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The Physical Fitness Boom *Implications for Education and Industry*

THE PHYSICAL FITNESS BOOM: IMPLICATIONS FOR EDUCATION AND INDUSTRY

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Editorial:

By Jerry R. Ball

In the past 30 years, physical fitness has made a very dramatic escape from the school gymnasium. It has moved into the streets, the corporate management headquarters, employee programs of American business and industry, and to more than 14,000 health fitness clubs (not counting some 750 private clubs and over 2,200 YMCAs). There is no question that the American public is concerned about exercise and its impact on fitness for people from a very early life through old age. We have passed through the phase of contemplation about whether the movement is a fad which will quickly disintegrate on the alter of a different diet or cocktail party, or if it has made a serious impact on the lifestyle of a significant percentage of Americans. We are now at a point of asking more serious questions about exercise programs for people of different ages.

One serious question that will be asked, as long as the immediate product of an exercise program is sudden death, is, "What is the individual exercise tolerance of individuals, and how does the private citizen, in an attempt to improve his/her quality of life by exercise, choose his/her tolerance level?" Even the most sophisticated techniques of physiological stress testing do not always produce definite and absolute results. The best results more often are of no use in indicating potential problems, nor do we know the impact of exercise programs on those potential problems. What we do know, of course, is that those who need the programs most are at greatest risk. Beyond that, we have much to learn and even greater need to apply our knowledge.

We are also coming to grips with the knowledge we have gained about exercise adherence. Even the most sophisticated programs have experienced alarming drop-out rates. Research has indicated those rates might be over 50% in programs purported to be well organized. While we know a great deal about why people drop out, it is more difficult for us to determine why they stay. One of the reasons seems to be a program director who has supportive knowledge and a motivating personality. In the case of the individual fitness enthusiast, however, his/her only sources of

motivation are primarily those he/she seeks through supportive friends, magazines and books. The writings of knowledgeable people on the subject of fitness, therefore, becomes a tremendous motivating force on those who run, walk, and bicycle the streets in search of an elusive model of fitness.

Another interesting and scant area of information centers around the cost effectiveness or cost benefits of a formal program of activities. Hospitals and corporate entities, not to mention individuals with an interest in this area, have attempted to translate the cost benefits module used in public and private health programs to programs in wellness and fitness. These attempts have met with a great deal of frustration, since the criteria for measuring either benefits or effectiveness have been so elusive.

In summary, fitness is obviously the most pervasive element of our field at this time. This publication has been designed to attempt to bring some of the best and most current thinkers in the field of fitness to bear on the broad spectrum of fitness in America. It is hoped that it will make a contribution to the literature.

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A Scientific Rationale for Exercise

By Bo Fernhall

The recent fitness boom, which swept not only this country, but much of western Europe, has created a tremendous interest in and impact on the fitness industry. Physical fitness has become big business, and more Americans are exercising on a regular basis today than ever before. The Gallup Polls have indicated that the number of exercising adult Americans have increased from 24% in 1961, to 59% in 1984. Thus, physical exercise has become a regular part of the lifestyles of many Americans.

Although exercise has become one of the most popular leisure activities in this country, some recent events have caused some concern for many exercise enthusiasts. The death of Jim Fixx created both fear and concern for many people; many probably started exercising because of Fixx's popular books on running. Fixx's death also occurred close to the highly publicized death of a New York marathoner. These and other highly publicized events made many people question the value of exercise, and have actually created a fear that exercise may be harmful. The timing of Solomon's (1984) book, "The Exercise Myth" certainly spurred such concerns. However, before coming to any definite conclusions about the value of exercise, one should familiarize oneself with the scientific evidence regarding the effect of exercise training, before making an informed decision on whether or not to exercise.

When discussing reasons for or against exercise, one of the most often asked questions is, "Will exercise make me live longer?" Although longevity is a legitimate concern, it is not the only concern. Physical exercise has diverse effects on the human body, many of which are desirable, and are common reasons for why people exercise. This article will try to help the reader make an informed choice regarding the value of exercise training. Hopefully, through an evaluation of epidemiological studies (large population studies) regarding exercise and longevity, and evaluating the physiological and psychological impact of exercise, the reader will be able to make such a choice.

Epidemiological Studies

The classical study which compared the incidence of myocardial infarctions (heart attack) in active and inactive populations was conducted by Morris et al., in 1953. They compared bus drivers (sedentary) and conductors (active) who worked on the double decked buses in London. It was found that the conductors exhibited 50% fewer heart attacks than the drivers. The authors

attributed this to the extra activity of the conductors, i.e., walking stairs during their shift. Thus, exercise appeared to have a protective effect against heart attacks. However, a follow up study, also by Morris et al. (1956), showed that the drivers had larger chest and waist circumferences than the conductors at the start of employment. In addition, they exhibited greater cholesterol levels and higher blood pressures than the conductors. Therefore, there may have been a process of preselection which makes it difficult to attribute the difference in heart attacks to the level of exercise, since other risk factors were present at the onset of the study.

Following the investigations by Morris et al. (1953; 1956), many occupational studies were conducted, comparing the incidence of heart disease in active versus inactive populations. Various occupations, ranging from the railroad industry, to postal workers, to farmers and other more sedentary occupations, and even cross sections of a multitude of various professions were studied (Froelicker, 1977). Most of the results were in agreement with those of Morris et al., i.e., exercise appeared to have a protective effect against heart attacks, but preselection could not be ruled out as a confounding factor. However, two more recent prospective studies by Paffenbarger et al. (1977, 1978), and one by Salonen et al. (1982), more strongly support the hypothesis of a protective effect of exercise.

Paffenbarger et al. (1977), followed San Francisco longshoremen for twenty-two years. They found that three factors posed twice the risk of increased levels of fatal heart attacks. These factors included a low energy output at work, smoking one or more packs of cigarettes a day, and elevated blood pressure. The authors concluded that physical activity was indeed protective and not selective, in protection against fatal heart disease.

In the second study, Paffenbarger and his associates (1978), followed 36,000 Harvard Alumni for a 6-10 year period. It was found that men who spent less than 2,000 kilocalories per week during some form of exercise, calculated from a physical activity index, showed a 64% higher risk of suffering a heart attack than those above this level. Again, cigarette smoking and hypertension were also significantly associated with increased levels of heart attacks. These results strongly support the role of physical activity in reducing the risk of heart attack.

Salonen et al. (1982), added more credence to the protection hypothesis. These authors followed over 7,000 men and women for approximately seven years, and all subjects were randomly selected. Their results indicated that low levels of physical activity were associated with increased risk of not only heart attack, but also with increased risk of stroke, and death due to any cause. These results held true even when the authors controlled for age, cholesterol, smoking and hypertension.

The epidemiological evidence for a role of physical activity in protection against heart

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attacks and fatal heart disease is overwhelming. However, critics often point out that these studies do not show a cause-effect relationship. Although epidemiological evidence is not as strong as experimental evidence, the relationship shown is still strong, and it would be improbable that some early form of self selection could account for all of the results. Therefore, based on epidemiological evidence, one can make a strong case for the use of exercise to decrease the risk of heart attacks and early death from heart disease.

Probably, the most well documented physiological change following an exercise program, is an increase in physical work capacity and maximal oxygen uptake.

Physiological Alterations

Regular physical exercise can produce many well documented physiological effects. Some of these effects appear to be beneficial in respect to heart disease, others may be more beneficial in daily life. Probably, the most well documented physiological change following an exercise program, is an increase in physical work capacity and maximal oxygen uptake. This means that an individual can produce a greater amount of physical work, and probably exhibit less fatigue (Pollock et al., 1984). Thus, daily tasks will be easier to perform, and the person will usually display more vigor and energy. There is even some evidence that this can carry over to one's professional life, with an increase in productivity (Shephard, 1984).

Another common effect of a regular exercise program is a decrease in body weight (Hartley, 1985; Pollock et al., 1984). It has also been shown that the majority of the weight lost from exercise is fat weight, i.e., the loss produced, was a desirable weight loss (Pollock et al., 1984). The ill effects of excess body weight are well documented, and include increased risk of certain cancers, increased risk of heart disease, and increased risk of age onset diabetes among others (Astrand & Rodahl, 1977; Corbin & Lindsey, 1985; Pollock et al., 1984). However, often overlooked in the scientific literature is cosmetic effect of a weight loss. The cosmetic effect, i.e., looking better, often produces desirable psychological benefits, which may be as important as the physiologic benefits. It should be noted though, that not all exercise programs will result in a significant weight loss, and that this benefit is more likely to accompany the chronic exerciser.

One of the primary effects of exercise which is often discussed is its impact on coronary heart disease risk factors. It is well established that exercise can alter many of these risk factors in a favorable direction. However, even though one's risk profile can be favorably altered, this does not automatically lead to a longer life. Instead, it should be emphasized that although the odds for a healthier longer life may be increased, there are no guarantees.

High levels of cholesterol is probably the

risk factor which has received the most recent attention. It is well known that people involved in endurance training on a continuing basis have lower blood cholesterol levels than sedentary individuals. More importantly, endurance trained persons also tend to exhibit better lipoprotein profiles, especially high levels of high density lipoprotein (HDL), which has been shown to have a protective effect against heart disease (Hartley, 1985; Pollock et al., 1984). The ratio of total cholesterol/HDL, which has the strongest risk association with heart disease, is especially improved with endurance training (Wood & Haskell, 1979). Thus, exercise training can have a profound effect on blood lipid characteristics.

Hypertension, another major risk factor, might be the most common and unrecognized medical problem in today's society (Hartley, 1985). Although exercise training will probably not lower the blood pressure of a normotensive (normal blood pressure) individual, substantial reductions in blood pressure have been shown in mild to moderate hypertensives (Fernhall et al., 1984; Pollock et al., 1984). Combinations of reductions in body weight and salt intake further amplifies this effect, and together with physical exercise, can be used as a therapeutic intervention for controlling mild to moderate hypertension (Pollock et al., 1984). However, such programs should be prescribed and monitored by qualified and experienced personnel. It should also be recognized that exercise appears to be less effective in lowering severe hypertension, which instead needs prompt medical attention.

There are many other physiological benefits produced as a result of exercise training including: improved cardiorespiratory function, reduction in blood clotting tendencies, reduction in triglyceride (a form of blood fat) concentration, and improved muscular function (Fernhall et al., 1984; Hartley, 1985; Pollock et al., 1984). The scientific evidence points to a vastly improved physiological profile of the endurance trained individual. Some of these changes may also be of protective or preventive value in regard to heart disease or other hypokinetic diseases (Froelicker et al., 1980; Pollock et al., 1984).

Psychological Alterations

Although many of the psychological changes associated with exercise are not as well understood, nor as commonly mentioned as the physiological alterations, they are no less

...among the more common effects of exercise were decreases in depression and anxiety.

important. Hartley (1985) showed that people involved in exercise programs tended to exhibit more healthful behaviors than nonexercisers. In particular, people who exercised tended to smoke less, have a greater likelihood of obtaining regular medical checkups, and of complying with medical advice.

In a recent manuscript, Ransford (1982) reviewed the current literature regarding the influence of exercise on psychological factors. He found that among the more common effects of

exercise were decreases in depression and anxiety. These changes were especially evident for those individuals who were moderately or mildly depressed or anxious at the onset of the study. Exercise appeared to have less of an effect on those with normal depression and anxiety scores. However, "normal" persons have often reported that they feel better following exercise (Morgan et al., 1971). This has also been substantiated with objective measures, showing exercise induced mood elevations (Hartley, 1985; Morgan et al., 1971). Virtually all investigators have been impressed with the exercise induced improved sense of well being and lessened proneness to depression (Hartley, 1985; Ransford, 1982). It has also been shown that exercise can improve the overall psychological profile of a person, including self concept and self esteem (Young & Ismail, 1976). Thus, exercise would appear to have many beneficial psychological effects, and can effectively be utilized to improve an individual's psychological state.

Summary and Conclusions

Based on the available scientific literature, it is evident that exercise training may have a protective effect against some physical manifestations of heart disease, such as heart attacks. There is no question that the physiological effects of exercise are beneficial for most people, creating an overall improved physiological state. In addition, there are many beneficial psychological effects. Together, these data provide compelling evidence for the beneficial results of exercise. In addition, other aspects which were not discussed, such as socialization (Corbin & Lindsey, 1985), further strengthens this conclusion. However, for many people, perhaps the best reasons for exercise is "to look better, and feel better." The scientific evidence indicates that for most normal people without severe medical problems, an appropriately conducted exercise program would have many desirable physiological and psychological effects. The slogan, "Exercise may not add years to your life, but it will probably add life to your years," may have some truth in it. However, it should be noted that any productive exercise program must be appropriate, safe, and individualized to be optimally effective.

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Exercise: Is It Safe?

By Joan A. Finn

Safety is an issue important to physical educators as they select and plan student activities, educational administrators concerned with facility usage and equipment purchase, and corporate executives addressing employee fitness and job productivity. The purpose of this article is to address the potential hazards inherent in exercise and to provide specific suggestions to make physical activity safe for participants.

Exercise as a factor in healthful lifestyles has recently attracted much attention from the scientific, educational and medical communities. Americans appear to be accepting more personal responsibility for their own wellness. Regular exercise, as a component of better health, has been adopted by millions of people (Nash, 1985). The question of exercise safety is rather simple. Is the return for regular exercise induced fitness worth the risk associated with vigorous physical activity?

It is the position of this author that the physical and mental benefits of regular exercise are worth the inherent hazards of activity. Education, supervision and instruction for an active population are imperative in making exercise as safe as possible.

Exercise Hazards

There are two major hazard potentials of exercise; the overly enthusiastic approach to fitness activity and the mode of exercise selected by the participant. Once an exercise regime becomes an important aspect of one's life, many physical and mental training effects occur. Significant changes in body composition reduce fat stores, girth measurements and clothes sizes become smaller, and a well-toned, lean, healthier physique emerges. Vigor, enjoyment of life, relaxation capacity, and a general sense of well being also result. Aerobic classes, jogging, weight training, swimming and racquet sports participation done on a regular basis can all produce the above positive effects.

As an individual's fitness level improves, he or she is capable of longer duration and more intense bouts of exercise. In an attempt to maximize the benefits of physical activity the exercise enthusiast may stress his or her body beyond its capacity (Brody, 1985). Such extreme enthusiasm of participants may result in chronic, overuse injuries that include stress fractures, tendonitis, bursitis and joint and muscle disorders (Kraus, 1981). Weight bearing

activities tend to be potentially most hazardous regarding overuse syndromes.

Controlled enthusiasm, setting of realistic performance goals and "listening to one's body" are three methods of avoiding chronic injury. A person can be a chronic exerciser without sustaining chronic injury. Gradual, well planned increases in frequency, duration, and intensity of any continuous, repetitive activity is important (Sharkey, 1979). Continuing education university courses, trained fitness specialists, and exercise program guides prepared by sport scientists can aid exercise enthusiasts to educate themselves on how to increase fitness levels and competitive performances safely.

The second potential hazard of exercise is the activity itself. By nature, some exercise modes are more dangerous than others. Alpine skiing, cycling, hang gliding and rock climbing are high risk activities that may result in acute, traumatic injuries. Proper skill execution and accurate assessment of one's skill level are important to exercise safety regarding these activities. Scholastic, collegiate and community based physical education programs are excellent avenues available for safe instruction and participation (Tangen-Foster and Lathen, 1983). Attentive supervision, instructional excellence, proper functioning apparatus, and equipment can minimize the hazards of high risk activities for participants.

The likelihood of either chronic overuse injury or acute traumatic accidents in exercise can be reduced with the use of common sense and hazard recognition on the part of participants. This point will be addressed next.

Prior to the onset of any exercise program, every potential participant should undergo a complete medical evaluation.

Making Exercise as Safe as Possible

The untimely, sudden death of running advocate Jim Fixx was perhaps the most graphic event focusing public attention on the effect of exercise. Sudden death during exercise has been the topic of numerous investigations (Ragosta, Crabtree, Sturner, & Thompson, 1984; Thompson, Funk, Carlson et al., 1982; Van Camp, 1984; Virmani, Rabinowitz & McAllister, 1982; Waller & Roberts, 1980). In a five year study on sudden death among male joggers 30-66 years old, Thompson (1982) found that only one man in every 7,620 died per year while jogging. Death related to exercise was more common among golfers than in any other recreational activity studied, according to Ragosta (1984). Exercise and Your Heart, a publication of the American Heart Association, describes physically inactive people at twice the risk of heart attack as active individuals.

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Scientific evidence documents the fact that healthy individuals and non-traumatic exercise related death is infinitesimally small.

Exercise safety in terms of acute or chronic injury and even death can be achieved by one's recognition of the need for precautions. Prior to the onset of any exercise program, every potential participant should undergo a complete medical evaluation.

The age of the exercise candidate should dictate the physician's examination focus. Maturity level, physical and psychological readiness, growth factors, history of disease and/or physical defects, and immunization information should be addressed in pediatrician's reports on children and adolescents. Such information should be reviewed and evaluated by physical education professionals responsible for elementary and secondary school exercise programs. Carefully planned, progressive, sequential and, therefore, safe programs can be developed by those teachers to meet the needs and unique characteristics of their students (Micheli, 1985).

As adults progress in age, the potential of chronic, degenerative disease incidence becomes an important factor regarding medical screening and safe exercise program development. Medical family and personal history, a complete physical examination to determine general health, overall lifestyle, and coronary artery disease risk factor analysis should be evaluated (Morris, 1984). In keeping with the guidelines of the American College of Sports Medicine (1986), inactive adults over age 35 should complete a graded exercise stress test prior to beginning an exercise program. These data provide information necessary for a trained professional to develop a safe, effective fitness program for most adults.

During an exercise session, the participant should be reminded to "listen to what the body is saying."

Exercise safety should be based on personal, realistic, common sense. The potential hazard of a particular activity should be logically assessed. One must evaluate if the possibility of injury outweighs the fitness potential, joy or attraction of an activity. Clearly, brisk walking offers significantly less risk than does skydiving.

During an exercise session, the participant should be reminded to "listen to what the body is saying." Common sense is important to this precaution as well. Knowing how much exercise is enough and how much is too much is a personal feeling. The purpose of the exercise should dictate the intensity and duration of the activity. A world class athlete and a health-oriented adult have different fitness requirements. Realistic evaluation of the exercise program goals will prevent overuse injury and promote steady progress in accomplishing such goals.

Finally, education regarding safety and physical activity must be addressed. Safety precautions can and should be taught by exercise leaders (Nash, 1985). Anticipation of potentially

unsafe situations can be learned. Exercising safely is like defensive driving. Being alert to possible danger and avoiding it can prevent many injuries. Wear reflective clothing when exercising outdoors at night, avoid traffic areas when bicycling, never swim alone, and avoid exercise-related clowning and horseplay.

The exercise leader, teacher, coach or supervisor must be encouraged to watch for dangerous behaviors from their group members and tactfully discourage such activities. Simple things like gum being inhaled, pierced earrings catching on clothing or equipment, or tripping on loose practice balls, can all result in serious injury. Safety is situation specific. Careful supervision can contribute significantly to both activity enjoyment and to injury prevention.

In summary, exercise is an important part of one's lifestyle that contributes to each individual's physical and mental fitness. Children should be taught safety practices in their physical education classes. Adults must become responsible in evaluating potentially hazardous exercise situations and focus on common sense solutions regarding exercise-related acute and chronic injury.

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Physical Activity and the Aging Process

By Thomas G. Manfredi

Today's focus on aging is greater than ever. It stems especially from the 1974 Research on Aging Act which lead to the structuring of the National Institute of Aging. This act presented impressive demographic statistics on the elderly. For example, over 75% of our population will live to be over 65 years of age (Butler, 1980). By the year 2030, the U.S. population should rise from its current level of 225 million to over 300 million, and people age 65 and older who now constitute 12% of the total population, should comprise over 17% of the population (Butler, 1980). Thus, the needs of the elderly will become even more prominent, including the need for physical activity.

There are many changes that occur with aging, including physical, physiological, mental, social and emotional. One of the more obvious changes is the shortening of our stature, due in part to degeneration of the intervertebral discs, and actual alterations of the vertebrae (Shepard, 1982). This may be accompanied by a lack of proper flexibility and weak abdominal and lower back muscles, which is often associated with lower back problems (McArdle, Katch & Katch, 1986). Although physical exercise will probably not affect the changes of the vertebrae and intervertebral discs, the other problems are usually a result of lack of activity. Therefore, appropriate physical activity may substantially aid in prevention or improvement of lower back problems associated with aging.

Another common change with aging is the increase in body weight. This is mostly due to the accumulation of fat. However, after age 50, body weight might actually start to decrease (Shepard, 1982). Unfortunately, this decrease is often due to a loss of lean body weight rather than body fat (Larsson, Sjodin & Karlsson, 1978). It has been hypothesized that the lean body weight loss is due not only to muscle atrophy, but an actual loss of muscle fibers (Larsson, 1982). These changes, together with changes in the contractile properties of the muscle, will produce declines in both muscular strength and endurance (Larsson, 1982; Larsson, Sjodin & Karlsson, 1978), which can in turn contribute to joint problems.

Another contributing factor to joint problems is a qualitative change in joint cartilage, which starts fairly early in life, between the ages of 20 to 30 years (Shepard, 1982). The functional consequences of these alterations with age is a decrease in joint range of motion. This may

result in a shortening of muscle fibers, which can induce pressure on nerves, producing pain and other disorders.

Physical exercise may aid in delaying or reducing the undesirable changes discussed above. It is well documented that exercise can decrease body fat and maintain lean body mass. Also, exercise has been shown to increase the strength, endurance and contractile properties of muscle. Although less certain, exercise may aid in preserving joint integrity and cartilaginous tissue (Butler, 1980; Caldwell, 1984; Holloszy, 1983; Larson, Sjodin & Larsson, 1978; McArdle, Katch & Katch, 1986; Shepard, 1982).

Osteoporosis has become one of the disorders associated with aging that has received a great deal of attention in the popular media. Presently, the mechanisms controlling osteoporosis are not clearly understood. It is believed that malnutrition, lack of calcium, heredity, gender and physical inactivity are contributing factors to the disorder. Although exercise alone is not cure or treatment for osteoporosis, recent research with females suggest that physical activity may retard the onset of the ailment (Caldwell, 1984).

Cardiovascular fitness and physical work capacity also decline with age. This decline is generally due to a decrease in cardiac output, or the ability of the heart to pump blood, and a decrease in the ability of skeletal muscles to use oxygen and produce work (Butler, 1980; Holloszy, 1983; Larsson, Sjodin & Karlsson, 1978). It is well known that aerobic exercise can increase cardiovascular fitness, and the body's ability to utilize oxygen (Skinner, Tipton & Vailas, 1982). Since it is believed that the decline in cardiovascular fitness is in part due to a sedentary lifestyle, aerobic exercise can aid in offsetting such an undesirable change (Skinner, Tipton & Vailas, 1982).

It is clear that physical exercise can have an impact on many of the undesirable physical and physiological changes associated with aging. However, it is important to understand that exercise will not prevent the process of aging, but rather, it will aid in altering the course of aging. In so doing, exercise may minimize the physical disabilities associated with aging, thus allowing a person to remain active and productive even at an advanced age.

Exercise Guidelines for the Aging Individual

It is clear that some age-related changes are associated with a sedentary lifestyle. The approach toward enhancement of physical fitness in the aging population should focus upon age-associated changes which can be partially eliminated through properly designed programs. Exercise programs for older adults should emphasize total fitness with a major focus on aerobic conditioning, flexibility, mild calisthenics, and mild weight training. A carefully integrated program should lead to improvement in cardiorespiratory function, joint range of motion, and body composition.

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Exercise prescription for adults should be based upon preliminary medical and fitness screening conducted by a physician and competently trained personnel in exercise physiology. A physician's release form is often required for participation in corporate, industrial, and community based programs. The prescription for proper aerobic training is typically generated from a stress test or field test (e.g., a 1.5 mile walk-run). The American College of Sports Medicine makes recommendations for the quantity and quality of exercise designed for "maintaining cardiorespiratory fitness and body composition in the healthy adult" (ACSM, 1978).

Exercise should be performed 3 to 5 days a week, 15 to 60 minutes per session, and at a heart rate between 60 and 90% of maximum heart rate reserve (% difference between maximum and resting heart rate, added to the resting heart rate). However, for a very deconditioned individual, it may be desirable to start a 40-60% of maximal heart rate reserve. It may also be necessary to allow the person to reach the goal of 15 minutes of exercise, through a modified interval exercise program, i.e., two minutes of appropriate exercise followed by 1-2 minutes of rest, until the person reaches 15 minutes of exercise. The kind of physical activity recommended should be rhythmical and continuous, and include large muscle groups. Swimming, rowing, bicycling, cross-country skiing, and running are examples. Heart rate should be checked often during the beginning week of the program. Progression during the first few weeks of training should emphasize increasing exercise time rather than exercise intensity.

The exercise session should include a warmup such as brisk walking while moving the arms. This minimizes the risk of musculoskeletal injuries when later engaging in more vigorous exercise. The warmup should be followed by a carefully designed stretching routine which includes slowly stretching the major muscle groups and holding the stretch position for several seconds. The aerobic and/or weight training phase of the workout follow stretching. It is advisable to cool down following moderately strenuous activity to allow the heart rate and circulation to slowly reach resting levels. Many participants stretch again at the conclusion of the workout since slow stretch facilitates muscle relaxation.

The Impact of Fitness on Business and Industry

The potential for fitness paying off in business and industry lies in reduced health care costs. For example, the total health care costs in 1975 was \$25 billion, 17% of our Gross National Product (Scheffler, 1979). The cost of cardiovascular disease to the US in 1984 was approximately \$64.4 billion (Scheffler, 1979). The Kimberly-Clark Corporation found a 12 to 18 month employee fitness program significantly reduced coronary risk factors, including blood pressure and serum triglycerides (Dedmon, Gander, O'Connor & Paschke, 1979). The staff projected that the financial break even point for the employee fitness program would be 3 years and the risk factor reduction program 6.5 years, with significant savings occurring in 10 years. Other benefits derived from the program were enhanced public image and a higher potential for corporate recruiting.

Johnson & Johnson's health care program has found similar positive results from its program for several thousand employees (Anonymous, 1983). Preliminary results from cost-benefit studies in J & J's "Life for Life" program showed that during

their first four years, four times as many participants stopped smoking when compared to non-participants. Reduced absenteeism, greater job satisfaction, lower blood pressure and body weight, and high levels of fitness were also reported in the program participants when compared to controls (Anonymous, 1983).

One of the major problems facing private business is the large cost of health insurance premiums, which exceeded \$80 billion a year in the early 1980's (Anonymous, 1983). Even more disturbing is the 20-25% increase in premium costs each year (Anonymous, 1983). Quaker Oats has decided to approach this problem through its "Health Incentive Plan" (Anonymous, 1983).

The directors of the employee benefits program set fixed payments for health care packages and is awarding each employee the difference between the projected and actual annual care cost if his or her actual cost is lower. Such an incentive places greater responsibility on the employee for health care costs. As a result of the program, it is expected that the increase in health care costs will be 8-10%, rather than 20-25% (Anonymous, 1983).

It has also been shown that employee fitness programs can have an impact on the coronary health of the employees, reducing the risk of heart attacks. A recent study of 100,000 Dupont employees demonstrated that their employee lifestyle enhancement program of blood pressure

It would appear that employee fitness programs will have a great impact on private business in the future.

screening, smoking cessation, diet intervention, and exercise reduced heart attacks by 18% in hourly workers and 35% in salaried workers (Luzela, 1985).

It would appear that employee fitness programs will have a great impact on private business in the future. It seems possible that the fit individual will exhibit less absenteeism, fewer health problems, and possibly increased productivity. These positive aspects may have the greatest impact on the older individual. Considering the many debilitating conditions associated with aging, and the prophylactic effect of exercise on these conditions, many employee health care problems may be improved or prevented through an appropriately implemented exercise program. This would allow the older employee to stay on the job and be productive for a longer period of time. In light of the large projected relative increase of the population of older individuals in this country, it would appear that the impact of physical activity could be dramatic.

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Physical Fitness in the Physical Education Curriculum

By Connie Fox and Janet Ainsworth

The proliferation of health clubs and spas, how-to books and video-cassettes on fitness, diet and weight training, along with the surge of humanity jogging, weight training and exercising has been a boon to the fledgeling fitness industry. Has this personal desire for fitness been brought on by school-based physical education programs, or is it occurring in spite of those

programs? While most states require some physical education in the public schools, very few states specify content requirements. Most physical education programs give cursory efforts to increasing the fitness of their charges. Perhaps it is a result of this lack of emphasis on fitness that has led to no increase in the fitness levels of our nation's school children since 1957 (Kneer, 1985).

It is true that fitness is one objective of school based physical education curricula. A look at program content, however, will often reveal a lack of real efforts at developing fitness. Evergreen Park High School (Evergreen Park, IL) offers a three week unit in fitness at the conclusion of the school year. Whatever gains that are made are lost over the summer vacation (Fox, 1985). Green County High School (Georgia) goes further in requiring a fitness unit of one semester for all ninth graders. The remainder of their physical education requirement is recreational in nature (Fox, 1985). Little else is done at either institution to develop or maintain whatever fitness was gained in that

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little time. These examples of fitness programs within a physical education setting appear to be typical across the nation.

What, then, must be done in the school physical education curriculum to insure a quality program for the development and maintenance of fitness? First, a commitment to a fitness based curriculum must be made. If fitness is to be an objective of the program, the program designers must make several key assumptions. Fitness is a

Fitness is composed of several parts: muscular strength and endurance, cardiovascular endurance, flexibility, and appropriate body composition.

process, not just an end product. Therefore, a continuous program must be established which will allow students to progress toward and to maintain desired levels of fitness. Fitness is composed of several parts: muscular strength and endurance, cardiovascular endurance, flexibility, and appropriate body composition. It is possible for an individual to excel in one component while failing in another. All components must be developed for optimal fitness. Finally, fitness cannot be achieved by developing physical aspects, or performance, alone. A knowledge of the interrelationships between components and an understanding of the effects of nutrition and mental and emotional health on those components are also necessary.

Once the commitment to develop and maintain fitness has been made, the curriculum designer must turn inward and examine the values from which school-based educational programs are derived. There are those who would argue that fitness development is a form of training, and that training is not synonymous with education. Proponents of this line of reasoning would promote learning how to become fit, but would not necessarily attempt to develop fitness. It may be this reasoning which has impeded the development of sound fitness programs in the schools.

Eisner and Vallance (1974) identify several value positions which have implications for what is done in the public schools. Of their five positions, two are most often found in physical education programs. The self-actualization concept had strong influence on curricula in the 1960 and '70's. Content was strongly saturated with the value of providing personally satisfying experiences for the individual. Programs emphasizing the needs of special populations such as the handicapped, and programs for developing the perceptual motor activities of children, were based on this concept. During the 1970 and '80's, curricular designs moved more toward fulfilling the needs of the society. Humanistic concerns grew, and physical education took as its mission the tasks of providing peak experiences and examining the inner self through movement (Hellison, 1973). Sport psychology became an accepted discipline, and psychological/physiological performance was the goal of movement.

It is in the context of providing self-knowledge and peak performance that the fitness

curriculum must carve a niche. Within this value-laden context, the program designer must determine the focus of the program. Is individual growth and development to be the key focus or is content to be selected according to the needs of the society in which the individual must function?

Once the value orientation and direction have been established, it is the responsibility of the curriculum designer to select a model and conceptual framework from which the program will be derived. A curriculum model is a symbolic representation of interrelationships of key concepts (of which fitness may be one or the only one) of value orientation and content. It provides the basis for selecting, organizing, sequencing, and evaluating learning experiences. A framework is derived from the model and is a system in which instructional actions may be selected. The framework necessarily includes the key concepts from the model, activities in which the concepts are illustrated, and the instructional strategies by which learning occurs.

There have been several attempts to design curricular models which may be used from setting to setting. Kenyon (1968) developed a model for assessing attitude toward physical education. The attitudes represent six dimensions or goals of physical education. These goals may be used to derive curricular objectives. The use of physical activity for developing health and fitness is a consistent goal and is strongly preferred by students. Annarino (1970), in clarifying traditional physical education objectives, lists, among the most recurrent objectives, the development of organic vigor. He describes organic vigor as a composition of muscular strength and endurance, cardiovascular endurance, and flexibility.

A curricular model frequently referred to is the personal meaning model, in which the assertion is made that for a movement to be relevant or important to a learner, it must have significance for that learner. Several curriculum designers

The lack of a comprehensive description of a curriculum model for fitness is a problem in the field of physical education.

have used this approach to developing curricular frameworks (Allen, 1982; Jewett & Mullan, 1977; Johnson, Updyke, Schaefer, & Stoldberg, 1975). However, the personal meaning framework proposed by Jewett and Mullan (1977) is the most widely accepted. This framework proposes three categories from which personal meaning may be extended. Fitness is one of those categories and includes circulorespiratory efficiency, neuromuscular efficiency, and catharsis as components.

There is, however, no fitness-based curriculum model that has been published (Jewett & Bain, 1985). The lack of a comprehensive description of a curriculum model for fitness is a problem in the field of physical education. This problem may be traced to the argument of training versus education, or it may be related to the lack of a clearly defined field. Some physical

educators believe that a fitness program more properly belongs in the domain of health education. For whatever reason, the curriculum designer is without an example of a framework on which to design a fitness program and must navigate in uncharted waters.

A conceptual framework for a fitness curriculum might consist of the components of fitness. Care must be taken to include not only the health-related components such as cardiorespiratory endurance, but also information about how exercise affects each component and how attitude toward movement is related to each component. The concepts of a fitness curriculum framework might also include such things as cardiovascular endurance, body composition, flexibility, muscular endurance and strength, and stress reduction. Some would also suggest that motor ability components such as coordination, agility, speed, power, and balance be included.

While no specific framework exists from which to select instructional objectives for a fitness curriculum, several authors offer descriptions of each component, tests for measuring each of them, and exercise programs for developing them (Annarino, 1970; Kenyon, 1968; Kneer, 1985). It should be noted that none of these authors propose that fitness development be the exclusive focus of the physical education program. However, information from any of these texts may be incorporated into a program developed by the curriculum designer.

An example of a unit of instruction, designed to promote cardiorespiratory endurance is provided below. The cardiorespiratory endurance component consists of several key concepts. Some of these concepts are the overload principle, target heart rate zone, and aerobic capacity. An example of a learning experience and performance objective related to each concept is given.

CARDIORESPIRATORY ENDURANCE

A. Overload Principle

1. Dance
Students will use rhythmic activities for a 20 minute duration and reach a 70% maximum heart rate.
2. Circuit training
Students will complete three repetitions of a circuit of running, jumping and calisthenics in 20 minutes.
3. Games
Students will actively participate in a soccer game for 35 minutes.
4. Aquatics
Students will reach 75% maximum heart rate and continue for 20 minutes.

B. Target Heart Rate Zone

1. Intensity
Students will perform calisthenics and reach a 135 beats per minute threshold heart rate.
2. Duration
Students will walk/jog/run above intensity levels for 30 minutes.
3. Frequency
Students will reach maximum intensity and duration while performing interval training at least three times weekly.

C. Aerobic Capacity

1. Dance

Students will perform aerobic dances for at least 20 minutes at 70% maximum heart rate.

2. Rope skipping
Students will jump rope for five minutes at 75% maximum heart rate.
3. Bicycling
Students will ride for 30 minutes at 70% maximum heart rate.

This sample unit provides some content ideas that might be included in a fitness program. It must be noted, however, that discussion of these concepts must be included in the program. Students must not only train their bodies, but they must also understand why these programs are necessary and effective. They must understand the physiological principles behind the fitness training. With these understandings, students will, hopefully, become fit enough to go out, on their own, and develop total fitness. These physically and mentally educated students can then lead the fitness boom into the twenty-first century.

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Physical Fitness for Elementary School Children

By Douglas N. Hastad

Much like the wicked queen in the fairy tale, Snow White, the American public is gazing upon the many mirrors of American life and asking "Who is the 'fittest of them all?'" From the smiling healthy faces on the cereal boxes, to the still popular Barbie doll, now complete with her own workout center, including cycle, dumbbells, slant board and locker with a towel, most people would expect the mirrors' response to be, "Why Americans, of course."

It certainly would appear that the American public has encountered sweaty epiphanies and is fast becoming a worldwide benchmark for health and physical fitness. During the past decade, the interest in physical fitness and increased awareness of the benefits derived from an active lifestyle have spawned a wide assortment of health clubs, a vast array of books and magazines concerning exercise and fitness, a weekly smorgasboard of distance runs and triathalons, streamlined exercise equipment, and apparel for virtually any type of physical activity. What appears to be truth, however, may be more fiction than fact. The 'fitness boom' may be a 'fitness bust.'

The many manifestations of active ways are misleading. Through daily exposure to powerful marketing strategies, vicarious witness of spectacular athletic feats, and a basic lack of knowledge regarding physical fitness, the American public is being lulled into a false sense of security about the overall fitness levels in our country. Most frightening, however, is that the situation among children is particularly bleak.

The nation's burgeoning enthusiasm for fitness and physical activity has not trickled down to elementary school youngsters. A recent statement issued by the American Academy of Pediatrics reported that children from the ages of 2 to 12 watch about 25 hours of television per week, more time than they spend in school. It is estimated that only about a third of our children and youth participate daily in school physical education programs nationwide, and that amount is both declining and insufficient. This compares unfavorably to the Surgeon General's 1990 goal of a 60% rate for daily physical education (Wilmore, 1982).

These statistics about youngster's sedentary habits pale in comparison to the rapid deterioration of physical fitness exhibited by children during the past 25 years. The current status of children's physical fitness levels is alarming. A report from the US Department of

Health and Human Services concluded that about half of American children and adolescents were not developing the exercise and fitness skills to develop a healthy heart and lungs (Ross & Gilbert, 1985). Scientific investigations have shown the presence of coronary heart disease risk factors in children. Research conducted on 47 active boys and girls 7-12 years of age found that 65% of the children had at least one risk factor associated with the onset of heart disease (Gilliam, Katch & Thorland, 1977).

In addition, other degenerative diseases associated with lifestyle have been identified in children. Conservative estimates suggest that between 30-60% of the school age children in

A primary factor contributing to the poor fitness levels of children is the low level of physical activity children experience on a day-to-day basis.

America are overfat. Of these obese children, it is predicted that four out of five will grow into obese adults. Likewise, 28 out of 29 teenagers who are obese will become obese adults (Johnson, 1956). While young children display increased flexibility with growth, by early adolescence this trend begins to reverse and by the time adulthood is reached, 80% will suffer some form of low back pain. Over 85% of this low back pain is the result of lack of strength, muscular endurance, and flexibility in the abdominal, low back, and hamstring region (Clarke, 1975).

A primary factor contributing to the poor fitness levels of children is the low level of physical activity children experience on a day-to-day basis. Results of a recent study which monitored electronically the heart rate of children six and seven years of age indicated that even though children appeared moderately active, they seldom experienced high intensity physical activity (Gilliam, Freedson, Geenen & Shahraray, 1981). It is perhaps surprising that this occurrence has been repeatedly verified through observational studies designed to establish movement frequency during periods of recess and recreation (Cumming, 1975; Howell, Bursick, Sharkey, & McClure, 1978).

We must understand that children are physiologically well-equipped for endurance exercise and perform well in aerobic sports (Bar-Or, 1983). In fact, children respond to prolonged bouts of physical activity in much the same manner as do adults (Chausow, Riner & Boileau, 1984). Evidence is mounting which suggests that children do not appear to have a 'biological handicap' in performing prolonged sessions of exercise, but rather, seldom engage in extended physical activity because they perceive it to be monotonous (Macek & Vavra, 1974).

If, as educators, we believe that health and

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physical well-being are an important commodity for our nation's children to possess, then the time has come to carefully review existing programs of physical education. We need to demonstrate that adequate levels of fitness are being maintained and improved. Also, we need to be assured that the knowledge necessary to understand and value physical fitness development is learned by the youngsters we teach. Successful programs of physical activity for children have many easily identifiable features. While not inclusive, the following features seem to be integral components of successful physical activity programs for elementary school children.

1. Programmatic goals are simple and realistic.

Development of physical fitness objectives is one of the major goals. While emphasis is on offering a balanced program of physical education, regular bouts of exercise are included in each lesson.

2. There is a strong commitment to health related physical fitness assessment and evaluation for all children in grades K-6.

Testing focuses on measuring the fitness components of cardiovascular efficiency, body composition, strength and endurance, and flexibility.

3. A computerized record-keeping service is employed to collect, analyze, store, and report fitness scores.

To offset the negative concerns associated with testing and in a bid to reduce the excessive paperwork, many school districts are relying on microcomputers to translate raw fitness scores into more meaningful percentile equivalents and print fitness profiles with an exercise prescription which can be sent home to parents.

4. School districts and educational agencies support the retraining of practitioners in health related physical fitness.

Administrators acknowledge the fact that many elementary physical education teachers may not be properly prepared to conduct health related physical fitness assessment, evaluation, or programs. Schools committed to improving the physical fitness of children are providing opportunities and/or resources (i.e. inservice workshops, consultant expertise, or financial assistance for coursework, travel, etc.) to update the practitioner on health related physical fitness.

5. The physical education curriculum is structured to provide for regular bouts of vigorous exercise.

Physical fitness activities are part of the daily physical education lesson. Fitness is not viewed as a by-product of physical education. Rather, teachers dedicate a minimum of ten minutes in each daily lesson to activities designed to enhance components of physical fitness.

6. Planned efforts are made to teach children

the value of being physically fit.

Youngsters are provided with information regarding the importance of making fitness a lifetime commitment. Activities designed to teach the 'why' and 'how' of physical fitness are included in physical education lessons. Many elementary schools are teaching physical fitness in a cross-disciplinary manner. Concepts of physical fitness is a topic appropriate for inclusion in science, social studies, health, and other subject matter areas.

7. Fitness activities are presented in a way that is appealing to youngsters.

Regimented calisthenics have been replaced by more exciting fitness activities. Aerobic dance, rope jumping, jogging, circuit training, and obstacle courses are among the many routines which can be structured to adhere to the principles of exercise and still be enjoyed by youngsters.

8. Physical fitness is modeled by instructors.

Quality programs of physical education are directed by instructors who do more than 'preach' fitness. As advocates of physical fitness as a lifestyle, superior elementary physical education teachers display physical and habitual characteristics associated with being healthy and fit. There is virtually no place in a quality program for teachers who are obese and/or smoke.

9. Children have ample opportunity to participate in instructional physical activity.

A regular time and space is reserved for physical activity. With emphasis on instruction (as opposed to recreation) class sizes do not exceed the number of students taught by the classroom teacher. Physical education is recognized by administration and classroom teachers as vital to the total educational experience of children.

10. Students visibly enjoy and readily discuss physical activity.

Youngsters habitually participate in vigorous physical activity. They understand that energy expenditure is necessary for fitness to occur and willingly accept the minor discomfort of exercise and strenuous effort.

It is quite possible that this intense concern regarding the physical fitness of children and concomitant shift in philosophy and direction of elementary physical education caught some programs off-guard. If so, the following sequential approach to implementing physical fitness in the curriculum may assist the practitioner in the developing or restructuring of physical activity programs.

1. Become familiar with current literature regarding the underlying reasons for the poor levels of children's physical fitness.
2. Consult with a trained expert about fitness assessment evaluation, and program implementation.

3. Visit exemplary physical education programs which have been successful in improving physical fitness in children.
4. Develop a yearly schedule for physical fitness which includes weekly routines differentiated by grade levels (i.e., K-2, 3-4, and 5-6), fall/spring assessment and evaluation, and supplemental activities for the classroom.
5. Proceed slowly, but deliberately, in implementing vigorous fitness activity into each daily lesson.
6. Adhere to the principles of exercise (i.e., intensity, frequency, duration, and progression).
7. Monitor the fitness of children through periodic self-testing activities.
8. Promote physical fitness through a quality program and a planned public relations effort.
9. Share successful aspects of the program with colleagues.

The physical fitness status of children is indeed alarming. The good news is that a cure is available. Properly organized sessions of physical activity can offset this decline of fitness exhibited by children and again begin to restore the vitality so essential to a youngster's growth and development.

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Physical Fitness in the Secondary School Curriculum

By Charles B. Corbin

The recent interest in physical fitness in the United States is more than a fad, it is a trend, according to Nesbitt (1982) the author of the popular book Megatrends. But for every bit of good news concerning the recent fitness trend, there is a bit of bad news.

The Status of Physical Fitness

The good news is that nearly 2 1/2 times as many Americans are physically active in 1984 as compared to 1960. A recently completed Gallup Poll shows that 59% of American adults over 18 years of age report doing some sort of regular exercise as opposed to 24% in 1960. The bad news is that the polls, including one done by Harris and associates (1979), show that only one in three adults gets enough exercise to improve his or her health and fitness and one in five adults is too fat. While Americans are exercising more than ever before in their leisure time, many are not really getting the full benefits from their exercise. Unfortunately, the people most likely to be vigorously active are young males with a college education. Other groups are significantly less active.

Other good news indicates that the interest in sports is very high among American adults. Seven of ten report reading about sports, viewing sports, or attending sports events on a regular basis, according to the recent Miller Lite Report on American Attitudes Toward Sports (1983). Most popular among spectator sports are football, baseball, basketball, gymnastics, and boxing. The

The most popular adult activities, according to many surveys, are walking, home calisthenics, jogging, bicycling, and swimming.

bad news is that most adults do not become active in the sports they most enjoy watching. Furthermore, spectator sports are the ones which parents often value for their children and the ones children spend the most time learning. It is not bad to learn the sports of our culture, but it is bad news when young people fail to learn the

Charles B. Corbin is a Professor in the Department of Health and Physical Education and the Exercise and Sport Research Institute, Arizona State University, Tempe, AZ. He is a specialist in motor development and physical fitness and has published sixteen books including a high school text entitled Fitness for Life which is used internationally.

activities in youth that are most likely to be performed as adults. The most popular adult activities, according to many surveys, are walking, home calisthenics, jogging, bicycling, and swimming. The only sport among the most popular in the participant activities is bowling and it is not particularly effective in building any important part of good health or fitness.

A last, but very important bit of good news is that 90% of all American adults believe that regular exercise is important to their good physical and psychological health. The bad news

The mixed news about fitness suggests that American adults believe in the value of exercise but lack good information about it.

is that many of these people who believe in the importance of good exercise do not know how to go about planning for their own personal exercise. For example, one study (Harris, 1979) indicates that more than one half of all adults hold misconceptions about exercise and fitness. Many perform exercises incorrectly and participate in dangerous fads.

The mixed news about fitness suggests that American adults believe in the value of exercise but lack good information about it. They often do not have good exercise habits. My own research indicates that there are two important reasons for this: lack of confidence in physical abilities, and lack of an educational background concerning exercise and fitness.

Traditional physical education and athletic programs have often focused on performance. The person who can do the most chin ups, who can run the fastest, or throw the farthest is rewarded with recognition and acclaim, not to mention good grades in physical education classes. Those who are not so good may drop out of sports early and often do not enjoy competitive activities requiring high levels of skill. Those who lack confidence sometimes feel that exercise is not for them. This is unfortunate because all people can benefit from exercise if they learn that for their own health, fitness, and enjoyment, it is not 'how fast' or 'how far' that counts, but that they do the exercise regularly. There is some form of exercise for every person in America. You don't have to be a great athlete to benefit.

The second major reason for the bad news about fitness is that many adults have never really learned the facts about exercise. Not only do they hold common misconceptions, they don't know how to go about planning for their own personal exercise. Many are not sure about the values of the many different forms of exercise available to them. At least part of the problem stems from the fact that leaders of many traditional physical education and athletic

programs view fitness as something teachers do to students rather than something students learn to do for themselves. Obedient students do as they are told only to find out years later that they really don't know why they did each of the various

Recent research has provided us with a great deal of information which can be useful to the exercise and fitness consumer.

exercises. Recent research has provided us with a great deal of information which can be useful to the exercise and fitness consumer. It is essential that teachers and coaches communicate this information to their students.

Fitness for Life Programs for the Schools

One way to help Americans to be better exercise and fitness consumers is to plan sound educational programs designed to meet this goal. Rather than limiting physical education and athletic experience to learning physical skills, some innovative educators have developed alternative programs designed to teach students the facts about exercise and fitness, to teach people how to do self-evaluations of fitness, and to teach people how to plan personal fitness and exercise programs. These unique "Fitness for Life" classes, such as the one described in The Physician in Sports Medicine magazine (Corbin & Lauri, 1978) have been quite successful at the college level. A recent report (Slava, Laurie & Corbin, 1984) of a long-term study of the effects of a "Fitness for Life" or consumer fitness course indicates that participants in the program have attitude-knowledge-behavior patterns which are significantly more positive than those who do not take such a course. These benefits are present years after the course is completed and years after college graduation. The researchers suggest that similar programs presented earlier in the school experience, such as at the elementary and secondary levels, could be equally, if not more effective.

The prestigious American Academy of Physical Education (1983) has recognized the importance of teaching fitness consumerism and recently endorsed a position statement which supports the teaching of "Fitness for Life" classes. Their position statement recommends that students in schools and colleges, as well as the general public, need to be "...intelligent consumers capable of solving their own exercise, fitness, and physical activity problems." It is my opinion that exemplary college programs such as those at Mercer County Community College, Kansas State University, and Arizona State University are, in part, responsible for the greater fitness of college graduates as compared to those with lesser education. But all people, not just college graduates can benefit from "Fitness for Life" programs. Nearly two thousand elementary and secondary schools have started such programs including model programs in Rochester, New York, Topeka, Kansas, Denver, Colorado, and Huntington Beach, California. Ideally, instruction should begin early in the school years. However, it is never too late to begin. At Mercer County Community College in

Trenton, New Jersey, older adults learn the facts about fitness from a well planned public television program. At Arizona State University, a similar class is available on cable television and is an interactive television class which allows factory workers to take the class on the job.

The most encouraging of all recent signs is the passage of a law in Florida, part of the RAISE (Raise Academic Standards in Secondary Education) BILL, requiring a personal fitness class of all high school students. Under the direction of Department of Education physical education supervisor Manny Harageones, educators and lawmakers have joined forces to require a course designed to help all students, regardless of sex, or physical ability to become good consumers of fitness and exercise. This course, which began in the fall of 1984 has been lauded by the American Alliance for Health, Physical Education, Recreation, and Dance as a major breakthrough in helping all people to become fit for a lifetime.

Unlike traditional physical education programs, "Fitness for Life" classes often are conducted in a classroom. A textbook (Corbin & Lindsey, 1985; Corbin & Lindsey, 1983) is used to help students learn the benefits and dangers of exercise of all types. Lab sessions in the gym focus on learning to self-evaluate the important parts of health fitness such as cardiovascular fitness, body fatness, flexibility, and muscle fitness. Students learn which exercise and sports build which parts of fitness and which activities build fitness of various body parts. They learn to read magazine articles on fitness, how to select fitness devices, and how to select a health club. Most importantly, students learn to plan their own personal fitness programs.

"Fitness for Life" programs are not a substitute for traditional sports skills classes because good sports skills help people enjoy their exercise. But these classes do help people learn which sports are best for them. In "Fitness for Life" courses grades are not based on level of performance or physical abilities. They are based on a person's ability to test his or her own fitness, to plan his or her own personal fitness program, and to demonstrate knowledge of the facts about exercise and fitness.

The bad news is that all people who take a "Fitness for Life" class will not become active for a lifetime. The good news is that all people who take such a class will have the information to be good fitness and exercise consumers. This

...people "...should not need to pay health spas or other organizations to teach them how to become fit; they should have learned it in the schools."

gives them a choice. If they choose not to exercise they will be no worse off than other inactive Americans. If they choose to be active for a lifetime they can participate with the confidence that their exercise will be safe, enjoyable, and personal. As the Commissioner of Education for the state of Florida put it, people "...should not need to pay health spas or other organizations to teach them how to become fit; they should have learned it in the schools."

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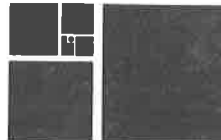
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Interaction Between the Fitness Industry and the University

By William J. Stone

The physical fitness boom is approaching the end of the second decade, and it has made a significant impact on many segments of this society (Stone, in press). Because of its longevity the boom can no longer be considered a transient health fad. Interest and participation in wellness, fitness, and sport remains keen and has become a permanent lifestyle for a significant portion of the adult population. Numerous surveys conducted in the past fifteen years attest to the fact that many more adults are engaged in regular, vigorous physical activity than in the late 1960s and early 1970s (Lupton, 1984).

Because of the staggering cost of health care (\$300 billion annually), many corporations have fostered fitness and wellness programs designed to encourage the employee to take more responsibility for his/her own health. Life and health insurance companies are beginning to offer reduced premiums for those who practice prudent health practices, like not smoking, controlling weight, and exercising regularly. The medical profession has done an about face in the last two decades, and exercise has become standard therapy for many diseases and a prudent preventative for healthy adults.

Two of the major beneficiaries of the boom are the fitness industry and fitness professionals. The fitness industry includes health and fitness clubs as well as fitness and sports goods manufacturers. Sales of sports goods and fitness attire and equipment have boomed and so have the number of health clubs and fitness chains. Health and fitness clubs have become the 'country clubs' and meeting places for young, single professionals. Thousands of jobs have also been created for adult fitness specialists. That, in turn, has influenced programs in institutions of higher education which are designed to prepare fitness professionals.

A 1982-83 national survey of major colleges and universities was focused on adult fitness programs (Bennet & Carmak, 1983). At that time, 200 institutions had course work and 135 had degree programs in adult fitness. The movement toward alternative careers, including physical fitness, has been noted earlier by others (Considine, 1979; Wiley, 1981).

Arizona State University is a major urban university in a large metropolitan area (Phoenix). During the fitness boom, the interaction between the Department of Health and Physical Education and the fitness industry has greatly increased. Like many institutions of higher education, the boom has also influenced the professional preparation curriculum.

Professional Preparation

Historically, departments of physical education have prepared student majors for careers in the education field. During the 1950s and 1960s the overwhelming majority of students who graduated with degrees in physical education were preparing for careers in education. By the 1970s two factors were operating to change that picture. A dampened economy resulted in a reduction in tax revenues, placing more pressure on dollars allotted for education. Secondly, there has perennially been an over-supply of physical education teachers and the general belt tightening that education faced in the recent past added to the reduction in teaching opportunities.

By the early 1970s, the fitness boom was beginning to gain momentum and job opportunities were growing in adult fitness and wellness programs. At Arizona State University, during the past decade, there has been a major shift from students concentrating in the B.A. degree programs in Education (formerly over 90%), to those preparing for careers in adult fitness, exercise physiology, and sports medicine. The non-teaching emphasis (B.S. degree) now constitutes over 50% of student majors. Adult fitness/exercise physiology is also the most popular concentration in the M.S. degree program.

There have been some efforts to identify the competencies required of those fitness professionals who are preparing to work in adult fitness (Considine, 1979; Golaszenski, Tomik, Pyle, & Pfiesser, 1982; Halcomb, 1984). Among the competencies required include: sufficient exercise physiology background for the development of sound fitness programs, personality characteristics and counseling skills for effective fitness motivation, and managerial and marketing skills necessary for program directors. Involvement with wellness programs may also require a broader background in health related problems (Golaszenski, Tomik, Pyle, & Pfiesser, 1982). The wellness director may be called upon to offer or organize stress management seminars, weight control classes, stop smoking clinics, and substance abuse seminars.

The exercise science undergraduate program at Arizona State University focuses on: 1) the core areas of the physical education discipline (biomechanics, exercise physiology, sport psychology, etc.); 2) related areas designed to strengthen the concentration (nutrition, counseling, business); and 3) career-specific experiences such as activities aimed at adult

William J. Stone is a Professor in the Department of Health and Physical Education of Arizona State University, Tempe, AZ. He is a consultant to numerous corporations, agencies, and medical practices for the development of fitness programs, and has recently completed a book on Adult Fitness Programs.

fitness (aerobics, weight training, racquetball), course work in exercise prescription and fitness evaluation, and senior internships.

Internships and Job Opportunities

The senior internship program has grown rapidly in the past five years and has forged a close relationship between the University and the fitness industry community. The relationship benefits all three parties involved. The student has the opportunity to engage in a good professional experience in the preferred fitness set-

The fitness agency has the opportunity to aid in the training of future fitness professionals and has the assistance of a well prepared fitness specialist.

ting. The educational program of the University is enhanced by the opportunity to offer the student a pre-professional learning experience. The fitness agency has the opportunities to aid in the training of future fitness professionals and has the assistance of a well prepared fitness specialist. An internship agreement is signed by all three parties indicating the duties and responsibilities of the student, the agency, and the University.

In the large metropolitan area, job opportunities (and internship sites) can generally be found in one of three settings: 1) the private sector (health clubs, fitness chains), 2) medically-related programs (hospitals, health promotion, and sports medicine centers); and 3) corporate fitness and wellness programs. The fitness industry has come to rely on the University to prepare adult fitness professionals as job opportunities expand. It is not uncommon for internships to lead to part-time or full-time paid positions. Nationally, job opportunities have also grown in community agencies (municipal parks, and recreation, YMCAs), in the federal government (military and law enforcement), and in universities needing faculty to prepare fitness professionals.

In the Phoenix metropolitan area, the number of job opportunities in the fitness industry has grown steadily over the past fifteen years. That parallels a national growth in fitness jobs but there is also a downside to that news. Gessel (1984) surveyed the job opportunities in the Phoenix area and found that there were many more jobs available for instructors in aerobics, fitness, or weight training than for exercise physiologists or program directors. A similar survey done in Florida found that there was a great deal of turnover in former positions and far fewer stable, well paying positions in the latter categories (Montour, 1982).

Certification of Fitness Professionals

Fitness industry trade associations, exercise science associations, and those involved in preparing fitness professionals at universities have all voiced concern about the training of fitness instructors. It has been estimated that there are approximately 1.5 million aerobics instructors nationally, and a high percentage of them are

self-taught. Lack of scientific background in exercise science has been identified as one of the three major factors leading to aerobics injuries among instructors and students. While most states require licensure for hairdressers, there is no required preparation for fitness instructors. The American College of Sports Medicine (ACSM) has had a multi-level certification program for more than a decade. ACSM has recently expanded its certification options to include fitness instructors. There are some colleges and universities that offer non-degree fitness certification programs. The problem, however, is monumental and neither ACSM, the Aerobic Center in Dallas, nor other certifying groups have been able to make a major impact.

International Fitness Centers (IFC) is the third largest privately owned fitness chain in the country. The home office for IFC is located in the Phoenix Metropolitan area and its fitness spas are located in several Western states. A fitness employee's certification program has been developed company-wide and is offered through university consultants in several states including Arizona, California, and Texas. Company policy decrees that anyone employed either in fitness sales or instruction must complete a two week training program in: 1) health/fitness and 2) company policies/procedures. Certification must be completed within 60 days in order to continue employment. Training programs are offered every two months to meet the requirements.

The company (IFC) benefits from exercise science expertise supplied by the university consultants and in turn offers numerous internship experiences and job opportunities for university students and graduates.

The company (IFC) benefits from exercise science expertise supplied by the university consultants and in turn offers numerous internship experiences and job opportunities for university students and graduates. The training program in health and fitness focuses on: 1) physical fitness and health, 2) the scientific bases of exercise, 3) fitness evaluation and programming, and 4) motivational techniques. Written examinations are administered and a 70% achievement score is required for certification and job retention. Including fitness sales personnel in the training program has meant a more knowledgeable and credible representative of the fitness industry for IFC. In addition, the company fitness instructors have the expertise to offer sound programs to adult clients.

Summary

Nationally, there is major shift occurring in higher education as increasing numbers of student majors in departments of physical education prepare for careers in adult fitness. Spurred by the fitness boom, that trend has resulted in greater interaction between universities and the fitness industry. Arizona State University has been responsive to the fitness boom by developing academic preparation for fitness professionals, senior internship experience for students, and

certification programs aimed at fitness professionals.

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A Corporate Model

By Al Kranz

The business world has embraced corporate fitness programs as health insurance for high salaried executives, a way to decrease absenteeism, and a means to increase productivity.

The aim of Amoco's program has been to provide preventive fitness and a rehabilitative component for heart and orthopedic problems.

The Amoco Corporation has been a leader in providing an exercise fitness program for eligible employees. The aim of Amoco's program has been to provide preventive fitness and a rehabilitative component for heart and orthopedic problems.

The program is primarily designed for upper and middle management employees, except for the rehabilitative component which is available to all employees in the Chicago office.

Program Description

The name of Amoco's program is the Cardiac Fitness Program (CFP). The CFP is part of the Medical Department of the corporation. Therefore, the medical supervision is provided by corporate physicians who also work closely with the personal physician of each employee. In addition, a corporate physician serves as the medical director of the program and works closely with the exercise program director and his staff. The day to day exercise supervision and instruction is provided by the exercise program director.

Before employees enter the program they are required to have approval from their personal physician. Following such approval the employee will then undergo a physical examination, including medical history and general interview and a cardiac stress test. These procedures are sponsored by the corporation. Based on the data generated each individual receives a personalized exercise program designed to fit each individual's need.

The original design for Amoco's fitness program was designed by Biodynamics, Inc., based on a medical research study done for National Aeronautics and Space Headquarters in Washington, DC. The program changed as the Amoco Medical Department increased their expertise and assessed

the needs of the middle-aged individuals in the program.

The CFP has been expanded to include a health education and preventive medicine center. This center provides information on various health issues and is available for the employees. Employees desiring assistance on these or personal health issues can obtain individual guidance from the medical department.

Cardiac Fitness Laboratory (CFL)

All exercise programs prescribed by the Medical Department are performed in the Cardiac Fitness Laboratory under the supervision of the exercise program director or his staff. The CFL consists of one thousand square feet of exercise space. A portion of that space is open for warm up and cool down exercises. Floor exercise space will accommodate twenty people at any one time. The remaining space contains various exercise machines and stations for circuit training.

Prior to individuals utilizing the exercise machines, orientation sessions are scheduled to acquaint the individuals with the equipment at each of the exercise stations, specifically the purpose and proper use of the equipment and proper safety techniques. Individuals are also instructed in the proper monitoring of their resting and exercise heart rates. The Perception Fatigue Chart is available for those individuals who wish to gauge their feelings of exercise exertion after a particular exercise or during a bout of exercise. The exercises performed at the exercise stations will develop cardiovascular endurance, muscular strength and endurance, coordination, flexibility and balance.

Unless specific rehabilitative needs are identified by the medical department, the preventive fitness program is conducted primarily as circuit training. The following exercise stations have been established and, depending on the individual's exercise prescription, all or selected stations may be used. All individuals' exercise programs will include the warm-up and cool-down.

Warm Up: Williams Back Exercises
Knee Machine: quadriceps and hamstrings
Wall Weights: strength and range of motion of upper body
Curl and Reverse Curl: abdominal exercises
Bicycle Ergometer: aerobic exercise
Treadmill: aerobic exercise
Nordic Ski Machine: aerobic exercises
Rowing Machine: upper body muscular strength and endurance
Dumb Bell Shoulder Routine: strength and range of motion in upper body
Cool Down: walking

Al Kranz is an athletic trainer and director of the cardiac fitness program at the Amoco Corporation in Chicago.

The Amoco Corporation has made a commitment to the CFP and feels that it has been beneficial to both the employee and employer. As an indication of this commitment, Amoco allows their participating employees to exercise during company time. In addition, the CFP is continually

evaluated and up-dated* to provide the best possible program for upper level and middle-management employees.



Exercise as a Rehabilitation and Therapeutic Mode

By Walter R. Thompson and Tommy Boone

Introduction

Cardiovascular diseases have reached near epidemic proportions, and have a worldwide distribution. The latest statistics indicate these diseases account for more causes of death than all other causes combined (American Heart Association, 1984). In the United States, cardiovascular diseases account for nearly 50% of all deaths each year (American Heart Association, 1984). These diseases generally include ischemic heart disease (atherosclerosis), cerebrovascular disease (stroke), hypertensive heart disease and rheumatic heart disease. Foremost among them, myocardial infarction (heart attack) accounts for the major portion of deaths.

Although acute myocardial infarction, especially in men, is the number one killer, there has been a steady decrease in coronary disease mortality since the mid-1960s (Levy, 1981; Stearn, 1979). The reasons for the decline are debated, unproven, and largely unknown. There is some speculation, however, that changes in lifestyle and risk factors, such as a decrease in cigarette smoking, lower cholesterol diets, and an increase in the daily expenditure of calories through exercise have contributed to the decline in coronary mortality. Hence, while prevention of coronary disease has probably contributed to the recent decline in coronary mortality, better treatment of coronary patients has quite likely been another contributing factor (Thom & Kannel, 1981).

Although the pathogenic process of coronary heart disease is thought to be atherosclerosis of the coronary arteries, the answer to the mechanism of development remains unknown. According to the

theory known as the "multiple risk factor hypothesis," a modification of risk factors associated with clinical manifestations of coronary heart disease offers the best available means for prevention. These factors include such parameters as diabetes mellitus, electrocardiogram abnormalities, heredity, sex, race, age, stress and behavior patterns, obesity, physical inactivity, cigarette smoking, hypertension, elevated levels of serum cholesterol and triglycerides, and levels of low-density lipoproteins (Pollock, Wilmore & Fox, 1978). Cigarette smoking, hypertension, and elevated serum cholesterol are considered the three most powerful predictors of coronary heart disease. Any combination of these risk factors often results in an exponential increase in the incidence of coronary heart disease.

Numerous studies of patients after the first coronary occlusion conclude that the likelihood of another heart attack is significant (Katz, Cole & Singian, 1953; Master, Teich, & Brinberg, 1954). It is apparent, then, with the prospect of another life-threatening event, that patients must delay or prevent, if possible, the otherwise inevitable progression of atherosclerosis. Cardiac rehabilitation is a process through which patients can gain sound medical advice to help restore and maintain the functional integrity of the cardiovascular system. The emphasis of rehabilitation is directed toward helping patients develop an optimal life-style consistent with a reduction in the clinical manifestations of coronary heart disease (Wake Forest University Cardiac Rehabilitation Program Brochure, no date).

Cardiac rehabilitation offers patients with myocardial infarction, angina pectoris, or coronary artery bypass surgery, and patients considered at high risk (hypertension, hyperlipidemia, diabetes mellitus, or strong family history of premature heart disease) the benefits of lifestyle modification for readaptation physically, psychologically, and socially. Thus in this regard, the major objectives of early mobilization through cardiac rehabilitation are (Wilson, Winga, Edgett & Gushiken, 1978):

Walter R. Thompson is Associate Professor and Tommy Boone is Professor in the Department of Physical Education at the University of Southern Mississippi, Hattiesburg, MS. Both are members of the American College of Sports Medicine.

1. to provide cardiac patients (non-operative and post operative) and those considered prone to coronary heart disease a scientifically and medically sound exercise program;
2. to provide supervision in the use of exercise as therapy in the rehabilitation of patients with cardiac disease;
3. to periodically determine, through laboratory evaluation, the most advantageous exercise level for the program participants;
4. to educate the program participants to the cardiovascular and related benefits of controlled, progressive physical exercise; and
5. to provide physicians an opportunity to refer cardiac patients and those considered prone to coronary heart disease to a scientifically based exercise program, from which they would receive data pertinent to the patients' laboratory evaluation and monthly exercise progress.

In addition to the emphasis on restoration of physical function, cardiac rehabilitation often utilized the collective experience of a dietitian, a psychologist, and a vocational rehabilitation counselor (Naughton & Hellerstein, 1973). Hence, the emphasis is on physical, mental, and social restoration, thereby permitting the patient, through a multiple intervention approach, a life compatible with his/her functional capacity. Numerous studies have shown that the 'team' approach to cardiac rehabilitation is effective in reducing the risk of further cardiac-related incidents (Bonanno, 1977; Fletcher & Cantwell, 1975; National Heart, Lung and Blood Institute, 1976; Pyfer, Mead, Frederick & Doane, 1976) and their severity (Frank, Weinblatt, Weinblatt & Sager, 1966).

Unfortunately, exercise does not confer immunity to coronary atherosclerosis (Eichner, 1983).

Although exercise as a protective factor against coronary heart disease remains plausible, data are still too sparse to prove the hypothesis. Unfortunately, exercise does not confer immunity to coronary atherosclerosis (Eichner, 1983). The weight of the epidemiologic evidence, however, suggests those individuals who exercise regularly may have lower risk of coronary heart disease (Froelicker & Brown, 1981; Montoye, 1977).

What, then, can exercise training do to help the individual who has experienced a myocardial infarction, has undergone coronary artery bypass surgery, or has crippling angina pectoris? There is evidence that isotonic, aerobic physical activity results in physiological alterations of potential benefit in angina patients, including an increase in effort capacity. Thus, after training, heart rate and blood pressure responses to a submaximal physical stress are less than in the untrained state. The increased efficiency of peripheral adaptations also allows the heart to function at a less intense level of stress (Clausen, 1976). In addition, exercise training may facilitate a reduction in serum triglycerides, body fat (Bonanno, 1977), and improve the

patient's psychological well-being (Folkins & Amsterdam, 1977).

Phases of Cardiac Rehabilitation

Phase I (Inpatient)

The benefits of early ambulation once the patient has been stabilized has been clearly documented (Wenger, 1977). The exercise facet of the rehabilitative process consists of a carefully planned schedule of low-level physical activity, which prepares the patient for more engaging activity during Phase II (the outpatient-convalescent program). The primary objectives of the inpatient phase are to decrease deconditioning problems and instill confidence in the patient. Table 1 highlights the supervised exercise sessions designed to enhance the patient's condition. At the end of the inpatient program, the attending physician may want the patient to do a low-level pre-discharge graded exercise test to provide additional physical activity guidelines or evaluate further the patient's functional capacity as well as medication efficacy.

Phase II (Outpatient-Convalescent)

Post-hospital follow-up with appropriate monitoring has become increasingly important as the hospital length of stay has decreased. Electrophysiological and hemodynamic (blood pressure) monitoring of the patient through electrocardiography and auscultation is a requirement of the Phase II rehabilitation program. Lifestyle modification with appropriate counselors for the patient and family continues at a higher intensity. The duration of the Phase II rehabilitation program is usually up to three months post-discharge.

Most facilities now require a pre-admittance graded exercise test prior to entering the Phase II program in favor of the pre-discharge test. This practice has been generally accepted by the medical community because of recent Medicare reimbursement schedules as well as giving a more realistic portrayal of the patient's functional capacity. Termination criteria for this test remains controversial. However, a general rule is to never physically stress a patient during exercise rehabilitation past the peak heart rate or blood pressure achieved during previous graded exercise testing. This practice will insure the safe conduct of Phase II exercise rehabilitation. The guidelines for phase II physical activity are shown in Table 2.

Phase III (Physical Conditioning)

Prior to entering the physical conditioning or Phase III outpatient exercise program, the patient is given a symptom-limited graded exercise test consistent with termination criteria which have been widely published (Nequin, Thompson, & Lesmes, 1980). The exercise prescription derived from the heart rate and blood pressure responses during the test allows for a greater variety of aerobic activities such as jogging, running, swimming, or cycling. The exercise prescription is dependent upon the patient's initial level of fitness, degree of disability from the acute illness or surgery, stage of recovery, and lifestyle. Table 3 demonstrates a typical exercise prescription.

Summary

Heart disease appears to be a function of a lifestyle that promotes the acceleration of the

Table 1. Phase I Exercise: Early Ambulation Program for the Hospitalized Postinfarction Patient*

Date	Hospital Day**	Facility	Guidelines***	Activity
_____	1	CCU	If free of chest pain. CHF, serious arrhythmia	Bedside commode sit 15 to 30 min; sit as tolerated Walk around bed
_____	2			
_____	3			
_____	4	Intermediate Care	Asymptomatic, telemetry monitor; record pulse rates at rest, immediately after Allow up to 15 beats/min above resting	Walk 50 feet b.i.d. Walk 50 feet b.i.d. Walk 50 feet t.i.d.
_____	5			
_____	6			
_____	7	Medical Floor	Record pulse rates (as above) Allow up to 25 to 30 beats/min above resting	Walk 50 feet t.i.d. Walk 100 feet b.i.d. Walk 100 feet t.i.d. Walk 150 feet b.i.d. Walk 150 feet t.i.d. Walk 200 feet b.i.d. Walk 200 feet t.i.d. plus down and up one flight stairs
_____	8			
_____	9			
_____	10			
_____	11			
_____	12			
_____	13			

Low-level predischarge
exercise test

*Suggested for use as a guide only: clinical correlation and individualization should preempt ambulation schedule.

**Hospital day(s) are used here as a guide to show progression of activity and should be used arbitrarily.

***If immediately-after pulses exceed recommended levels, cut back to previous level.

Table 2. Phase II Exercise Prescription: Low-Intensity Daily Walk Program

- MAXIMUM TRAINING PULSE: _____ DO NOT EXCEED!**
1. This low-intensity walk workout should be done daily, and the distance and time should be noted. Record pulse rates before, immediately after, and 3 minutes after each walk.
 2. Any unusual symptoms (chest pain, unusual breathlessness, etc.) and/or changes in medication should be recorded in the exercise diary.
 3. For adequate conditioning, the pulse immediately after each walk (or at peak effort) should be within the exercise pulse rate range.
 4. Start at the stage indicated below, stay at each stage for 1 to 2 weeks, and advance to the next stage only if the immediately-after pulse count no longer reaches the maximum training pulse for at least 3 consecutive days. If "over target", step back to one stage lower for a few days longer.
 5. After reaching stage 5 and keeping this level without unusual symptoms, an exercise test will help determine the advisability of a higher intensity individual program.

Date	Stage	Distance	Time	Speed	MET Level	Rx given by
_____	1	1/4 mile	6 minutes	2.5 mph	3.0	_____
_____	2	1/2 mile	12 minutes	2.5 mph	3.0	_____
_____	3	1 mile	18 minutes	3.3 mph	3.5	_____
_____	4	1.5 miles	23 minutes	3.9 mph	4.0	_____
_____	5	2 miles	28.5 minutes	4.2 mph	4.2	_____

Table 3. Phase III Exercise Prescription

MET Level	—	METS (oxygen consumption)
Exercise Type	—	Home daily walk
	—	Stationary bicycle
	—	Swimming
	—	Walk-jog, jog
	—	Group exercise program other (sports)
Intensity	—	
	Walk-jog speed	
	slow -	min/mile = mph (60% of HR range)
	fast -	min/mile = mph (85% of HR range)
Duration	—	min/session
Cooldown	—	min (slow down to get pulse to pre-exercise rate)
Frequency	—	times/week
Re-evaluate Rx in	—	weeks/months

atherogenic process. Although major risk factors have been identified through epidemiological studies for its development, cause and effect relationships have yet to be proven. Many of these risk factors can be controlled through prudent living, and as such is a goal that needs to be pursued aggressively. Exercise, as a beneficial therapeutic intervention, is vitally important not only in the rehabilitation plan, but as a significant step toward the continued enhancement of health and fitness and possibly the lowering of the incidence and mortality of coronary artery disease. Exercise, thus, as a rehabilitative and therapeutic mode is not only prudent, but safe and effective.

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Exercise and Future Implications

By Jack H. Wilmore

According to the mass media, America is in the middle of a physical fitness boom. Joggers and cyclists fill our streets, physical fitness centers are filled to the brim, and it is nearly impossible to find an empty tennis or racquetball court. In 1978, the Pacific Mutual Life Insurance Company published a nationwide survey conducted by Louis Harris and Associates, Inc. (1978) which attempted to determine the barriers to better health and ways of overcoming them. The sample consisted of a national cross-section of 176 corporations drawn from the Fortune listing of 1250 companies; and 35 labor unions drawn from a list of the locals of the largest labor unions in the 15 largest cities in the United States. While only 37% of the total sample stated they were involved in a regular exercise program, 58% felt they were getting enough exercise.

The Perrier study published in 1979, also conducted by Louis Harris and Associates, Inc. (1979) was commissioned to determine many different aspects of the physical fitness phenomenon in a sample of over 1,500 adults. Of major interest was their finding that 59% of those surveyed had engaged in some physical activity or sport during the past year. By comparison, in 1961 no more than 24% reported comparable activity. In 1980, Hoffmann-LaRoche, through its Fine Chemical Division, commissioned Trost Associates Inc. (1981) to create a profile of the general United States population developing a demographic analysis of nutrition and exercise habits and knowledges. Based on a national probability sample of 1,000 adults representative of households in the continental United States, 81% considered that they got some exercise, while 45% exercised on a regular basis.

The above data strongly suggest that America is truly on the move, an active society with physical fitness as a primary goal and major concern.

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physical fitness as a primary goal and major concern. However, Kirshenbaum and Sullivan (1983), in a feature article for *Sports Illustrated* published in February of 1983, questioned the existence of the fitness boom. It was their contention that the fitness boom, if it did exist, was impacting a very small percentage of the total population, with the major focus on the higher income groups, and on the executive-level, white, college-educated, young to middle-age adult population. Further, they questioned whether it was so much a 'boom in fitness' as it was a 'boom in the business of fitness.'

A closer inspection of two of the above population surveys confirms Kirshenbaum and Sullivan's observations. According to the Pacific Mutual Life Insurance Company survey (Harris, 1978), 56% of those earning \$25,000 or more per year were involved in regular exercise compared to 42% of those earning between \$15,000 and \$24,999, 34% of those earning between \$7,000 and \$14,999, and only 24% of those earning under \$7,000 per year. Further, 40% of whites were regular exercisers compared to only 25% of the non-white population; 51% of those 18 to 29 years of age were involved regularly in exercise compared to only 30% of those 50 years of age and older; and 75% of business leaders and 51% of union leaders were active on a regular basis. In the Perrier study (Harris, 1979), physical activity was broken down into actual levels of energy expenditure, i.e., high, moderate, low, and non-active. Of the total sample, only 15% achieved the high active category defined as minimum of 1,500 kilocalories per week in sport or activity, while an additional 16% were classified as moderately active, although no definition was given as to the range of kilo-

Of primary concern, yet not addressed in any of the above three population surveys, is the state of fitness and health of our youth.

calorie energy expenditure for this classification. Further, the demographics of this data set were similar to the Pacific Mutual Life Insurance Company study. Three additional national surveys (General Mills, Inc., 1979; Harris, 1983; Miller Brewing Company, 1983) also reported between 15% and 36% participation by adults in regular vigorous activity.

Of primary concern, yet not addressed in any of the above three population surveys, is the state of fitness and health of our youth. Kirshenbaum and Sullivan (1983) conclude that the fitness boom has not trickled down to school-aged children and youth. The cover of *Newsweek* (1985) for April 1, 1985, headlines, "America's Kids - Why They're Out of Shape." In this article, Don

Haydon, Executive Director of the Governor's Commission of Physical Fitness for the state of Texas is quoted as stating, "Kids are less fit now than at any other time data has ever been taken." Funded by the American Heart Association, Texas Affiliate and The Texas Governor's Commission on Physical Fitness, the **Texas Youth Fitness Study 1984** (Morrow, Crowhurst, Monaghan, Morava & Pyfer, 1985) was conducted by the Texas Association for Health, Physical Education, Recreation and Dance to define the present state of fitness of Texas youth. Using a sample of 6,609 students, the results of this study indicated that when compared to normative data obtained in 1973, some 11 years earlier, there was a general decline in fitness levels, with 31% of the age/gender group comparisons demonstrating a significant decline, 43% showing no change, and 26% exhibiting a slight improvement. Upper body strength in five to nine year old boys and girls was substantially below the 1973 normative values, with nine year olds in 1984 exhibiting approximately 60% of the strength of the 1973 reference normative data. Cardiorespiratory endurance (1.0 and 1.5 mile runs) was also reduced for most comparisons with the 1973 normative data.

In January, 1985, the findings of the National Children and Youth Fitness Study (NCYFS) were released (Ross & Gilbert, 1985). Initiated by the Office of Disease Prevention and Health Promotion (US Public Health Service), the study evaluated 8,800 students, grades 5 through 12 obtaining information on the types, frequency, duration, and seasonality of exercise, sports, and active games provided through school physical education classes, other school programs, community organizations, and home or neighborhood. Also, the American Alliance for Health, Physical Education, Recreation and Dance's Health Related Physical Fitness Test was administered, and the results were compared to data that had been obtained in past national population surveys of

...there are rather alarming trends toward declines in the fitness of our youth.

this age group. For skinfold fat thickness, the 1984 data indicate that the median skinfold sums (triceps and subscapular) for both boys and girls were two to three millimeters thicker (~10%) than a 1960 sample studied by the National Center for Health Statistics. When compared against a 'convenience sample' measured in 1980 (Pate, Ross, Dotson & Gilbert, 1985), the 1984 sample was generally fatter, had lower cardiorespiratory endurance, lower abdominal strength, and lower scores for hamstrings/lower back flexibility. The most disturbing aspect of the results from these studies is the fact that even with the current emphasis on physical fitness nationwide, there has been little improvement in the fitness of our youth. In fact, there are rather alarming trends toward declines in the fitness of our youth.

The National Children and Youth Fitness Study: A Summary of Findings (1985) reported that 80.3% of boys and girls in grades 5 through 12 were enrolled in physical education an average of 3.6 days per week for a total average activity

time of 141 minutes per week. However, these figures are somewhat deceptive as 97% of those in grades 5 and 6 were enrolled in physical education, but this figure drops to about 50% for grades 11 and 12. Further, only 36% of all students in grades 5 through 12 take physical education on a daily basis.

In 1980, the US Department of Health and Human Services published what has now become a landmark report **Promoting Health/Preventing Disease: Objectives for the Nation (1980)**. In this report, 226 specific health objectives were defined with a target date of 1990 for achieving those objectives. Eleven of these objectives related to exercise and fitness, and five focused specifically on children and youth. For the 10 to 17 year old age group, three of the behavioral objectives included, 1) 60% will attend daily physical education classes; 2) 70% will have their fitness tested periodically; and 3) 90% will participate in physical activities that maintain cardiorespiratory fitness. The 1985 NCYFS results indicate that we are falling far short of these stated objectives.

What can be done to increase opportunities for improving the state of fitness of our youth and our adult population? First, we must recognize the role played by groups outside of the

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public school environment. Commercial fitness centers are attracting increasing numbers of members, and there is a shift away from a primary emphasis on strength-type activities to an emphasis on a range of activities that promote the development of the various components of fitness, i.e., strength, power and muscular endurance; flexibility; cardiorespiratory endurance; and an appropriate body composition. Colleges and universities are now training individuals to work specifically in this environment, and fitness centers have embarked on their own in-house training programs. Thus, the qualifications of the exercise leaders have improved considerably and quality-control is of major concern.

Not-for-profit agencies such as YM and YWCA's have likewise kept pace with the commercial enterprises with respect to facilities, programs, and exercise leadership. Most recently, hospitals have started instituting health promotion programs with exercise as a major focus. Corporate/executive health promotion and fitness centers also provide tremendous opportunities for employees and their families. Unfortunately, most of these programs are still targeted toward upper level management.

One of the more exciting movements in the past few years has been the development of the home market, with major sales efforts promoting equipment, audiotapes, videotapes, and an unending supply of new fitness books. The equipment, while very expensive, has become quite innovative with physiological monitoring capabilities, computer-controlled workouts, and videogame-linked exercise challenges. Videotapes, on the other hand, can be

rented for as little as \$2 per day and contain excellent workouts for the beginner and the advanced. In addition, many of these videotapes provide good instruction and are informative and motivational.

Where do we go from here? What can we expect in the future? First, there must be a renewed emphasis on health promotion, with a balanced emphasis on appropriate physical activity, proper nutrition, adequate rest and sleep, reduced stress, and the control of substance abuse. To emphasize only one or two to the exclusion of the others makes no sense and will not accomplish the desired objectives of health promotion. Second, there must be a much greater research emphasis on

...there is an urgent need to reorganize public school physical education, providing excellent programs and qualified instruction at the pre-school and elementary school grades.

understanding issues of compliance, and the related area of appropriate motivational strategies. It is imperative that the discipline of physical education develops programs that are enjoyable and fun; programs that will attract the masses. Further, there is an urgent need to reorganize public school physical education, providing excellent programs and qualified instruction at the pre-school and elementary school grades. The teachable moment for the growing child occurs at this early age. If the practice of placing most of the trained physical education instructors in junior and senior high schools continues, the declines in the fitness levels of our youth will continue, and few children will truly be physically educated. Finally, the emphasis must shift from the elite, or physically gifted student, to those students who have average or below average abilities. These less gifted students present a real challenge to the physical educator, but the eventual rewards are considerable to both teacher and student alike.

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