cochran, GA 31014-1599
Mid-State Tech. College	Wisconsin Rapids, WI 54494-5599
Mississippi Delta C.C.	Moorhead, MS 38761-0668

Montcalm Community College	Sidney, MI 48885-0300
Motlow State Community College	Tullahoma, TN 37388-8100
Mountain Empire Community College	Big Stone Gap, VA 24219-0700
N. Central Technical, Mansfield, Box 698	Mansfield, OH 44901-0698
N.W. Connecticut Tech. College	Winsted, CT 06098
N.W. Technical College	Archbold, OH 43502-9542
Nassau Community College	Garden City, NY 11530-6793
National Business School	Harrisonburg, VA 22801-9709
National Education-Bauder College	Ft. Lauderdale, FL 33334-3929
New Hampshire Tech. Institute	Concord, OH 03302-2039
New York City Tech. College, 300 Jay St.	Brooklyn, NY 11201-2983
North Shore C. College, 1 Funcroft Rd.	Danvers, MA 01923
Northampton County Area C.C.	Bethlehem, PA 18017-7599
Northcentral Technical College	Wausau,WI 54401-1880
Northern Essex C. College, Elliot Way	Haverhill, MA 01830
Northern Virgniia Comm. College	Annandale, VA 22003-3796
Ohio Institute, 2029 Edgefield Rd.	Dayton, OH 45439-1917
Okaloosa Walton Community College	Niceville, FL 32578-1295
Penn Technical, 110 9th St.	Pittsburgh, PA 15222-3692
Pennsylvania College	Williamsport, PA 17707-5778
Phillips Beth Israel/Nursing, 310 E. 22nd St.	New York, NY 10010-5702
Piedmont Virginia C.College	Charlottesville, VA 22902-8714

Pittsburg Technical Institute, 635 Smithfield St.	Pittsburgh, PA 15222-2560
Prince George's C. College, 301 Largo Rd.	Largo, MD 20772
Rappahannock C. College, P.O. Box 287	Glenns, VA 23149-0287
Rockingham College College	Wentworth, NC 28375-0038
Sauk Valla Community College	Dixon, IL 61021
Schenectady County C.C., 78 Washington Avenue	Schenectady, NY 12305-2294
South Suburban College	South Holland, IL 60473-1270
Southwestern College of Business	Cincinnati, OH 45246-1122
S.W. College of Business, 225 W. 5th St.	Dayton, OH 45402-3003
State Univ. of NY	Cobleskill, NY 12043
State Univ. of NY	Delhi, NY 13753
Tampa College, Lakeland	Lakeland, FL 33801-5907
Technical College of the Lowcountry	Beaufort, SC 29901-1288
Triangle Technical Institute, Greensburg Center	Greensburg, PA 15601-2012
Tri-county Community College	Murphy, NC 28906-7919
Tunxis Community College	Farmington, CT 06032-3026
Union County College	Cranford, NJ 07016-1528
Univ. of Maine at Augusta	Augusta, ME 04330-9410
University of Wisconsin Center, 705 Viebahn St.	Manitowoc, WI 54220
University of Wisconsin, Fond, 400 Campus Drive	Fond du Lac, WI 54935-2950
W. Wisconsin Tech. College, P.O. Box 908	Lacrosse, WI 54602-0908
Wake Technical Comm. College	Raleigh, NC 27603-5696

Wallace State Comm. College	Hanceville, AL 35077-2000
Warren County C.C.	Washington, NJ 07882-9605
Waycross College	Waycross,GA 31503-9248
Wayne County Comm. College, 801 West Fort St.	Detroit, MI 48226-9975
West Side Institute, 9801 Walford Avenue	Cleveland, OH 44102-4797
Westchester Comm. College	Valhalla, NY 10595-1698
Wilkes Community College	Wilkesboro, NC 28697
York Tech. College	Rock Hill, SC 29730-3395

West Respondents

Aims Community College, Box 69	Greeley , CO 80632-0069
Allen County Comm. Col.	Iola , KS 66749-1607
Alvin Community College, 3110 Mustang Rd.	Alvin, TX 77511-4898
American River College, 4700 College Oak Dr.	Sacramento, CA 95841-4286
Arizona Western College	Yuma, AZ 85366-0929
Art Institute of Dallas, 8080 Parklane	Dallas, TX 75231-5993
Bakersfield College, 1801 Panorama Dr.	Bakersfield , CA 93305-1299
Barton County Community College	Great Bend, KS 67530-9283
Bee County College,3800 Charco Rd.	Beeville, TX 78102-2197
Bel-rea Institute	Denver , CO 80231-3048
Big Bend Community College	Moses Lake, WA 98837-3299
Blinn College, 902 College Ave. E	Brenham, TX 77833-4049
Brazosport College, 500 College Drive	Lake Jackson, TX 77566-3199

Cannons Int'l Bus. Col., 1500 Kapiolani Blvd. Honolulu, HI 96814-3797

Casper College, 125 College Drive Casper, WY 82601-4699

Central Calif. Comm. College, 255 West Bullard Fresno, CA 93704-1706

Central Arizona College Coolidge, AZ 85228-9779

Clackamas Community College, 19600 S. Molaila Oregon City, OR 97045

Clark College, 1800 E. McLouglin Vancouver, WA 98663-3598

Clatsop Community College Astoria, OR 97103

Clovis Community College, 417 Schepps Boulvd. Clovis, NM 88101-8381

Coastline Community College, 11460 Warner Ave., Fountain Valley, CA 92708

Cochise College, 4190 W. Highway 80 Douglas , AZ 85607-9724

Coffeyville Community College, 400 W. 11th Coffeyville, KS 67337-5063

Colby Community College Colby, KS 67701-4099

College of the Siskiyous, 800 College Avenue Weed, CA 96094-2899

College of Oceaneering Wilmington, CA 90744-6399

Colorado N.W. Comm. Col., 500 Kennedy Drive Rangely, CO 81648-3598

Community College of Denver, P O Box 173363 Denver, CO 80217-3363

Community College of Aurora, 16000 E. Centretech, Aurora, CO 80011-9036

Cuyamaca College, 2950 Jamacha Rd. El Cajon, CA 92019-4304

Cypress College, 9200 Valley View Cypress, CA 90630-5897

Denver Auto & Diesel College, 405 S. Platte River Dr., Denver, CO 80223-2025

Dodge City Community College, 2501 N. 14th Ave., Dodge City, KS 67801-2399

East Lost Angeles College, 1301 Brooklyn Ave. Montery Park, CA 91754

Eastern New Mexico Univ.	Roswell, NM 88202-6000
Eastern Wyoming College, 3200 West C. Street	Torrington, WY 82040-1699
Everett Community College, 801 Wetmore	Everett, WA 98201-1390
Fashion Inst. of Design & Merc., 919 S Grand Ave.	Los Angeles, CA 90015-1426
Foothill College, 12345 El Monte Rd.	Los Altos Hills, CA 94022
Fort Peck	Poplar, MT 59255-0398
Frank Phillips College, P.O. Box 5118	Borger, TX 79008-5118
Fresno College, 1101 E. University	Fresno, CA 93741-002
Galveston College, 4015 Ave. Q	Galveston, TX 7750-7496
Gateway Electronics Inst., 4862 South 96th St.	Omaha, NE 68127-2048
Glendale Community College, 6000 W. Olive Ave.	Glendale, AZ 85302-3090
Golden West College, 15744 Golden West St.	Huntington Beach, CA 92647-2748
Grays Harbor College	Aberdeen, WA 98520-7599
Haskell Indian Nations Univ.	Lawrence, KS 66046-4800
Heald College, 100 Prof. Center Dr.	Santa Rosa, CA 95403-3116
Heald Business College, 2910 Prospect Park Dr.	Rancho Cordova, CA 95670-6005
Heald Institute of Technology	San Jose, CA 95130-1623
Heald Business College, 1453 Mission St.	San Francisco, CA 9410.
Howard College, 1001 Birdwell Ln.	Big Spring, TX 79720-3702
Iowa Lakes Community College	Estherville, IA 51334-2725
Itasca Community College	Grand Rapids, MN 55744
ITT Technical School, 630 E Briar Dr. #150	San Bernadino, CA 92408

ITT Technical Institute, P.O. Box 7567	Boise, ID 83706-2831
ITT Technical Institute	Aurora, CO 80014-1476
ITT Technical Institute, 12720Gateway Dr., #100	Seattle, WA 98168-3342
Jacksonville College	Jacksonville, TX 75766
Johnson Cty. Comm. College, 12345 College	Overland Park, KS 66210
Kilgore College, 1100 BROADWAY	Kilgore, TX 75662-3299
Kirkwood Comm. College, P.O. Box 2068	Cedar Rapids, IA 52406-2068
Labette Comm. College, 200 South 14th	Parsons, KS 67357-4299
Laramie Cty. Comm. College, 1400 E. College Dr.	Cheyenne, WY 82007
Latter-Day Saints Bus. College, 411 E. South Temple St.,	Salt Lake, UT 84111-1392
Linn-Benton Community College, 6500 S.W. Pacific Blvd.,	Albany, OR 97321
Los Angeles Pierre College	Woodland Hills, CA 91371-0001
Los Angeles City College, 855 N. Vermont Ave.	Los Angeles, CA 90029-3590
Los Angeles Harbor College, 1111 Figuero Rd.	Wilmington, CA 90744-2311
Louisiana State Univ.	Eunice, LA 70535-1129
McCook Community College	McCook, NE 69001-2631
Mission College, 3000 Mission College	Santa Clara, CA 95054
Modesto Junior College, 435 College Ave.	Modesto CA 95350-5800
Mt. San Antonio College	Walnut, CA 91789-1399
Muscaline Community College	Muscaline, IA 52761-5396
Napa Valley College	Napa, CA 94558-6236
NEI College of Technology	Columbia Heights, MN 55421-2910

Northeastern Junior College	Sterling, CO 80751-2344
Northwest Iowa Community College, 603 W. Park St., Sheldon, IA 51201-1046	
Oklahoma City Community College, 7777 S. May Ave., Oklahoma City, OK 73159	
Olympic College	Bremerton, WAS 98310-1699
Oxnard College, 4000 S. Rose Ave.	Oxnard, CA 93033
Parks Junior College	Denver, CO 80229-4339
Peninsula College	Port Angeles, WA 98362
Pennvalley Community College, 3201 S.W. Traffic Way, Kansas City, MO 64111	
Phoenix College, 1202 West Thomas Rd,	Phoenix, AZ 85013-4234
Presentation Community College'	Aberdeen, SD 57401-1299
Rainy River Community College	International Falls, MN 56649
Red Rocks Comm. College, 13300 West 6th Ave.	Lakewood, CO 80401
Ricks College	Rexburg, ID 83460-4172
Saddleback College	Mission Viejo, CA 92692-3697
Saint Charles Cnt. Comm. College, 4601 MidRivers Mall Dr., St. Peters, CO 63376	
San Juan College	Farmington, NM 87402-4699
Scottsdale Comm. College, 9000 East Chapparral Rd., Scottsdale, AZ 85250-2699	
SE Community College	Milford, NE 68405-9397
Semnole Junior College	Seminole, OK 74818-0351
Seward Cnt. Comm. College	Liberal, KS 67905-1137
Sheridan College, P.O. Box 1500	Sheridan, WY 82801-1500
Sierra College	Rocklin, CA 95677-3397

South Puget Sound Comm. College	Olympia, WA 98512-6218
South Mountain Community College	Phoenix, AZ 85040
S.E. Community College	West Burlington, IA 52655
Southern Arkansas University	Camden, AR 71701
S.W. Oregon Community College	Coos Bay, OR 97420-2911
ST. Paul Technical College, 235 Marshall Ave.	ST. Paul, MN 55102-1800
ST. Gregory's College	Shawnee, OK 74801-2499
ST. Louis Community College, Forest Park	ST. Louis , MO 63110-1316
Stevens Henager College, 2168 Washington Blvd.	Ogden, UT 84401-1420
S.W. Collegiate Inst. for the Deaf	Big Spring, TX 79720
Trinidad State Junior College	Trinidad, CO 81082-2396
Umpqua Community College	Roseburg, OR 97470-0226
United Tribes Technical College	Bismark, ND 58504-7596
Univ. of Alaska S.E. Campus	Sitka, AK 99835-9418
University of Hawaii, Windward Comm. College	Kaneohe, HI 96744-3528
University of Hawaii Honolulu Comm. College	Honolulu, HI 96817-4505
Victoria College, 2200 E. Red River	Victoria, TX 77901-4494
Wentworth Military & Jr. College	Lexington, MO 64067
Western Wyoming Community College	Rock Springs, WY 82902
Western Texas College	Snyder, TX 79549-6189
Wyoming Technical Institute	Laramie, WY 82070-9519
Yavapai College	Prescott, AZ 86301-3297

Yuba College Marysville, CA 95901-7699

APPENDIX C

RESPONSES FROM SAMPLE POPULATION

RESPONSES FROM SAMPLE POPULATION

Several survey questions elicited responses from the sample population. Responses are coded and were summarized for data analysis.

Are physical education courses required for students at your institution?

29 Class offered at a high school for college credit and at a self-defense school, no department or classes on campus

38 We do not offer physical education classes.

45 Offers P.E. classes through neighboring Metro State College which is a 4 year college. Three universities work with C.C. of Denver to provide physical education at their schools. They are the only community college of the 12 in Colorado that have this arrangement with the universities. In the near future they will offer a Health and Wellness Management Course.

113 A two-unit activity requirement is in place. Music, theater, etc. count as well as p.e. activities.

171 We do not have own program. It is offered by a cooperating institution. Services are purchases from a local college when needed.

182 No physical education program, teaches only K-8

237 No physical education program

part of the 7 city colleges of Chicago, Illinois, some have p.e.

269 P.E. is no longer required to achieve a two year associates degree in this state. The community college governing body deemed it was more cost-effective to discontinue the requirement, rather than build facilities for the schools that didn't have gymnasiums.

336 Elective except education sport management

-- for some programs

340 My answers are as true as I can make them. Perhaps these results will help me sell a better P.E. program to this institution. I coordinate P.E. offerings here, but we contract them to the local YMCA.

Which extracurricular activities stubstitute for a physical education class?

064 Dance

113 Music and theater

At the college level, should physical education be required for all students or offered as an elective? The following responses are from persons who answered that it should be required.

01 To develop a commitment to lifelong participation

02 High schools are not requiring enough courses

03 No one should graduate without having an understanding of the components of fitness and of the importance of lifetime wellness.

04 Poor K-12 P.E. programs discourage activity. A good Community College instructional program can change habits, probably for life.

06 Today's society emphasizes good health/fitness and leisure activities (required).

09 We're dealing with lifetime fitness, not just semester requirements.

11 This is the last time we will have the opportunity to help young people develop good habits and programs.

13 College student needs to develop a fitness and wellness lifestyle

17 to help the students reach their potential both cognitively and physically

24 Mind/body relationship is everything! Many people returning for lifetime activities due to need for relaxation, recreation and stress reduction.

25 Promote exercise, assist student success while in school, learn basic fitness values

28 We know through past experience that; one: 90% of the population don't exercise regularly Two: Even though they know they should via educational information, media etc.

30 All students must have 2 units of P.E. to graduate (required)

31 To help "round" the student's life

32 High schools are not doing the job of teaching proper P.E., fitness, health, etc. Information in P.E. is constantly changing. Why not keep young adults informed and active?

36 Because of the sedentary nature of our society P.E. classes are more important than ever

42 Every person can benefit from physical education.

47 Good for stress management., overall health, and prevention

48 Part of college mission statement

49 should be part of a general education program-balanced life, spiritual, mental, physical

52 Cardiovascular disease is #1 killer in U.S. People do not voluntarily condition themselves. Requirement is a favor to students.

53 Our class "exercise and wellness education" is required for an AA degree

54 All students need activity, especially aerobic fitness

57 Many students do not have the time (they say) or make the time to exercise. Taking a class would provide the opportunity and lead to a better understanding of the importance of exercise.

63 Lifetime recreational skills taught, need for activity, release of energy

64 Awareness, alertness, a belief in sound mind and body

66 Benefits of lifetime fitness and health

70 Surgeon General's recent statement on activity

72 A healthy lifestyle should be part of, not set apart from a well-rounded education

74 Without physical education, a major portion of one's approach to a holistic entity would be missing.

79 We feel a person with knowledge of a lifetime sport may better use his/her leisure in the future.

84 To learn to care for one's body and to have leisure time skills are pre-requisites for an educated person.

91 All individual's need the knowledge of the importance of physical activity

93 Learning is valuable for all ages

94 Most colleges have general requirement. I believe physical education/activity classes should be taken especially for lifetime fitness of the individual.

95 Learning about health and movement is as essential as psych or basic English

99 Exercise and fitness is lifelong. By requiring P.E. there is constant promotion of that concept.

102 Lifetime wellness teaches need for personal responsibility and choice and that course needs to and is required. Students then do take activity classes.

103 Lack of P.E. in middle and high schools. Poor physical condition of general population

104 Most students consider PE unnecessary.

105 Not to have smart fat unhealthy students

106 In the particular area of the country in which the student population is from, there is a very high incidence of CVD and cancer. These students need knowledge of the risks for these disease and exercise needs to be emphasized to lessen their risks.

109 I feel physical health is every much as valuable as mental bookwork. If you feel good physically, it makes your performance improve and I feel that programs (technical areas) as desirable as they may be, there is not enough time allowed by the state and accrediting agencies to get it in for all students.

111 Everyone needs to know how to be active and students health, social and psychological outlook as well

113 Students (adults) need understanding of how physical activity will relate to the quality of life as they age, the teaching of lifelong activities becomes increasingly important after high school

118 As educators we do very little to educate students about something as important as the human body. It is neglected most of the time.

121 It is important to have a balanced and comprehensive education including the physical domain.

127 Essential part of a whole education. If you don't have physical health, you don't have reason for academic prowess

133 Fit mind and body go together. We are educating the whole person.

135 To give the general education portion of our degree more credence. Another attempt to introduce lifelong activities to a persons daily activities.

144 Health is a major issue in America today. Like any other discipline, activity and health need to be learned.

148 All students need an understanding of staying "fit for life" and having a skill in a lifetime sport/activity.

152 Students will focus on required academic courses and not take time for those that are not the physical get neglected

153 A healthy body is required for best intellectual performance. We subscribe to the Ancient Greek ideal of mind/body/spirit all begin developed simultaneously

154 We need well-rounded people in the workforce. That means body and mind.

156 Mind and body must work together. If it is not required, students aren't as likely to take it and miss developing lifetime fitness goals.

158 Lifestyle of general population

159 People who are usually inactive can improve their health and well-being by becoming even moderately active on a regular basis.

160 We are committed to enhancing the quality of our student's life.

161 Population needs and desires life-long activity and nutritional benefits

163 Health and wellness is an important aspect of functioning in society

164 To promote lifelong activity

166 Education is for the mind and body

168 To get people to be active-explore new and different types of activity-Educate them on different facts about physical activities

173 P.E. not perceived by students as an immediate educational need, therefore student benefit would not be provided consistent with need.

181 General populace needs to stay active, stay in shape, active in Wellness promotion, reap in health benefits, wt. control

184 Health/wellness concept for prevention (required)

190 Increase and maintain overall physical fitness, wellness, stress management. Promote lifetime improvement, lifestyle, etc.

195 There isn't anyone who cannot exercise if they have the use of upper and/or lower body. We design program for special populations and require a physician's release with contraindications. Exercise is needed for good health and fitness and life skills regardless of degree area.

196 Look at America.

200 To foster and promote quality health and exercise habits for carryover into adult life.

212 Fitness necessary by all

214 We have an elective requirement (2 hrs. are required from 18 different classes)

218 Physical wellness is essential to development of whole person.

232 With everyone concerned about health and fitness, it should be a must.

233 Fitness and wellness lecture course as a foundation to life beyond college.

239 College freshman

243 We are responsible to create a balance for life for students physical education/health education/wellness all assist in allowing students to develop balance

258 Physical education can be a lifetime sport-this is our emphasis today.

259 Students do as little as possible. Physical fitness and strength is on a decline

260 See Surgeon's Report on Physical Activity and health.

262 The majority of students lack both proficiency in psychomotor skills and general health knowledge.

265 Total level of physical fitness in USA lower than used to be and need to improve in the future. I would like to see that physical fitness level will improve.

266 Fitness health is the nation's #1 problem and concern and we can solve it by exercise, diet, stress control, our area of expertise

268 Optimal health and fitness increases work efficiency, decreases sick time,

accidents, substance abuse problems. In short, students will be more able to enjoy what they worked hard to achieve.

269 Yes, P.E. should be required and provide a large variety of activities for selection. The variety would give students the opportunity to enroll in classes they're comfortable with (either fitness or sports activities), or try an activity they might never experience outside the collegiate atmosphere.

277 Carryover

281 As a wellness/health component requirement

285 Carry over of lifetime sports are important, fitness programs for a healthy lifestyle are needed.

295 Need for activity

297 Physical education is a part of the "total" education.

299 Because of the poor fitness and nutrition of Americans

300 Physical activity is just as important for a student to be well rounded as anything else

304 Promotion of health and wellness as prescribed by Healthy People 2000-Stress reduction, lifetime fitness and health

305 Fitness and leisure activities are very important in society today. If it is of significance, students should be required to take physical education classes.

308 Students need to learn what healthy living is all about.

What good is a dead artist?

309 Students need to be physically fit in order to maintain a good quality of life

314 Adults need activity. It helps to manage stress. It helps to manage overweight and its the best anti-aging pill we presently have.

315 Surgeon General's Report on Physical Fitness

321 If it isn't required some students will avoid activity classes and all students need activity

323 All students should be exposed so to promote lifetime activity.

328 People should exercise all their lives to make a healthy body and mind

329 To encourage an active lifestyle during and after college

330 Everyone needs to exercise. Research has shown benefits in so many areas-rehabilitation, illness prevention, regulator of diabetes, hypertension, etc. It offers a break to students for relieving stress and the opportunity to learn new skills

331 A rare opportunity to educate in a social way-must enhance the value of physical activity in all students.

340 Lifetime skills and physical fitness are important factors in longevity and healthy living.

341 They are uneducated coming from high school. They need it for lifetime fitness and wellness.

345 Develop the "total" student. Instill the "fitness need" behavior.

352 Health reasons, living skills, stress management

355 It sounds so simple, but I strongly believe in a strong and healthy body compliments a strong and healthy mind.

357 Knowledge without health is worthless, stress release, lifetime fitness skills

361 Majority of our students commute and work and have limited time to exercise to keep the body functioning. They need activity to help them with the stresses.

370 We are responsible in higher education for educating the whole person (mind and body)

371 I personally feel that every student at the college level can benefit from P.E.

388 Lifetime activity, knowledge from physical education has unlimited benefits

390 Better health-promote lifetime activity

394 In this day and age some physical education or activity should be required because most persons need some type of activity to improve their overall fitness level.

--- All students need come kind of physical activity and the best place to get it and get the proper instruction in the activity is in school.

397 The need for physical activity is an on-going process. Most people put activity (physical) on the back burner. Important provider of social interaction in a diverse population

399 I feel that physical education is vital to total student education a well as the school as an educational environment

412 A wellness related class should be required, all others elective.

413 Yes, because lifestyle related diseases are rampart and many people need formal education concerning how to care for their body

421 I think the course material is important enough for it to be required of all students.

422 A fitness theory course should be required-all others elective

433 Every student should have some basic course in wellness/P.E. as a part of their general education. It's important for their health.

435 Lack of fitness in American public, lifetime importance of leisure activities

Responses to the question whether or not physical education at the college level should be required for all students or an elective. These respondents indicated physical education as an elective.

60 Lifelong learning, health and wellness

71 We feel that our offerings are attractive to students. Our 60 unit A/A degree is not conducive to a required PE course although it is permissive.

129 Many non traditional students do not see need.

140 Although I personally place a high value on physical education I do not believe it should be required in higher education

141 Heavy emphasis on occupational courses with set curriculum and transfer students must meet, but not exceed requirements of senior institution which are all different from each other.

147 The required course forces students to take part in something they don't want to. It fosters a negative impersonal reaction to fitness/exercise and will eventually damage the industry (elective)

165 Requirement should come earlier in life, at post-secondary level. Students should be able to decide for themselves what's important.

171 Because it is required by a cooperating institution and we have no say in the requirement

172 How would we enforce this?

318 My first reaction was, yes, it should be required. However, for a 2 year institution some programs very tight-they already exceed the norm (60 credits). At the 4 year institutions, it is more feasible to be required.

336 Best suits curriculum needs of students- we have a great number electing p.e.

379 No mandating P.E. courses at the 4-year college-Level in our state

392 Students are too busy with academic and personal responsibilities

398 We are a technical college and only issue career specific credits. We are not a community college.

405 At a 2 year commuting school where 80% of students are less than full-time and work, it is difficult to require as part of everyone's curricula.

407 Not defined here as a core competency.

417 The diversity of students in terms of age, etc. has changed

What specific courses are required, if any?

09 Any activity class-golf, tennis, lifetime fitness, etc.

24 Health and Fitness for life or Personal Health or Activity Classes

53 Exercise and wellness education

54	Must take 1 class from each of the general courses listed: fitness (5 classes offered) or general activity (19 classes offered)
63	Any activities class will meet PE requirements
74	P.E. Activity, Wellness-4 hours for all Teacher Education Students
84	Wellness (lecture and activity)
102	Lifetime wellness
106	One activity/ personal & community health
147	Aerobic Conditioning I, II, III for firefighting students only
152	Fitness survey-lecture
156	For P.E. degree: Intro. to P.E., Dance Humanities, For A.A. degree: First Aid/CPR
158	Wellness-Human Development
160	Wellness, wellness activity
181	Health and wellness
190	Minimum of two hours of student's choice
200	Health Ed. or Fitness-related class and activity class
212	Concepts of P.E. and Applied P.E.
214	Wellness
229	wellness
233	Fitness and wellness
243	Introduction to wt. training, aquatics mgt., golf mgt.
260	A&P, Intro to HPER, Intro to Education

265 Healthful living, Concepts of Physical Fitness

266 Personal physical fitness and health

336 Any of our activity courses, bowling, golf, tennis, fitness, wt. training, racquetball, exercise thru movement and dance

341 Lifetime Fitness and Wellness, Activity elective

343 Wellness (3 hr.)

352 Health or P.E. requirement

390 Health/or P.E. (1 health/2 activity classes)

394 Health

-- Principles of personal and community health

397 Health and Fitness, Sports and Recreation

412 Healthful living

426 Fitness Concepts

Why are students exempted for physical education classes (other reasons not listed)?

121 Nursing students

What are the most popular activites among the student population (other reasons not listed and their ranking)?

04 Dance (5)

17 Bowling (4)

24 Conditioning

32 (1) Bowling (5) dance

47 (1) Yoga

102 (5) Step aerobics

103 Dance (5)

111 Social dance (2)

133 Mountaineering (5)

135 Circuit training (1)

152 (1) Yoga

153 Horseback riding (4)

160 Step

165 Bowling (3)

166 Bowling (2)

95 (5) Weight management and individualize fitness programs

258 Martial arts, self defense (1)

265 Wrestling (4)

266 Yoga (4) and martial arts (5)

269 Bowling (2)

314 Backpacking (2)

315 Bowling (1)

324 Swimming (2) body conditioning (1)

331 Bowling (1)

336 bowling (1)

352 Canoeing (2) and bowling (4)

370 Wellness

390 (3) Bowling (5) archery

394 Archery (5)

405 Canoeing (5)

407 (4) Bowling (5) archery

Name three conceptual areas that are most likely to be included in the nnonactivityactivity courses (such as nutrition, stress management).

01 Wellness, Nutrition, Stress Management

02 Physical fitness for Life, Nutrition, Safety and First Aid

03 Wellness, flexibility, lifestyl

04 Recreation course, coaching theory, P.E. for re-entry women

06	No curriculum, change anticipated in the near future.
11	Assessment of fitness, Nutrition and Weight control,Stress management
13	Strength and aerobic development, nutrition, wellness lifestyle
17	Health, nutrition, injury prevention/care
23	Nutrition, health, sports officiating
24	Stress mng., energy sources/concepts, cardiovascular conditioning/concepts
25	Fitness (health), nutrition, stress
26	Nutrition, stress management, health and P.E. for Life
29	Weight control, fitness/nutrition, lifestyle changes
30	Lifelong wellness, health for life
32	Fitness components, Nutrition, Stress Management
36	Health, athletic injury prevention, sports officiating
47	Stress mng., nutrition, physical information about how body works
48	Nutrition, behavioral components, biomechanics and physics
49	Health, first aid, sport in U.S. society
53	Exercise, nutrition, wellness
54	Weight control, nutrition, conditioning
60	Nutrition, athletic injury, stress management
63	Drug use and abuse, First Aid and Safety, Theory of Coaching
64	Body composition, nutrition, goals
66	Wellness, First Aid
70	Fitness principles

71 Principles of exercise, weight control, design a program for lifetime of fitness

72 Drug/alcohol course

74 Wellness, sexual orientation, communicable disease

79 Health, First Aid, Drug and Alcohol Abuse

82 Weight management, stress, nutrition

84 Nutrition, stress management, first aid

89 First benefits, lifetime fitness, wt. control

91 Cardiovascular fitness, wellness areas and first aid, health

93 cardiovascular fitness, other health fitness aspects, nutrition

99 Nutrition, First aid and CPR, Community Health

102 Stress management, Aids, Drugs in Society

103 Nutrition, promotional, relationships

106 Nutrition, Weight management, Cancer and (CVD, Accidents)

113 Nutrition/wt. control, peak performance in sport psychology, rehabilitation in care and prevention of injuries

116 Nutrition, Stress management, physical assessment

121 Body composition and measurement, stress reduction, first aid and health

127 Aerobic intensity training, nutrition, warm-up and stretching and cool-down

133 Healthy lifestyle, nutrition, behavior modification

135 Fitness for Life, Nutrition, Sports and Recreation

141 Wellness, nutrition, stress management

140 Wellness, nutrition, recreation management

144 Wellness, Nutrition, Aids

146 Nutrition, drugs

148 Nutrition, stress mng., heart disease

152 Stress management, nutrition, drug abuse (health course) fitness-Exercise principles

153 Wellness, drugs, first aid

154 Nutrition, Wellness

158 Wellness, Human Developmental- all areas are covered

159 Personal community health, care & prevention of athletic injuries

160 Stress management, weight management, drug awareness

161 Nutrition, whole body conditioning, stress

163 Lifestyles for wellness, Principles of physical fitness, nutrition

164 Stress management

165 Health/nutrition, lifelong fitness, current topics in P.E.

166 Nonactivity courses are not offered.

168 stress management

171 Stress management, wellness

172 First aid, CPR, concepts of wellness

173 Wellness, Health, First Aid

176 Stress management, first aid, cpr

181 Nutrition and wt. control, cardiovascular disease prevention, stress management

184 Holistic approach, Self-care management, Awareness

190 First aid only, do not teach any other lecture classes

195 Wellness, first aid and personal safety, nutrition

200 Healthy habits, nutrition

214 First Aid, Water safety, and nutrition/diet control

218 Fitness for life, nutrition

229 Wellness

232 Health Fitness

233 Fitness concepts, nutrition, stress management

239 Nutrition, CPR, Stress management

242 First aid, general health

243 Applied Fitness testing/assessment, management application,

258 Cardiovascular fitness, nutrition, stress management

259 Wellness, Nutrition, Stress management

260 Wt. Management, health promotion.

262 Physical fitness, nutrition, stress management

265 Nutrition, Program development,

266 Aerobic preventive medicine, diet and nutrition, stress reduction

277 Nutrition, Wellness

281 Body Composition/Weight management, cardiovascular Fitness,

Substance/Smoking Cessation

285 Introduction to Physical Education, Basic Activities for Elementary

295 Nutrition, Wt. control

297 Heart disease, nutrition, stress management

299 Cardiovascular fitness, strength, flexibility

300 Nutrition, Sexuality, Fitness

304 Stress management, wellness

308 Wellness/fitness, calorie counting/charting, training zones

309 Stress management., wt. mng./diet

314 Nutrition, Wt. Management, Stress Management

315 Drugs, Alcohol, Wellness

321 Fitness, Nutrition, stress

323 Personal health/ nutrition, stress management, cardiovascular fitness

330 Nutrition is offered with nursing

331 Family living and human sexuality, personal and family health, healthy living

341 Fitness, Nutrition, Stress

343 Wellness, Nutrition, Health Education

345 first aid, stress mng., personal and community health

352 Wellness, Sex Education, Environmental Health

355 Nutrition, body composition, stress mng.

357 First Aid, Cardiovascular fitness, stress management

361 Emergency Care, health Science

370 Fitness, stress, nutrition

371 Fitness, Lifestyle choices, Stress mng.

379 Personal Fitness, Stress Management, Nutrition

390 S.T.D., Family Planning, Fitness Factors

392 Nutrition

394 Alcohol, Aids, tobacco

-- Drugs/alcohol, aids, tobacco

397 Fitness/Aerobics and target heartrate, risk factors and cardiovascular disease, healthy lifestyles

398 Nutrition, stress management, weight control

405 Nutrition, stress management, first aid and safety

407 Structure/Scheduling, nutrition, physiology

413 Exercise physiology, nutrition, stress management

417 Family values, safe sex, drug and alcohol abuse

421 Physiological concepts of particular course, nutrition, wt. management, stress

426 Exercise, Nutrition, Stress management

435 Nutrition, sexual issues, lifelong health

-- Nutrition, physiology, AIDS and disease

-- Nutrition, stress management, weight control

The three most important purposes of a physical education program were ranked (other responses were not on pre-selected list).

64 Complete education

159 With coaches teaching activities classes, it is probably different

173 Understanding of need and concepts of fitness and wellness via exercise

243 Sport appreciation-varying forms

281 Assess present lifestyle

318 Bonding with other students (3)

345 Learn benefits of being fit and healthy

398 Socialization

412 Exposure to wellness choices

What factors had the most influence on the physical education curricula at your institution (other responses not listed on pre-selected list).

02 Staff (1)

04 Student interest and request

06 Dedicated faculty

11 My belief in exercise

24 FTE Generation

25 Faculty (1)

47 (1) Student demand

48 Own philosophy

49 Individual teachers

52 Staff

71 (2) Budget cutbacks

72 Faculty input

91 Needs of community

95 Research at nearby university

102 Staff at college (1)

106 (1) Expertise of instructors

121 Covert Bailey

127 Instructors

153 Student interest

154 A combination of factors and research

159 School council-

161 Internal evaluation (1)

163 Instructors

168 Our department (1)

171 Another community college

195 Our own faculty (P.E. dept)

232 Needs of community (1)

243 Advisory committee

266 American Heart Association

297 NDEITA, ACE (organizations)

315 Administration (2)

318 Department

331 Professionalism of our faculty, nothing else has had much effect

352 Administration (2)

405 Local faculty

407 Other colleges, private activity

412 Consumer interest

433 Importance of health in media

438 Protect jobs

Which of the following activities that Cooper developed have you used in your courses (other responses not listed in pre-selected list)?

03 1 mile walk

47 Only classes are Thi Chi and Yoga at the Mind, Body, and Health Center on campus

54 Step test

57 Step test

70 Step test

71 VO2 max and astrand/rhuming

84 Mile walk test and 3 min. bench step test

121 Cycling

148 3 mile walk and 12 min. swim/bike

159 Swim test

181 Circuit

214 Walking test (1 mile)

214 1 mile walk test

330 I heard Dr. Cooper speak in Akron, OH. He was very interesting. I have also read a couple of his books.

361 3 minute step test, arm hand, push up, abdominal curl

397 12 minute swim

Other comments listed by respondents at end of questionnaire.

28 Dr. Cooper has had an impact on Physical Education, that is certain. But to mention him only when there are many, many others who's research has had an impact on fitness and wellness in this country, and around the world.

48 There were many influences other than Cooper's

57 100% of all activity and nonactivity courses are taught by part-time faculty. There is no full-time p.e. faculty

111 Ken Cooper has had a tremendous impact on the fitness movement in the country fortunately in the 60s and 70s. He was the "main man".

129 I do not think this of value to you. We are a 600 student community college with one 3 hr. fitness course taught by an adjunct and only intramural sports.

159 send results to aquatics director

-- They purchase physical education services from a local college when needed

195 We are growing. D. H. is currently developing a new Recreation degree. We went from 2 full-time faculty to 3. We added more part-time faculty also. We have added a new health and fitness A.S. degree. This is my new program for exercise science majors. I designed and implemented this program and designed

several new courses. I'm attaching a copy of the curriculum. Good luck on your study. T. F.

214 Seems like we're always using his name (Cooper)

243 Excellent-Great work!

266 Good luck, Prof. B. T.

277 Who's Cooper-don't know Cooper's work. I am not familiar with Cooper's work. Please give me information on it if appropriate.

343 We use the entire Cooper format since those who teach wellness attended his clinic.

349 From S. M., offers a wide array of p.e. courses. The courses offered are housed in two divisions: Science and Technology and continuing Education. The courses offered in both divisions are unofficially guided by the understanding that there will be no conflict of interests. For the most part, all the courses offered through continuing education are off campus, whereas the courses offered through Science and Technology are both on and off. The difference between the courses offered off campus is that the ones through S & T are taught by the college's physical education instructor or by adjuncts hired by him or the division chair. These hirings are facilitated by the relationships and connections nurtured over the years. The Office of Science and Technology has nurtured relationships with outside organizations which also provide a swimming pool, two gymnasiums, golf course, bowling alley and dance studio. We have also recently negotiated a contract with the University of Virginia which provides us with racquetball courts

and volleyball courts. Unfortunately, this arrangement has not been successful as the times the facilities are available to us, simply do not allow for convenient scheduling for our students. Our curricula is basically no different now than it was 10 years ago.

352 (32) Productivity, class size, major player in cutting physical education and health classes (10 students) (state governing body) P.E. classes (22 students) big problem

357 Cooper was the beginning, but how many relate what they do to a specific person? Did he develop the knowledge base of these areas? If he did , then he has affected them as each is important part of what we teach.

390 Currently, we do not have the space or facilities to offer a fitness course. In the past I have used Cooper's research a great deal. I anticipate doing to again when the course which has been approved is instituted.

392 We offer only one physical education course

398 We do not have a physical education department. All credit courses offered by our college must be career specific. Our Associate Degree Health Occupations students can take a 2 credit Personal fitness course as an elective. Our Police Science students take a Defense and Arrest Tactics course in our gym, and our Food Service students do take nutrition. We do offer several non-credit fitness and activity classes throughout our District, as well as a NJCAA Div. 3 athletics program, and a Wellness Center (which I operate) for our students.

J. B., Student Development Manager

413 Cooper's work is not directly used here. He has had a direct effect on the fitness movement in this country, but many others have also, i.e. ACSM, IDEA, ACE, AAPHERD, etc.

REFERENCES

Adami, H.O., Baron, J.A., & Rothman, K.J. (1994, April 16). Ethics of a prostate cancer screening trial. Lancet (North American Edition), 343, 958-960.

Adler, T. (1994, July 17). Just say no to prostate cancer screening. Science News, 146, 180.

Adler, T. (1995, April 22). Power foods: Looking at how nutrients may fight cancer. Science News, 147, 248-249.

Aerobics by Kenneth H. Cooper. (1968). Book Review Digest, 276.

Aging panel endorses high-dose antioxidants for disease prevention. (1994, April). Geriatrics, 49, 17.

Ames, B.N. (1983, September 23). Dietary carcinogens and anticarcinogens. Science, 221,U 1249, 1256-1264.

Ames, B.N. (1984, May 18). Cancer and diet. Science, 224, 658-666.

Ames, B.N., Shigenaga, M.K., & Hagen, T.M. (1993). Oxidants, antioxidants, and the degenerative diseases of aging. Procedures of the National Academy of Science, USA, 90, 7915-7922.

Anderson, G. (1990). Fundamentals of educational research. Bristol, PA: Falmer Press, Taylor & Francis.

Anderson, O. (1994, January). On the edge. Runner's World, 29, 28.

Anderson, R.E., Kretzer, F.L., & Rapp, L.M. (1994). Free radicals and ocular

disease. Advances in Experimental Medicine and Biology, 366, 78-86.

Angier, N. (1993, April 25). Free radicals: The price we pay for breathing. The New York Times Magazine, 62-64, 100.

Antioxidant use can save U.S. $8.7 billion a year. (1994, January). Better Nutrition for Today's Living, 56, 16-20.

Antioxidants. (1993, August). Mayo Clinic Health Letter, 11 (8), 1-3

Arloma, O.I. (1994, July). Nutrition and health aspects of free radicals and antioxidants (Pharmacology Group, University of London King's College). Food Chemistry Toxicol (England), 32 (7), 671-683.

Ary, D., Jacobs, L.C., & Razavieh, A. (1972). Introduction to research in education. New York: Holt, Rinehart and Winston.

Badgett, R.G. (1994, January 20). Screening for prostate cancer. The New England Journal of Medicine, 220.

Barbato, J. (1988, March 25). The father of the fitness boom. Publishers Weekly, 20-25, (microfiche).

Barinaga, M. (1991, October 18). Vitamin C gets a little respect. Science, 254, 374-376.

Barone, J., Taioli, E., Hebert, J.R., & Wynder, E.L. (1992). Vitamin supplement use and risk for oral and esophageal cancer. Nutrition and Cancer, 18, 31-41.

Barry, R.J., & Barry, P.A. (1992). Establishing equality in the articulation process. New Directions for Community Colleges, 78. San Francisco: Jossey-Bass.

Bean, A. (Ed.). (1995, May). You get what you run for. Runner's World, 22.

Beil, L. (1993, December 14). Vitamin E helps heart, study finds. The Dallas Morning News, p. A33.

Bernstein, A. (1986). The devaluation of transfer: Current explanations and possible causes. In L.S. Zwerling (Ed.), New Directions for Community Colleges, 54, San Francisco: Jossey-Bass.

Bishop, J.E. (1994, April 14). Beta carotene's power to avert cancer is questioned as more studies continue. Wall Street Journal, p. B8.

Bjorneboe, A., & Bjorneboe, G.E. (1993, January). Antioxidant status and alcohol-related diseases. National Institute of Forensic Toxicology, 28 (1), Oslo, Norway. Alcohol (England), 111-116.

Blair, S.N., Kohl, H.W., Paffenbarger, R.S., Clark, D.G., Cooper, K.H., & Gibbons, L.W. (1989, November 3)). Physical fitness and all-cause mortality. JAMA, 262 (17), 2395-2401.

Blair, S.N., Kohl, H.W., Barlow, C.E., Pffenbarger, R.S., Gibbons, L.W., & Macera, C.A. (1995, April 12). Changes in physical fitness and all-cause mortality. JAMA, 273 (14), 1093-1097.

Block, G., & Langseth, L. (1994, July). Antioxidant vitamins and disease prevention. Food Technology, 48 (7), 80-84.

Blocker, C.E., Plummer, W., & Richardson, R.C., Jr. (1965). The 2-year College: A social synthesis. Englewood Cliffs, N.J: Prentice-Hall.

Book Review Digest. (1968). 276.

Borg, W.R., & Gall, M.D. (1971). Educational research. New York: David

McKay.

Borman, S. (1994, April 18). Alzheimer's disease. Chemical and Engineering News 72 (16), [on-line] 4-5. Abstract from: MEDLINE File: Free radicals Item: 0009-2347.

Brant, J. (1987, May). And the word was aerobics. Runners World, 68-76.

Bricklin, M. (1993, July). Why we're pro-antioxidant. Prevention, 45, 37-39.

Briefing. (1990, November 5). The Dallas Morning News, p. D2.

Briefs. (1995, August 21). The Dallas Morning News, p. 3C.

Bruess, C.E., & Richardson, G.E. (1994), Healthy decisions. Wisconsin: Brown & Benchmark.

Burfoot, A. (1995, September). How much should you run? Runners World, 66-67.

Burns, J.A. (1992). The impact of the La Crosse Wellness Project on the health promotion involvement of college students residing on the campus of the University of Wisconsin-La Crosse. (Doctoral dissertation, University of Wisconsin, 1992). Dissertation Abstracts International.

Burton, G.W., & Ingold, K.U. (1984, May 11). B-carotene: An unusual type of lipid antioxidant. Science, 224, 569-573.

Brynteson, P., & Adams, T.M., III. (1993). The effects of conceptually based physical education programs on attitudes and exercise habits of college alumni after 2 to 11 years of follow-up. Research Quarterly for Exercise and Sport, 64, 208-212.

Cameron, E., Pauling, L., & Leibowitz, B. (1979). Ascorbic acid and cancer: A

review. Cancer Research, 39, 663-681.

Carpenter-Phinney, C. (1988, August). Overtraining. Bicycling, 29, 54-56, 97-98.

Castleman, M. (1994, November). Mother knows best. Sierra, 79 (6), 28-30.

Chodak, G.W. (1994, September 14). Screening for prostate cancer: The debate continued. JAMA, 272, 813-14.

Chollar, S. (1994, July). Should you take vitamins? McCall's, 121, 102-103, 134, 136

Clue is reported to speed of AIDS. (1993, November 14). New York Times. p. 27.

Cohen, A.M. & Brawer, F.B. (1987). The collegiate function of community colleges: Fostering higher learning through curriculum and student transfer. San Francisco: Jossey-Bass.

Cohen, A.M., & Brawer, F.B. (1989) The American Community College. San Fransciso: Jossey-Bass.

Cohen, A.M. & Ignash, J.M. (1994). An overview of the total credit curriculum. New Directions for Community Colleges, 86. San Francisco, California: Jossey-Bass.

Cooper Aerobics Center. (1995a). Kenneth H. Cooper biography [Brochure]. Dallas, TX: Author.

Cooper Aerobics Center. (1995b). Kenneth H. Cooper information packet [Brochure]. Dallas, TX: Author.

Cooper Clinic. (1994). Books written by Kenneth H. Cooper, M.D.. (Brochure). Dallas, TX: Author

Cooper, K.H. (1968). Aerobics. New York: Bantam Books.

Cooper, K.H. (1969). The role of exercise. Journal of Health, Physical Education and Recreation, 40, 22-25. (University Microfilms No. 5, 0022-1473)

Cooper, K.H. (1970). The new aerobics. New York: Bantam Books.

Cooper, K.H. (1975). An aerobics conditioning program for the Fort Worth Texas school district. Research Quarterly, 46, 345-350.

Cooper, K.H. (1977). The aerobics way. New York: Bantam Books.

Cooper, K.H. (1982). The aerobics program for total well-being. New York: Bantam Books.

Cooper, K.H. (1984). Physical fitness programming issues for total well being. Journal of Physical Education, Recreation and Dance, 55, 35-36.

Cooper, K.H. (Instructor). (1985a). Aerobics. [Videotape]. (Available from Word, Inc., Horizon Entertainment Group, Burbank, CA)

Cooper, K.H. (1985b). Running without fear: How to reduce the risk of heart attack and sudden death during aerobic exercise. New York: M. Evans.

Cooper, K.H. (1986, May). Re-shape your body and re-charge your heart. Prevention Magazine, 38, 33-34+.

Cooper, K.H. (1988a, May/June). Cholesterol: Be aware of your ratio. The Saturday Evening Post, 260, 102-103, 106-108.

Cooper, K.H. (1988b). Controlling cholesterol. New York: Bantam Books.

Cooper, K.H. (1988c, November). Controlling cholesterol. The Saturday Evening Post, 260, 90-91, 94.

Cooper, K.H. (1988d, April). How to control your cholesterol. The Saturday

Evening Post, 260, 82-83, 86, 96.

Cooper, K.H. (1988e, January). The lower-your-cholesterol diet. Ladies Home Journal, 105, 48, 58-59.

Cooper, K.H. (1988/1989, December/January). Coronary combat. Modern Maturity, 31, 78-84.

Cooper, K.H. (1989a, April). The basics of bone. Health, 21, 80-82.

Cooper, K.H. (1989b, March). Osteoporosis: Are you at risk. The Ladies Home Journal, 106, 56-58, 60.

Cooper, K.H. (1989c). Oxygen and athletes. Journal of American Medical Association, 262, 264.

Cooper, K.H. (1989d). Preventing osteoporosis. New York: Bantam Books.

Cooper, K.H. (1990a, April). Confronting cholesterol. The Saturday Evening Post, 262, 40, 92.

Cooper, K.H. (1990b). Overcoming hypertension. New York: Bantam Books.

Cooper, K.H. (1991a, March). Boning up. The Saturday Evening Post, 263, 18-20, 96.

Cooper, K.H. (1991b, September). Countdown to lower blood pressure. Prevention, 43, 37-43+.

Cooper, K.H. (1991c). Kid fitness: A complete shape-up program from birth through high school. New York: Bantam books.

Cooper, K.H. (1992a, January). Eating for energy. Working Mother, 15, 77-82.

Cooper, K.H. (1992b, January/February). Give our kids a healthy lunch. The

Saturday Evening Post, 264, 48-49, 74.

Cooper, K.H. (1992c, May/June). Time to prevent osteopososis. The Saturday Evening Post, 264, 24, 102-103.

Cooper, K.H. (1994a). Antioxidant revolution. Nashville, TN: Thomas Nelson.

Cooper, K.H. (1994b). The inventor of aerobics tells all about antioxidants. Health Confidential, 8 (12), 1-2.

Cooper, K.H. (1995a, December). Don't rust out too soon: The antioxidant revolution. In S. Johnson (Chair), The sports medicine symposium. Symposium conducted at Institute for Aerobics Research, Dallas, TX.

Cooper, K.H. (1995b). It's better to believe. Nashville, TN: Thomas Nelson.

Cooper, K.H., & Cooper, M. (1988). The new aerobics for women. New York: Bantam Books.

Cooper, M., & Cooper, K.H. (1972). Aerobics for women. New York: Bantam Books.

Corbin, C. (1994). Concepts of fitness and wellness. Wisconsin & Iowa: Brown and Benchmark.

Cowley, G. (1994, April 25). Are supplements still worth taking? Newsweek, 47.

Darnowski, V.S. (1978). The maze in Connecticut. New Directions for Community Colleges, 23. San Francisco: Jossey-Bass.

Davis, S. (1993a, October 17). Dallas' Cooper center assists U.S. team in search for aerobic edge. The Dallas Morning News, p. B10.

Davis, S. (1993b, October 24). Tournament minus England means more skill, less

violence. The Dallas Morning News, p. B15.

Davis, S. (1994, March 13). Referees head to Dallas hoping to get the call. The Dallas Morning News, p. B20.

Day, N.E., Bingham, S.A., Taylor, P. Y., Li, B., & Blog, W.J. (1994, November 2). Nutrition intervention trials in Linxian, supplementation with specific vitamin/mineral combinations, cancer incidence, and disease-specific mortality in the general population. Journal of the National Cancer Institute, 86 (21), 1645-1648.

DeNitto, E. (1993, October 18). New energy for vitamin market. Advertising Age, 64 (44), 50.

Dilts, S.W. (1994). Peterson's 2-year colleges. NJ: Peterson's Guides.

Dressendorfer, R.H., Wade, C.E., & Scaff, J.H. (1985). Increased morning heart rate in runners: A valid sign of overtraining? The Physician and Sportsmedicine, 13, (8), 77-86.

Ehrenkranz, R.A., Ablow, R.C., & Warshaw, J.B. (1982). Effect of vitamin E in the development of oxygen-induced lung injury in neonates. Annals New York Academy of Sciences.

Epstein, J.H. (1977). Effects of B-carotene on ultraviolet induced cancer formation in the hairless mouse skin. Photochemisty and Photobiology, 25, 211-213.

Ernst, R.J. (1978). Articulation: A working definition. Community College Review, 5 (4), 32-34.

Fackelmann, K.A. (1989, January 28). Progress in the fight against heart disease. Science News, 135, 60.

Fackelmann, K.A. (1994, July 23). Antioxidant vitamins fail to prevent polyps. Science News, 146 (4), 54.

The father of the fitness boom. (1988, March). Publishers Weekly, 233, 20.

Fleming, T. M. (1990). The aerobic years: An historical analysis of the work of Kenneth H. Cooper and his influence in promoting healthy lifestyles (Doctoral dissertation, Texas A&M University, 1989). Dissertation Abstracts International, 51(01), 84.

Forever young, (1994, October). Mademoiselle, 56-58.

Friedlander, J. (1980). An ERIC review: Why is transfer education declining? Community College Review, 8, (2), 59-66.

Frye, J.H. (1992). The vision of the public junior college. New York: Greenwood Press.

Gerber, G.S., Thompson, I.M., & Thisted, R. (1993, January 6). Disease-specific survival following routine prostate cancer screening. The Journal of the American Medical Association, 269 61-4.

Gershoff, S. (1990). The Tufts University guide to total nutrition. New York: Harper Perennial.

Gey, K.F. (1993, July). Prospects for the prevention of free radical disease, regarding cancer and cardiovascular disease. Berne, Switzerland: University of Berne.

Giraud, D.W., Martin, H. D., & Driskell, J.A. (1995, July). Plasma and dietary vitamin C and E levels of tobacco chewers, smokers, and nonusers. Journal of the American Dietetic Association, 95, 798-800.

Goldstrich, J.E. (1994). The cardiologist's painless prescription for a healthy heart and a longer life. Dallas, TX: 9-Heart-9 Publishing.

Greenberg, J.D., Dintiman, G.B., & Oakes, B.M. (1994). Physical fitness and wellness. MA: Allyn & Bacon.

Gridley, G., McLaughlin, J.K., Block, G. Blot, W.J., Gluch, M., & Fraumeni, J.F. (1992). Vitamin supplement use and reduced risk of oral and pharyngeal cancer. American Journal of Epidemiology, 135 (10), 1083-1092.

Grundy, S. (1991, March 13). Free radicals: How to deter them. The Dallas Morning News, p. F2.

Gutteridge, J.M. (1994, September). Antioxidants, nutritional supplements and life-threatening diseases. British Journal of Biomedical Science, 51 (3), (Department of Anaesthesia and Intensive Care, Royal Brompton Hospital, London, England, UK), 288-295.

Hall, C. (1993a, November 21). Cooper still gets a workout spreading gospel on aerobics. The Dallas Morning News, p. H1.

Hall, C. (1993b, November 21). The doctor's formula for reaching 100. The Dallas Morning News, p. H1.

Hankinson, S.E., & Stampfer, M.J. (1994, November 9). All that glitters is not beta carotene. JAMA, 272, 1455-1456.

Harris, B. (1993, September). Experience required. Shape, 13, 17.

Heinonen, O.P., & Huttunen, J.K. ((1994). The effect of vitamin E and beta carotene on the incidence of lung cancer and other cancers in male smokers. The New

England Journal of Medicine, 330 (15), 1029-1035.

Hendrickson, C.D., & Verde, T.J. (1994). Inadequate recovery from vigorous exercise. The Physician and Sportsmedicine, 22 (5), 56-62.

Hennekens, C.H. (1994, September 26). Antioxidant vitamins and cancer. American Journal of Medicine, 97, (Department of Medicine and Ambulatory Care and Prevention, Harvard Medical School, Boston, Ma), (3A), 2s-4s.

Hennekens, C.H., & Buring, J.W. (1994, April 14). Antioxidant vitamins-benefits not yet proved. New England Journal of Medicine, 330, 1080-1081.

Hietanen, E., & Bartsch, H. (1994, August). Diet and oxidative stress in breast, colon, and prostate cancer patients--A case control study. European Journal of Clinical Nutrition, 48 (8), 575-586.

Higdon, H. (1986, August). Newest research tells us: If you want long life-exercise. 50 Plus, 26, 17-19, 63.

Higdon, H. (1993, January). Laboratory tested. Runner's World, 34-39.

Hollinshead, B.S. (1936) The community college program. Junior College Journal, (7), 111-116.

Institute for Aerobics Research. (1992, September). The Prudential Fitnessgram. [Brochure]. Dallas, TX: Author.

Jacques, P.F., Chylack, L.T., McGandy, R.B. & Stuart, C.H. (1988). Antioxidant status in persons with and without senile cataract. Arch Ophthalmol, 106, 337-340.

Jackson. (1990). The Dallas Morning News, p. 3C.

Joseph, T.Y. (1991, October 14). Beyond spandex your fitness instructor may

look good, but it takes more than that to teach a class--like understanding the ins and outs of skin-fold tests, kinesiology and dynamic strength. The Dallas Morning News, p. C3.

Kemp, G.L., Ellestad, M.H., Beland, A.J., & Allen, W.H. (1969, May). The maximal treadmill stress test for the evaluation of medical and surgical treatment of coronary insufficiency. The Thoracic Cardiovascular Surgeon, 57 (5), 708-713.

Kintzer, F.C. (1980). Organization and leadership of 2-year colleges: preparing for the eighties. Gainesville: University of Florida, Institute of Higher Education .

Kissler, G.R. (1981, May 19) From junior college to community colleges: The effect on four-year institutions. Presentation to the annual forum of the Association for Institutional Research.

Kissler, G.K. (1982). The decline of the transfer function: Threats or challenges. In Frederick C. Kintzer (Ed.), New Directions for Community Colleges, 39, San Francisco: Jossey-Bass.

Koos, L.V. (1924). The junior college. Minneapolis: University of Minnesota Press.

Krahn, M.D., Mahoney, J.E., Eckman, M.H., Trachtenberg, J., Pauker, S.G., & Detsky, A.S. (1994, September 14). Screening for prostate cancer. Journal of the American Medical Association, 272, 773-780.

Kunde, D. (1992, November 4). Telecom center makes fitness fun. The Dallas Morning News, p. D1.

Kunde, D. (1993, December 22). On-the-run execs improvise workouts. The Dallas Morning News, p. D1.

Kusmitz, I., & Fine, M. (1983). Your guide to getting fit, CA: Mayfield.

Lauerman, C. (1985, June 19). Dr. Aerobics still running with a healthy crowd. The Chicago Tribune, Sec. 5, p. 1-3.

Lautenslager, G. (1991, June 21). Ailing masters runner finds relief, hope in sport he loves. The Dallas Morning News, p. B3.

Lautenslager, G. (1992a, April 24). Law student struggles in bid to make trials. The Dallas Morning News, p. B13.

Lautenslager, G. (1992b, October 2). Coach amazed by performances at Barcelona Paralympics. The Dallas Morning News, p. B15.

Lautenslager, G. (1993, December 3). Samuelson to be honored. The Dallas Morning News, p. 4B.

Lee, M. (1983). A history of physical education and sport in the U.S.A. New York: Wiley.

Leske, M.C., Chylack, L.T., & Wu, S.Y. (1991). The lens opacities case-control study. Arch Ophthalmol, 109, 244-251.

Levin, S. (1991). Overtraining causes olympic-sized problems. The Physician and Sportsmedicine, 19 (5), 112-118.

Liebman, B. (1992). Antioxidants and cancer. Nutrition Action Healthletter, 5-7.

Long, P. (1992, October). The Power of Vitamin C. Health, 66-72.

Long, P. (1993, May/June). The vitamin wars. Health, 7 (3), 45-54.

Long, P. (1994, September). Should you believe in it? Vitamin E: Here's all you need to know. Health, 94, 96, 98, 100.

Louie, E. (1995, July 12). The fit commandment: Health is next to godliness. The New York Times, p. B2.

Machlin, L.J., & Sauberlich, H.E. (1994, January/February). New views on the function and health effects of vitamins. Nutrition Today, 29, 25-29.

Mangalindan, M. (1994, April 28). Buying into good health sales of vitamins growing mega-fast. Dallas Morning News, p. 10.

Marino, G. (1994, August 6). Vitamin C helps cigarette-smoking hamsters. Science News, 146, 86.

Marsa, L. (1995, May/June). Can vitamin creams combat wrinkles? Health, 9, 49-51.

McCay, P.B., King, M.M., & Ricans, L.E. (1980). Interactions between dietary fats and antioxidants on DMBA-induced mammary carcinomas and on AAF-induced hyperplastic nodules and hepatomas. Journal of Environmental Pathology and Taxicology, 3, 451-465.

McGill, S.L. (1986). Development of a wellness program model for small liberal arts colleges (Doctoral dissertation, Slippery Rock University, 1986). Dissertation Abstracts International.

Medina, E. (1993). The effect of the Cooper Wellness Program in promoting long-term lifestyle behavior changes. (Doctoral dissertation, Loma Linda University, 1993). Dissertation Abstracts International, 54 (11), 5618.

Melograno, V.J., & Klinzing, J.E. (1992). An orientation to total fitness. Dubuque, IA: Kendall/Hunt.

Moreau, D. (1989, June). Change agents. Changing Times.

Murray, F. (1993, August). Antioxidants for disease prevention. Better Nutrition for Today's Living, 55 (8), 38-43.

Murray, M. (1994, September). Can these pills make you live longer? Reader's Digest, 145, 19-26.

National Center for Health Statistics (1995). Health United States 1994, (DHHS Pub. No. (PHS) 95-1232). Rockville, MD: U.S. Department of Health and Human Services. Public Health Service. Centers for Disease Control and Prevention. National Center for Health Statistics.

The New Aerobics by Kenneth H. Cooper. (1970). Book Review Digest, 302.

Nierenberg, D.W., Stukel, T.A., & Mott, L. (1994, January 19). Stead-state serum concentration of alpha tocopherol not altered by supplementation with oral beta carotene (vitamin E supplementation). Journal of the National Cancer Institute, 86 (2), 117-120.

O'Conner, C. (1992, April 27). The evolution of Euro-fitness. The Dallas Morning News, p. C1.

Oliveria, S.A., Kohl, H.W., Trichopoulos, D., & Blair, S.N. (1996). The association between cardiorespiratory fitness and prostate cancer. Medicine and Science in Sports and Exercise, 28, 97-104.

Ostgarden, J. (1994, February). Are free rads eating you alive? Bicycling, 35, 74-75.

Packer, L., & Sullivan, J.L. (1995, January/February). The promise of antioxidants. The Saturday Evening Post, 267, 50-51, 87.

Parnell, D. (1985). The neglected majority. Washington, DC: The Community College Press.

Pelletier, O. ( ). Vitamin C and cigarette smokers. Annals of New York Academy of Sciences, 156-169

Phinney, C.C. (1988, August). Overtraining. Bicycling, 29, 54-58.

Pierce, K. (1994, April 6). Five-a-Day keeps cancer away. Dallas Morning News, p. F1.

Radical protection for athletes. (1992, June 13). Science News, 141, 398.

Raloff, J. (1989, August 26). Vitamin C protects blood from radicals. Science News, 136, 133.

Raloff, J. (1992, August 1). Hearty vitamins. Science News, 142, 76.

Reice, S. (1985, April). Dr. Kenneth H. Cooper's health and fitness guide. The Ladies Home Journal, 102, 149-156.

Reinhold, R. (1987, March). Has the aerobics movement peaked? An interview with Kenneth Cooper. The Good Health Magazine, 14-17.

Richardson, R.C. (1985). Keynote speech. CUNY Articulation Conference. City University of New York.

Rimm, E.B., Stampfer, M.J., Ascherio, A., Giovannucci, E., Colditz, G.A., & Willett, W.C. (1993). Vitamin E consumption and the risk of coronary heart disease in men. The New England Journal of Medicine, 328 (20), 1450-1456.

Roan, S. (1994, September 21). Antioxidants: Cancer prevention or a waste of time? Los Angeles Times, p. E1.

Roffmann, A. (1995, March). Vitamins: Health or hype? Better Homes and Gardens, 52, 62-64.

Rosato, F.D. (1986). Fitness and wellness-The physical connection. St. Paul, MN: West Publishing.

Rover, E. (1995, January/February). The great antioxidant debate: Do active women need to take supplements? Women's Sports and Fitness, 17, 65-66.

Schalch, W., & Weber, P. (1994). Vitamins and carotenoids--a promising approach to reducing the risk of coronary heart disease, cancer and eye diseases. Experimental Medicine and Biology, 366, 335-350.

Schectman, G., Byrd, J.C., & Hoffmann, R. (1991). Ascorbic acid requirements for smokers: Analysis of a populations survey. American Journal of Clinical Nutrition, 53, 1466-1470.

Science update. (1994, February 28). The Dallas Morning News, p. F1.

Screening for prostate cancer. (1990, October). America Family Physician, 42, 991-994.

Seidman, E. (1985). In their own words: Perspectives on improving teaching and educational quality in community colleges.. San Francisco: Jossey-Bass.

Seiger, L., Vanderpool, K., & Barnes, D. (1995). Fitness and wellness sStrategies. Wisconsin: Brown & Benchmark.

Seligmann, J. (1983, August 15). Guidelines: Detecting breast cancer in time. Newsweek, 102, 49.

SerVaas, C. (1989, March). Beating heart disease. The Saturday Evening Post,

261, 20-21, 26-29, 92-96.

Sheehan, G. (1990, May). Life after sex. The Physician and Sportsmedicine, 18, (5),45.

Sheffield, L.T. (1985, September 5). Another perfect treadmill test. New England Journal of Medicine, 313, 533-535.

Shephard, R.J. (1993, April). Exercise in the prevention and treatment of cancer: An update. Sports Medicine, 15 (4), 258-280.

Showalter, M. (1994). An assessment of student wellness needs and perceptions as compared with the wellness perceptions of student affairs professionals. (Doctoral dissertation, University of Mississippi). Dissertation Abstracts International, 55 (07), 1832.

Sies, H., Stahl W., & Sundquist, A.R. (1992, September 30). Antioxidant functions of vitamins, vitamins E and C, beta-carotene, and other carotenoids. Annals New York Academy of Sciences (U.S.), 669 (Institute for Physiologists, Germany), 7-20.

Simnacher, J. (1991, March 25). Survey to take pulse on group's fitness. The Dallas Morning News, p. D1.

Simnacher, J. (1993, March 27). Baylor offers MBA program at Cooper Aerobics Center. The Dallas Morning News, p. F1.

Simnacher, J. (1995, July 10). Memorial service to be Sunday for avid runner Williard Samples. The Dallas Morning News, p. A14.

Skerrett, P. (1994, August/September). Screening for prostate cancer. Technology Review, 97, 16-17.

Slaga, T.J. (1995). Inhibition of skin tumor initiation, promotion, and progression by antioxidants and related compounds. Critical Reviews in Food Science and Nutrition (U.S.), 35 (1-2), (University of Texas, M.D. Anderson Cancer Center, Science Park--Research Division, USA), 51-7.

Sorensen, J., (1979). Aerobic dancing. New York: Rawson, Wade.

Spaulding, M. (1988, January). Oxygen absorbers keep food fresher [On-line]. Packaging, 33 (1), 8-10. Abstract from: MEDLINE File: Antioxidants Item: 0746-3820.

Stampfer, M.J., Hennekens, C.H., Manson, J.E., Colditz, G.A., Rosner, B. & Willett, W.C. (1993). Vitamin E consumption and the risk of coronary disease in women. The New England Journal of Medicine, 328 (20), 1444-1449.

Stavric, B. (1994, October). Role of chemopreventers in human diet. Clinical Biochemistry (U.S.), 27 (5), 319-332.

Study supports PSA plus rectal exam for prostate cancer screening. (1994, July). Geriatrics, 49, 18.

TEKS Committee. (1996). Unpublished report by the State Board of Education Texas Essential Knowledge and Skills Committee, Austin, TX.

Texas Higher Education Coordinating Board Community and Technical Colleges Division (1996). Community College General Academic Course Guide Manual. Austin, TX.

Thangaraju, M., Vijayalakshmi, T., & Sachdanandam, P. (1994, July 1). Effect of tamoxifen on lipid peroxide and antioxidative system in postmenopausal women with breast cancer. Cancer (U.S.), 74 (1), (Department of Medical Biochemistry, University of

Madras, India), 78-82.

Thompson, H. (1995, June). Walk, don't run. Texas Monthly, 114, 117, 136.

Tollefson & Fountain, (1992). Forty nine state systems.

Tribble, D.L., Giuliano, L.J., & Fortmann, S.P. (1993). Reduced plasma ascorbic acid concentrations in nonsmokers regularly exposed to environmental tobacco smoke. American Journal of Clinical Nutrition, 58, 886-890.

Trimble, R.T., & Hensley, L.D. (1994). Survey of basic instruction programs in physical education: 1993. Executive summary, University of Northern Iowa.

High vitamin doses for warding off colon cancer. (1994, September). Tufts University Diet and Nutrition Letter,12 (7), 1.

Turkington, C. (1995, April). Saving face. Vogue, 185, 354-355.

Usefulness of PSA level in prostate cancer screening. (1995, February15). American Family Physician, 51, 662+.

Vastine, P. (1984). A survey of wellness programs in junior and community colleges in the United States. (Doctoral dissertation, 1984). Dissertation Abstracts International.

Vinnedge, M. (1995, January 23). Age erasers for women. The Dallas Morning News, p. C3.

The virtues of vitamin E. (1992, November). Prevention, 44, 10, 12

Vitamin C attacks the body's worst enemy. (1989, December). Health, 21, 14.

Vitamin-rich diets drive down risk of stroke, heart disease, studies find. (1993, March 19). The Dallas Morning News, p. A7.

Voelker, R. (1994, April 20). Recommendations for antioxidants: How much evidence is enough? JAMA, 271 (15), 1148-1149.

Walker, K. (1995, April). Are long-distance runners dying? Sports Spectrum, 20-23.

Wattenbarger, J.L., & Starnes, P.M. (1976). Financial support patterns for community colleges. Gainesville: University of Florida.

Weinstock, C. (1992, June). A tune-up for the treadmill test. American Health, 11, 12+.

Willett, W.C. (1984). Relation of serum vitamins A and E and carotenoids to the risk of cancer. New England Journal of Medicine, 310, 430-434.

Wood, D. (1994, January 12). Vitamins for skin care. Cosmetic firms market ingredients, but does it work. Dallas Morning News, p. E4.

Wright, J. (1994, March 13). Walk the walk, you can live to talk the talk. The Dallas Morning News, p. J7.

Zeigler, E.F. (1979). History of physical education and sport. Englewood Cliffs, NJ: Prentice-Hall.

Zeldman, D. (1982). Articulation and transfer in Florida. In Frederick C. Kintzer (Ed.), New directions for community colleges, 39, San Francisco: Jossey-Bass.