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LIFESTYLE ACTIVITY: A REPORT TO PROMOTE THE FUTURE HEALTH OF YOUTH

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Education: Secondary Option

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by

Martha Ann Vranich

December 1998

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ABSTRACT

This paper reviews the condition of youth in regards to skin fold measurements, obesity, and physical activity. The literature revealed that obesity was increasing in 12 to 17 year olds and physical activity was declining. Interventions were incorporated in a middle school physical education program to motivate students to learn how exercise effects their bodies and to encourage them to exercise more out of class by incorporating lifestyle exercise into their daily lives. Three self-report questionnaires were given to the students before and after lessons were given. A modest increase in activity, though at a lower level, was seen from the students. A correlation was found between the mother's activity and the child's activity. Both the child's reporting of TV watching on school days and the parent's reporting were correlated. Including parents in the physical education program and continuing to help students understand the implications of activity through the physical education experience seems promising. The Fitness Education Pyramid (Strand, Mauch, & Terbizan, 1997) and use of heart rate were motivators.

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CHAPTER 1

Introduction: Risks of Inactivity

The literature has revealed a growing understanding of the benefits of physical activity and the risks associated with inactivity (U.S. Department of Health and Human Services, 1996, p. 10). Despite the increase in knowledge of the benefits of activity and the risks associated with inactivity, adolescents have continued to become less active. Rowland (1990) stated that "objectively measured physical activity declines dramatically with age, resulting in an almost 50% decrease between ages 6 and 16" (cited in Sallis et al., 1992, p. s248). Interventions are necessary to counter the decline in physical activity.

Previously reported skinfold data from the 1966 to 1970 National Health Examination Survey, cycle 3, when compared to the 1976 to 1980 National Health and Nutrition Examination Survey, indicated a "39% increase in the prevalence of obesity [85th percentile of triceps skinfolds] among youth 12 to 17 years old and a 64% increase in the prevalence of super obesity [greater than or equal to the 95th percentile of triceps skinfolds]" (cited in Douthitt & Harvey, 1995, p. 31). Kuntzleman and Reiff (1992) also reviewed the same statistics and noted the increased obesity

of children. They compared that study to the National Child and Youth Fitness Study II (Ross & Pate, 1987) which found an increase in skinfold measurements. Dotson and Ross (1985) attributed the increase in skin fold measurements to a lack of knowledge about diet and how it effects the body and well as inactivity. Interventions that work are needed to lower the weight of 12 to 17 year olds.

Decreases in activity and increases in obesity are causes for concern when considering the health of adolescents. Ross and Pate (1987) reported "changes in physical fitness are matters of scientific concern because they imply alterations in the capacity to work and play, adjustments to the quality of life and shifts in vulnerability to various health problems" (p.54). The Surgeon General of the United States (U.S. Department of Health and Human Services, 1996) issuing the first report (SGR) on physical activity and health, stated the many benefits of physical activity, but indicated, Americans, young and old, are not "vigorously active on a regular basis"(p. 10). Physical fitness deteriorates and obesity occurs without adequate physical activity. Current research has confirmed the lack of activity and the resulting increase in the risk of disease. This lack of activity is manifested in the decline of enrollment in high school

physical education classes (U.S. Department of Health and Human Services, 1996) and the decline of physical fitness of adolescents, demonstrated by the worsened mile run times, (Updyke & Willett, 1989) and reported by Kuntzelman and Reiff (1992). Increased obesity, increased weight gain, declining fitness, and declining activity also signal increased risk for coronary heart disease and other health problems. An important connection to these diseases was the report of Aaron et al. (1993) that stated "cross-sectional studies (Andersen, Henckel, & Saltin, 1989, Frerichs, Srinivasa, Webber, & Berenson, 1976, Gilliam, Katch, Thorland, & Weltman, 1977, Lauer, Conner, Leaverton, Reiter, & Clarke, 1975, & Wilmore & McNamara, 1974) have shown that many of the known risk factors for these chronic diseases are also present in children" (p. 847).

Anderssen and Wold (1992) reported that "the rationale for promoting physical activity in children and youth is well established" (p. 341). They cite various authors (Blair et al., 1989; Leon, Connett, Jacobs, & Rauramaa, 1987; Paffenbarger, Wing, & Hyde, 1978; Slattery & Jacobs, 1988) who have presented evidence to show that increased activity can prevent coronary disease and other causes of mortality.

Blair and Connelly (1996) reported that even moderate levels of physical activity, such as walking, can substantially improve the risk for coronary disease over sedentary living. Kuntzleman and Reiff (1992) reported on a study by Kuntzelman and Drake (1984) that showed increased activity for a group of two hundred sixty-six children, 7-12 years of age, resulted in an increase in HDL cholesterol values and a decrease in triglyceride values, skinfolds, and blood pressure.

Douthitt and Harvey (1995) demonstrated that lack of physical activity continues to be a problem with adolescents and it continues into adulthood. The SGR also reported that "participation in all types of physical activity declines strikingly as age or grade in school increased" (U.S. Department of Health and Human Services, 1966, p. 10). An intervention is needed to teach adolescents knowledge of exercise and motivation to participate in physical activity on a daily basis.

The purpose of this project is to determine if the Fitness Education Pyramid (FEP) (see Appendix A) is an effective intervention tool to teach students about exercise, how it effects their bodies, and how they can determine whether they are exercising at a level needed to

develop fitness or at a level necessary to maintain health (Strand, Mauch, & Terbizan, 1997).

This author also sought to motivate physical education students to be active outside of school seven days a week using activity that would fit into their lifestyle.

CHAPTER 2

Review of the Literature

To arrive at the decision to use the FEP (Strand et al., 1997) in physical education classes, a review of the literature on physical activity, physical fitness, motivation and strategies to encourage adoption and maintenance of physical activity was completed.

Physical activity done in work and leisure time can influence the state of adult fitness (Paffenbarger & Hale, 1995). This, in turn, has positive effects on health, morbidity, and mortality of adults. Evidence of these positive benefits is seen throughout the SGR (U.S. Department of Health and Human Services, 1996). It stated:

> The body responds to physical activity in ways that have important positive effects on musculoskeletal, cardiovascular, respiratory, and endocrine systems. These changes are consistent with a number of health benefits, including a reduced risk of premature mortality and reduced risks of coronary heart disease, hypertension, colon cancer, and diabetes mellitus. Regular participation in physical activity also appears to reduce depression and anxiety, improve

mood, and enhance ability to perform daily tasks through the life span. (p 11)

Sallis, Buono, Roby, Micale, and Nelson, (1993) reported that physical activity might effect the bodies of children by improving their health and reducing the probability of children developing risk factors for heart disease and other debilitating illness later in life. Moderate to vigorous exercise by adults can lead to decreases in blood pressure, resting heart rate, trygliceride, LDL, risk for breast cancer and osteoporosis. It can increase HDL and intestinal motility (U.S. Department of Health and Human Services, 1996). The SGR (U.S. Department of Health and Human Services, 1996) also indicated that increased physical activity is necessary for "maintaining normal muscle strength, joint structure, and joint function. In the range recommended for health, physical activity is not associated with joint damage or development of osteoarthritis and may be beneficial for many people with arthritis" (p. 13). An increase in physical activity can improve fitness and health and lead to improvement in the length of the lifespan of an adult. "Vigorous physical exercise as defined by an apparent threshold or critical level of energy output is associated with reduced risk of coronary mortality, particularly the sudden-death syndrome" (Paffenbarger &

Hale, 1975, p. 548). People who participate in regular exercise at a level to maintain fitness, also reduce their risk of heart disease and should live longer than those who don't exercise. It is also possible that physical activity would provide the same benefits for children and adolescents. They would maintain good health and not develop the risk factors for coronary disease as children and adolescents. Recent research has indicated that this has occurred.

Previous exercise guidelines to improve health included activity done for 20-30 minutes, three times a week, at 60-80% of an individual's maximum heart rate (Pangrazi, Corbin, & Welk, 1996). Now, Pangrazi et al. (1996) have reported that cardiorespiratory fitness gains are similar when physical activity occurs in several shorter periods of play, suggesting that physical activity can improve health and eliminate or reduce the risk of developing disease.

"Higher levels of regular physical activity are associated with lower mortality rates for both older and younger adults. Even those who are moderately active on a regular basis have lower mortality rates than those who are least active" (U.S. Department of Health and Human Services, 1996, p. 13). When a person engages in "regular physical activity . . . and increases cardiorespiratory fitness,

. . . the risk of cardiovascular disease mortality decreases as does coronary heart disease mortality in particular" (U.S. Department of Health and Human Services, 1996, p. 13). Also, the SGR (U.S. Department of Health and Human Services, 1996) stated, "regular physical activity prevents or delays the development of high blood pressure and exercise reduces pressure in people with hypertension" (p.13).

Those who have chosen a sedentary lifestyle have chosen to give up the deliberate and constant effort to stay healthy. They have chosen the opposite of wellness and are on a path that will deplete their body of fitness capabilities. They will become susceptible to developing coronary heart disease. The American Heart Association (AHA) (1992) divides risk factors into three levels including independent, secondary, and irreversible. Physical inactivity has been added as an independent risk factor on the same level as smoking, high fat diet, hypertension, and high LDL (>130) and obesity (cited in Corbin & Pangrazi, 1996). The secondary risk factors increase the risk of coronary heart disease when combined together with one or more of the other secondary risk factors. These include increase in triglycerides, Type A personality and an inability to cope with stress. Irreversible risk factors,

such as family history (diabetes), gender (males lacking estrogen), old age, racial genetic characteristics, and psychological stress are also risk factors. The Surgeon General (U.S. Department of Health and Human Services, 1996) reported that inactivity could be harmful to your health and the report made the connection between a sedentary lifestyle and the increased risk of cardiorespiratory disease. Paffenbarger and Hale (1975) reported an increased incidence of heart attack and sudden death with adults who had developed the risk factors and were also sedentary. Blair, Kohl, Gordon, and Paffenbarger (1992) reported increasing activity improves physical fitness and the risk of disease is lessened. The forward to the AHA's, Fitting in Fitness, (Blair, 1997) cited "poor physical fitness as important a predictor of premature death as cigarette smoking, high blood pressure, and high blood cholesterol" (pp. v, vi). Also, "low to moderate exercise intensity is associated with favorable status on coronary artery disease risk factors and other clinical variables" (Blair & Connelly, 1996, p. 201). It would seem logical that if inactivity produced a risk of cardiorespiratory disease and an increase in a person's fitness level lowered this risk, that people would choose to be active. They do not. Due to a decline in fitness and an increase in

obesity, children and adolescents have developed a greater risk for developing these risk factors (Kuntzelman & Reiff, 1992). "Inactivity among children has now been linked to sedentary living among adults" ("NASPE Releases First Ever", 1998, p. 1).

The recommendations for the amount of physical activity necessary to maintain physical fitness and the dosage necessary to maintain health are different. The centers for Disease Prevention and Control (CDC), the American College of Sports Medicine (ACSM), and the President's Council on Physical Fitness and Sports (PCPFS) made this recommendation: "Every US adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week" (Pate et al., 1995, p. 404). This prescription is used to maintain "health benefits associated with reduced morbidity and mortality rather than fitness and performance benefits" (Pangrazi et al., 1996, p. 39). This is referred to as the lifetime physical activity model (LPAM).

The children's lifetime physical activity model (C-LPAM) recommendation was developed because the evaluation of children on the exercise prescription model (EPM) showed them to be inactive (Corbin, Pangrazi, & Welk, 1994). The ACSM exercise prescription model, also know as

the FIT formula, had prescribed 20-60 minutes of vigorous exercise three times per week with the heart elevated 60-90 percent of maximum heart rate or 50-85 percent of heart rate reserve (Corbin & Pangrazi, 1996). Most children are not active for 20-30 consecutive minutes with their heart rates at 140 bpm or higher. Corbin et al. (1994) reported that "children are sporadic exercisers who alternate between vigorous activity and rest. They are high volume exercisers who do not engage in continuous high intensity exercise" (p.4).

The C-LPAM for maintaining health or minimal physical activity standards called for daily, frequent (three or more) activity sessions of moderate activity, equal to energy expenditure of 3 to 4 cal/kg/day, which is equal to 30 minutes or more of active play. This is based on the adult LPAM. The C-LPAM for optimal function standard called for daily, frequent (3 or more) activity sessions of moderate to vigorous activity, equal to energy expenditure of 6-8 cal/kg/day, which is equal to 60 minutes or more of active play (Corbin et al., 1994). This plan meets the needs for children's physical activity. It should include activity that is high-volume, of moderate-intensity, and done in sporadic activities in several sessions per day. Activities that are part of a regular daily routine, called

lifestyle activities, should be included. They would include taking the stairs instead of the elevator or escalator, walking the mall, riding a bike to the store or school, or doing any physical tasks at home, such as vacuuming (Corbin et al., 1994). The minimum standards can be achieved by inactive children when they see that it doesn't require a lot of work. They are induced to be active by walking, jogging, hiking, riding their bike, and doing other individual and moderate intensity activities that become addicting and integral to their lives. (Pangrazi et al,. 1996). If children are encouraged to meet the optimal functioning standard, they decrease their risk of heart disease even more. Also, when they reach adolescence and their activity slows down, the minimum acceptable level of exercise activity can be maintained (Corbin et al., 1994). Children should be exercising at the C-LPAM level, and should be encouraged to exercise at the optimal level.

The adolescent guidelines (for children 11 -17 years old) recommend daily activity. Adolescents should be encouraged to be active when playing sports or games, when working or going to and from work or school, and when participating in recreational activities, physical education, and planned exercise. They should also be

encouraged to be active with the family, in school, and in community activities. Exercise should include three or more sessions per week of activities that last 20 or more minutes at a time and are moderate to vigorous in exertion (Pangrazi et al. 1996).

Two main challenges have faced the exercise science field. The "first challenge is how to get people to initiate physical activity. . . . the second is how to get active people to maintain their levels of activity" (Marcus & Simkin, 1993, p. 83). Even though adults know that physical activity is good for them, they often choose the opposite. "The need to identify the factors that can stimulate interest in lifetime exercise habits seems . . . to be an increasingly critical issue" (Rowland, 1986, p. 128). It is especially important "to understand the factors that affect the type, frequency, duration, and intensity of children's physical activity behavior because childhood physical activity has important health consequences" (Sallis et al., 1992, p. s248). Sallis et al. (1992) mentioned numerous factors that can influence children's physical activity patterns. Biological, developmental, psychological, social, cultural, environmental, and physical factors all influence children's participation in physical activity. Each area contains

elements that determine activity for adolescents. Puberty, self-efficacy, relationships with parents and peers, access to activity programs, television viewing, and habits seem to effect adolescents. C. J. Cohen (1995) supported the position that lifestyle behaviors were established early in life; therefore, intervention programs must be implemented early on in elementary school.

Marcus, Selby, Niara, and Rossi, (1992) have stated that in changing undesirable behavior, people go through four specific changes: "Precontemplation (no intent to change), Contemplation (intent to change behavior), Action (involved in behavior change), and Maintenance (sustaining behavior change)" (p. 60). This model of the stages-of-change was used to help understand what a person goes through to initiate change in an unhealthy behavior, such as, smoking. "Exercise researchers have recommended that this model be applied to exercise behavior, . . . " (Marcus et al., 1992, p. 60). "The strength of this model is its focus on the dynamic nature of health behavior change" (Marcus, Rakowski, & Rossi, 1992, p. 258). Marcus et al. (1992) found that those engaging in exercise had positive feelings towards the activities and felt good about themselves. Those who did not exercise gave many reasons why they didn't want to exercise.

The results of the studies of Marcus et al. (1992) revealed that ". . . scores on the self-efficacy measure were significantly related to stage in the change process. . . . Both the stages of change and the self-efficacy instruments are highly reliable" (p. 64). Therefore, it can be said that ". . . individuals at various stages have different degrees of exercise-specific self-efficacy" (Marcus et al., 1992, p. 64). The efficacy expectation is the conviction a student has when he/she believes he/she can perform a given behavior (Bandura, 1977, p. 193). The intervention used to enhance efficacy should be different at each stage (Marcus et al., 1992).

In order to succeed in establishing a pattern of regular activity individuals must pass through transitional periods successfully with a continued pattern of confidence and self-efficacy (Marcus, 1995). This is true of the adolescent period. Adolescents must be motivated, especially in light of the fact that "gender differences in motor skills, body composition, and socialization are mechanisms . . . affecting their physical activity" (Sallis et al., 1992, p. s249). "More research is necessary on the psychological and biological effects of puberty on physical activity in adolescents" (Sallis et el., 1992, p. s249). Physical activity declines in early adolescence for females

and somewhat later for males. Interventions are necessary that bridge the gap between adolescence and adulthood when these students will no longer be participating in physical education classes. Sallis and McKenzie (1991) declared that "school physical education directly controls the activity in class, but the most important outcome is increased physical activity in adulthood" (p. 131). There is no proven cause and result, but it is believed that a good program will result in carry-over into adulthood. Because the California high schools require only two years of physical education for graduation, middle school eighth grade students may be only two years away from being on their own and responsible to choose or reject activity.

Interventions that concentrate on supporting and enhancing the factors that help adolescents positively, will help negate the developmental milestone of puberty which can affect participation in physical activity. Anderssen and Wold (1992) stated that "social cognitive theory, (Bandura, 1986) with its concepts of reinforcement, self-efficacy, outcome expectations, and model learning, points to the importance of a supportive environment to performing, establishing, and maintaining a pattern of regular physical activity" (p. 341). Anderssen and Wold (1992) determined ". . . that significant others, (parents and peers),

through their behavior and encouragement, do exert an influence on young adolescents' participation in leisure-time physical activity" (p. 344). Thomas Rowland (1986) also reported that, "the major factor that influenced the child's interest in participation in these two studies was parent support" (p.126). Stonecipher (1995) found adolescents with low activity reported each of five perceived barriers was more important than those who reported high levels of activity. Inactive girls reported lack of parental and peer encouragement as a significant barrier to physical activity. Rowland (1986) found that peer competition and achievement of tangible rewards did not appear to be important.

The most interesting results were reported by Douthitt and Harvey (1995). Adolescent males and females were motivated to exercise by different psychological factors. Girls were motivated to increase their adherence to exercise when they wanted to improve their perception of their athletic competency. Males who felt they lacked a strong romantic appeal increased their exercise adherence to increase their athletic appeal. Additionally, the more positively females viewed their appearance, the more they continued to adhere to the program. These findings differed from the beliefs that "self-efficacy (i.e. confidence in

one's abilities) regarding physical activity and intentions about exercise are very specific beliefs about one's personal physical activity that have been strongly associated with and predictive of physical activity of adolescents" (Sallis et el., 1992, p. s249). Douthitt and Harvey's (1995) results may have reflected a strong desire to change behavior and the increased adherence may have indicated the stage of the models of change as the adolescent moved from the Preparation to Action stage.

Sallis et al. (1992) reported that increased exercise can influence obesity and cardiovascular disease. Both of these begin to develop early in life; and sedentary behavior is a likely risk factor. Physical activity may help control obesity by favorably affecting body fat distribution (U.S. Department of Health and Human Services, 1996). Four studies (Epstein, Wing, Koeske, Ossip and Beck, 1982, Epstein, Wing, Koeske, and Valoski, 1985, Epstein, Coleman, and Myers, 1996, Gutin, Cucuzzo, Islam, Smith, and Stanchura, 1995) that used exercise and diet to affect changes on obese children were reviewed. A summative review of these studies indicates that teaching children lifestyle exercise versus programmed aerobic exercise promotes a lasting change in their behavior, which could carry on into adult life.

Epstein et al. (1982) reported fitness changes, as measured by heart rate during exercise and recovery, improved more during intensive treatment for the programmed versus the lifestyle exercise groups. Epstein et al. (1985) replicated this study. During both studies children incorporated lifestyle exercise into their daily lives. The lifestyle exercises were behaviors identified as "walking instead of riding, taking the stairs instead of using the elevator, and doing errands by walking" (p. 652). Behavioral procedures used to influence behavior change were self-monitoring, modeling, contingency contracting and parent management. Self-monitoring required keeping a record book, modeling required parents and children being good examples for each other, contingency contracting required giving an $85 deposit which was given back for each of the meetings attended, and parent management required instruction of the parents in the use of modeling and reinforcement for child behavior change (Epstein et al., 1985). Although the fitness of the programmed group improved more during the intensive treatment, during maintenance the fitness of the programmed exercise group deteriorated while fitness of the lifestyle group was maintained.

Epstein et al. (1996) again compared exercise programs for obese children and adolescents and found that an important component of exercise intervention research for obese children and adolescents was exercise adherence, specifically daily exercise. This is also important for all children and adolescents. Exercise adherence was greatest when it became part of their daily program.

When Gutin et al. (1995) studied obese girls they used two approaches: "one approach was supervised physical training (PT) while the other was lifestyle education (LSE) which provided children with the knowledge and skills needed to incorporate exercise into their everyday lives" (p.19). Again, as in the other three studies, the PT group showed more initial gains in aerobic fitness and body composition. However, four weeks after the end of the program, the PT subjects' physical activity dropped off sharply, while the LSE subjects maintained a higher level.

In all these studies, lifestyle exercise seemed to develop a pattern of continued activity. Physical activity that fit into their lives was more apt to be included daily. Daily exercise, continued throughout childhood and adolescence is more apt to continue into adulthood. Exercise continued by adults will be responsible for improved health and longevity of life.

After having reviewed the literature on adolescents and physical activity, three behaviors stood out that needed to be addressed: many adolescents stop participating in physical activity on a regular basis; many adolescents stop taking physical education classes because they are not required; and many more adolescents add obesity to their list of risk factors for CHD.

Interventions are needed to alter habits and attitudes of adolescents that relate to physical activity and lead adolescents to develop fewer risk factors for CHD. Interventions are also needed to promote adherence to a program of physical activity. Starting early in life to develop a pattern of regular activity is suggested (Sallis et al., 1992). Physical education classes are recommended as a starting place, with the goal of increasing by 50%, the number of students enrolled in physical education classes (U.S. Department of Health and Human Services, 1991). It is also recommended that physical education teachers address the problem by increasing by 50%, the amount of physical activity that takes place in class (U.S. Department of Health and Human Services, 1991). A new teaching technique, called the Fitness Education Pyramid (Strand, Mauch, & Terbizan, 1997), was designed as an intervention to educate students on the use of their heart rate as a guide to the

intensity of an activity and to pair it with different amounts of time exercising, and different frequencies of exercise periods. The lifestyle education (LSE) (Gutin et al., 1996) intervention addresses the problem of exercise adherence, specifically daily exercise. Exercise It's Easier Than You Think and Exercise Finding the Time, (1997) pamphlets on LSE, LSE activity journals, paper and pencil exercise and sports games (You Stay Active, 1996 Supple.) are other interventions that can be used to motivate students to increase physical activity.

Increasing physical activity on a daily basis could be accomplished by teaching and promoting lifestyle education (LSE) among adolescents. Using moderate intensity activities, students would be allowed to individualize their activity, learn basic skills while developing fitness, and develop behaviors that lead to lifetime activity (Pangrazi et al., 1996).

CHAPTER 3

Methods

The purpose of this project was to organize a LSE project to help students develop knowledge of the value of physical activity as a component of a lifelong wellness program with skills to maintain an active and healthy lifestyle.

The Fitness Education Pyramid (Strand et al., 1997) was used as the main element of this project to educate adolescents about the need for physical activity and to motivate students to engage in physical activity at an appropriate level. Strand et al. (1997) developed this pyramid to meet the Presidents Council on Physical Fitness and Sports recommendations:

> . . . physical education classes should provide for lifetime activity needs for students and be guided by the following points: (1) education need not be a physical training class where students are forced to do regimented activities; (2) classes should encourage out-of-school as well in-class activities, and (3) at the secondary level, physical education concepts should be taught in a classroom as well

as in a gymnasium (p. 20)

Strand et al. (1997) reported that the pyramid was also designed to meet the National Association for Sport and Physical Education (NASPE) National Standards for Physical Education and the Surgeon General's Report (1996) recommendations for physical activity.

The FEP (Strand et al., 1997) for middle school consisted of a pyramid, divided into 5 horizontal zones, each zone a different color, representing an idea that promoted the level of activity in that zone (see Appendix A). The base of the pyramid, or yellow zone represented the concept of fat burning. An hour of activity, six days a week, at a slow pace (130-145 BPM) was needed to burn fat according to the concept promoted in the Fat Burning Zone. The green or Healthy Heart Zone was represented by the concept of eating green leafy vegetables to keep you healthy. Thirty minutes of moderate activity (145-170 BPM), four to five times a week, was needed to keep a person healthy. The blue or Kick It Zone represented the concept of aerobic (with oxygen) activity. Only fifteen minutes of fast paced activity (170-185 BPM), three times a week, was required to maintain fitness. The purple or Power Zone represented power and muscular strength. Five to ten minutes of activity, done at 180-200 BPM would help you

train harder before experiencing pain. The Red zone which represented a stop sign meant doing activity at 190 BPM for only a short time while resting frequently. This zone was meant for those who are extremely fit and preparing for competition.

The concept for the different zones was developed from Edwards' (1993) idea of using five different heart rate training areas and from Franks (1997) idea of having an exercise level for everyone (cited in Strand et al., 1997).

The pyramid was used in combination with four work sheets (Terbizan, Strand, Roesler, Mauch, & Schumacher, 1997) (see Appendix A). The first sheet, the physical activity and heart rate monitor work sheet was used after the students had found their heart beat and counted it. They did this first, while resting, and then after walking a lap. They counted it again after running the same lap that they had walked. This sheet tells the students how to compute their maximum heart rate (MHR).

Calculating MHR:

220-your age =MHR

11 year old: 220-11=209 MHR

12 year old: 220-12=208 MHR

13 year old: 220-13=207 MHR

14 year old: 220-14=206 MHR

Using their MHR and previouly counted RHR, the students then computed exercise heart rates for each of the 5 levels (zones) of the fitness pyramid using the following formula: [MHR - RHR (resting heart rate) x % needed for the level (kick it zone-70%)] + RHR = Exercise Heart Rate for Zone

Example: 11 years old/ MHR 209; RHR 85; 70%=kick it zone

[209-85 x 70%] + 85 = 172 BPM

[124 x 70%] + 85 = 172 BPM

87 + 85 = 172 BPM

The second and third work sheet (see Appendix A) explained each zone according to the FIT principle. This means that each zone had a frequency, an intensity, and a time necessary to: burn fat, yellow zone; become healthy, green zone; become fit, blue zone; develop power and muscle strength, purple zone; and become fit for competition, red zone.

F-frequency= how often or number of times per week to exercise

I-intensity= how hard you are exercising measured by heart rate (BPM)

T-time = how long or the amount of time required for each work out

Example: Fat Burning zone

The student would exercise:

F- 6 days/ week at

I- 40-60% of MHR at 130-145 BPM

T- 60 minute/workout

The fourth work sheet (see Appendix A) was a review of the material on pages two and three. It also included questions designed to allow the students to set their own goals.

This project was started in April and continued through the end of school, June 12th. It was integrated with the existing softball and track units. It began with the students completing two activity questionnaires, one teacher generated test (on the concepts of the FEP), and a survey that was to be taken home and filled out by a parent (see Appendix B).

The Modifiable Activity Questionnaire for Adolescents (Aaron et al., 1993) (see Appendix B) was used to determine the amount and type of physical activity of three physical education classes outside of the physical education class. The reproducibility was determined by "comparing the estimates of hours/week obtained from two administrations of the questionnaire. . . . A 1-year reproducibility correlation of 0.55 (significant at the $P < 0.05$) was found, which remained significant after stratifying by

gender, race and age" (Aaron et al., 1993, pp.848,849). The test was found to be "indirectly valid in assessing the habitual patterns of adolescents" (Aaron et al., 1993, p. 851). Leisure activity remembered from the past year was found to be related to fitness (rho= -0.37) judged by estimate of hours/week of leisure activity and time taken to run one mile. When gender, race, and age were considered the "association remained significant with correlations ranging from -0.11 to -0.45" (Aaron et al., 1993, p.849). Met-hours/week strengthened this correlation.

The second activity questionnaire was the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) (see Appendix B). The questionnaire was a simple self report on exercise for the past seven days. Students were asked to indicate how many times they did strenuous, moderate or mild exercise in the last seven days. They were also asked to rate how often they engaged in regular activity, enough to break a sweat (often, sometimes, or rarely). Sallis, Buono, Roby, Micale, and Nelson (1992) reported an unpublished test-retest reliability coefficient of 0.84 had been reported for this test. The reported validity for 5th, 8th, and 11th grade students was 0.32 at the $p < 0.05$ level and 0.39 at the $p < 0.05$ level when kilocal/d were determined.

Students completed a 15-question multiple choice test (see Appendix B) based on the FEP (Strand et al., 1997) and the understanding of lifestyle activity.

The Parent Survey (Ross and Pate, 1987) (see Appendix B) was developed for parents to determine the physical activity behaviors and exercise of 8-9 year olds, at home or through community organizations. The questionnaire was designed to answer several questions:

> (1) Do parents rate the overall activity levels of their children somewhat sedentary . . . ? ;(2) . . . How much television do children actually watch, both on school days and on weekends? ; (3) . . .What percentage of children make use of community organizations . . .? ; (4) In what types of physical activities . . . ? ; (5) . . . How often do parents engage in moderate to vigorous exercise? ; (6) How do parents view their own overall activity level? ; (7) How frequently do parents spend just 20 minutes exercising with their children? . . . (p. 85)

Pate, Dowda, and Ross (1990) completed a study to validate the questionnaires for The National Children and Youth Fitness Study II. They found -0.17 at the $p < 0.05$

level for community activities and a 0.17 for Parent's activity rating of child and 0.09 for television watching. The participation in sports team was -0.22 at the $p < 0.05$ level. 50% of the parents rated their child as average, the same as most children on physical fitness. The correlation between parent and teacher ratings was strong on this question (R +0.23 p <.001) (Ross, Pate, Casperson, Damberg, and Svilar, 1987). 43% of mothers and 36% of fathers rated their activity level with their children as average, believing that most children and parents are average (Ross et al., 1987).

After completion of the two questionnaires and the 15-question exam, students were given 4 lessons using the FEP (Strand et al., 1997). Students were reminded when exercising or engaged in any physical activity to try to determine their performance level (zone) using BPM.

During a classroom lesson the students were presented with 2 pamphlets: *Exercise It's Easier Than You Think* and *Exercise Finding the Time* (1997). Different types of lifestyle activities were discussed and students were asked to choose activities they usually did not think of as exercise. They were also asked to name other activities not pictured. Students were requested to keep a two week calendar of their physical activities. This was provided

for each student. The students were reminded every few days that they should be recording physical activities they did outside of school. They were also told to mark those activities that were not generally thought of as exercise (Crouch, Meredith, Cain, & Corbin, 1995).

Following completion and return of the two week calendar, students were placed in groups to play Fitness Football as outlined by the You Stay Active, 1996, Supple. Each student was responsible for completing an activity log for two weeks. The activities or exercises, completed for a certain amount of time (10 min. of stretching = 2 yards) were worth yards towards a touchdown. Each student was supposed to do 10 yards of activity for 10 days for his team to score a touchdown.

Parent newsletters were sent out by the school twice during the school year. An article regarding children's activity and health from The You Stay Active program was included in each newsletter. The titles of the two articles were: "Sedentary Living Risk Factor for Heart Disease" and "What Parents Can do to Help Children be Active" (Crouch et al., 1995).

The first week in June the students were given a second copy of the Parent Survey (Ross & Pate, 1987) to take home. The second week of June the activity questionnaires

were repeated and the teacher generated test was given as a post test.

CHAPTER 4

Results

The purpose of the project was to determine if the Fitness Education Pyramid (FEP) was an effective intervention tool to teach students about exercise, how it effects their bodies, and how they can determine whether they are exercising at a level needed to develop fitness or at a level necessary to maintain health (Strand et al., 1997). Would they use this information to increase their participation in sports or leisure activities?

Three self-report questionnaires were chosen to determine children's leisure activity. The Modifiable Activity Questionnaire for Adolescents (Aaron et al., 1993) was used to determine amounts of hard and light exercise, hours of television viewing, number of competitive activities, and the number of hours per week of leisure activity participated in by the students. The Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) was used as a measure of the types of activity (strenuous, moderate, or mild) and of the frequency of activity (often, sometimes, and rarely). The third questionnaire used was the Parent Survey from the National Children and Youth Fitness Study II (Ross & Pate, 1987)

given to parents to help assess the activity level of children 6 to 9 years old. It was used with students in grades 6, 7, and 8, typically eleven-fourteen year olds.

A teacher developed written test was also given to the students to see if they understood the concepts of the FEP (Strand et al., 1997).

This study used 127 sixth (N=39), seventh (N=39), and eighth (N=49) grade middle school students. There were 60 males and 67 females. Questionnaires were given twice, in April at the beginning of the project, and in June at the end of the project. The types of activity and the amounts of leisure activity were to be compared from the first test (pre-test) to the last test (post-test).

The first questionnaire, the Modifiable Activity Questionnaire for Adolescents (MAQA) (Aaron et al., 1993) reported *hard* and *light activity* for two weeks. Test 1, the mean score for *hard activity* was 5.3 days. The mean score for *light activity* for two weeks was 3.2 (1). This was a combination score of 8.5 days total activity for the two weeks. The mean score for *hard activity* (2) dropped to 3.1 and the *light activity* (2) increased to 3.3 for a total activity of 6.4 days for two weeks. The largest percentage of students reported 3 to 5 days of both *hard* and *light* activity in both pre-test and post-test, 38.3% (1) and 40%

(2) *hard activity* and 26.2% (1) and 31.7% (2) *light activity*.

When reported by gender, males mean score was 3.33 days for *hard activity* (1) and increased slightly to 3.4 days (2). The mean score for females, *hard activity*, was 7.38 days (1) and it dropped to 2.97 days. On the Independent Samples t-test for Equality of Means, although the variances were not significant ($t=1.933$, $df=78$, $p<.057$), it is likely that there are differences. The Chi-Square scores for the MAQA for *hard activity* (1) 67.785, $df=5$, $p<0.000$ and *hard activity* (2) 30.500, $df=4$, $p<0.000$ showed that there were differences.

When the Chi-Square was used for comparison of MAQA (Aaron et al., 1993) reporting the number of competitive sports (2) it showed significance at $p<0.046$.

In the MAQA (Aaron et al., 1993) the students reported mean scores of 3.4 (1) and 3.2 (2) respectively for hours spent watching TV on weekdays. A t-test for Paired Samples Correlations was significant for adolescent TV watching (1) .325, $p < 0.006$ and (2) .3248, $p<0.01$. In the Parent Survey (Ross & Pate, 1987) the parents reported their children watching TV an average of 3.05 hours on the weekdays and 3.6 hours on the weekend (1). The mean for weekdays increased to 3.4 (2) and fell to 3.2 for weekends

(2). The Paired Samples Correlation showed significance for MAQA (Aaron et al., 1993) adolescent TV watching (2) and the parent rating child's TV watching for school days (2) .478, $p < 0.004$. Pate and Ross (1987) had reported a significant relationship between the estimate of the number of hours a child watched TV and the mile walk/run. As the number of hours that the child watched TV went up, the mile scores also went up.

The MAQA (Aaron et al., 1993) also reported total leisure hours of activity. The students reported how many months, how many days/week, and how many hours/day they participated in an activity. The total number of hours of leisure activity was computed by formula excluding the MET hours (Appendix B). When the hours/week of MAQA (HRSWKT1) were compared to the hours/week of MAQA (HRSWKT2) by using the Wilcoxon Signed Ranks Test, the $z = -5.135$ was significant at $p < 0.000$. When both the mile and HRSWKT1 and the mile and HRSWKT2 were compared they both showed significance with HRSWKT1/mile -5.601 at $p < 0.000$ and HRSWKT2/mile -3.712 at $p < 0.000$.

The t-test for Paired Samples Correlations, comparing HRSWKT1 and HRSWKT2 reported $t = .869$ at $p < 0.000$. The Paired Sample Test reported $t = 4.335$, $df = 113$, significant at $p < 0.000$. A t-test comparison of Paired Samples for Paired

Differences for HRSWKT1/mile (pair 1) (t=5.169,df=96, p <0.000) and HRSWKT2/mile (pair 2) (t=4.436, df=96, p <0.000).

A Pearson correlation between mile, class, and HRSWKT1 and HRSWKT2 was significant r=-.438 at p <0.01 two tailed for class. When the correlation was changed to mile, gender, HRSWKT1 and HRSWKT2 an r=.374 at the p <0.01 level was found for gender and r=-.201 at the p <0.05 level was found for HRSWKT1 (two tailed). A correlation was reported for gender r=.374 at p <0.01 level and for HRSWKT2 r=-378 at p <0.01 level (two tailed).

The second questionnaire, The Godin Leisure-Time Exercise Questionnaire's (Godin & Shephard, 1985) mean score reported for student activity was 71.53 MET-h/wk the pre-test, with 110 students reporting, and a mean of 73.76 MET/h/wk for the post-test, with 89 students reporting. (Appendix B) When reporting how often they engaged in any regular activity long enough to work up a sweat, the mean for *often* was 1.8 for the pre-test and 1.6 for the post-test, representing 33 of 110 (1) and 33 of 89 (2). *Sometimes* was the answer given most often in the pre-test and post-test, 66 of 110 (1) and 51 0f 89 (2). Those that reported *rarely* dropped from 10%, 11 of 110 (1) to 5%, 5 of 89 (2). When reported by gender (pre-test) , 26.4% (14) of

the males reported *often* and 33.3% (19) of females reported *often*. The *sometimes* responses reported were 60.3% (32) males and 59.6% (34) females; the *rarely* responses were 13.2% (7) males and 9% (4) females. In the post-test, 45.2% (19) of males reported *often*, 29.7% (14) of females reported *often*; 47.6 % (20) of males reported *sometimes*, 65.9% (31) females reported *sometimes* and 7% (3) of males reported *rarely*, and 4% (2) of females reported *rarely*.

A t-test for Paired Samples Correlations showed a correlation of .417 at p <0.000 level for pair 1 weekly leisure sweat (1) and weekly leisure sweat (2). When weekly leisure sweat (1) and the mile,walk/run were paired the correlation was .186 at the p <0.072. This was not significant, but probably there are differences. When weekly leisure sweat (2) and the mile,walk/run were compared the correlation was .357 at the p <0.001 level. When these same pairs were run on the Paired Samples Test, the Paired Differences for the second pair (weekly leisure sweat (1) and mile,walk/run) t=39.325, df=93, p <0.000. Pair three (weekly leisure sweat (2) and the mile, walk/run) the t=45.385, df=79 at p <0.000. (two-tailed)

The mean score for parents rating their child's activity was 3.0, a little less physically active than most (test 1). The mode was 2.0, a little more physically active

than most (test 1). In test 2, the mean was 2.6 and the mode 1.0. When rating themselves, the father's mean score was 3.34, a little less physically active than most, with the mode being 2.0, a little more active than most (test 1). In test 2, the mean was 2.9, and the mode was 2.0. The mean score for mothers rating of themselves was 3.7, a little less physically active than most, with the mode being 5.0 average, same as most (test 1). In test 2 the mean was 3.1, a little less physically active than most, with the mode 2.0, a little more physically active than most. The Paired Samples Test for Paired Differences correlation showed a significance of -2.540 at $p < 0.014$ for the relationship between parent rating of the child's activity (1) and the mother's activity rating (1). The Paired Samples Correlations showed a correlation of .280 at $p < 0.049$.

In the third questionnaire, the Parent Survey, (Ross & Pate, 1987) when fathers reported exercising with their child, they reported a mean score exercising with their child 1.26 hours/week (test 1) and 2.16 hours/week (test 2). The mothers' reported exercise mean score was 1.5 hours/week (1) and was 2.5 hours/week (2). The Paired Samples Test for Paired Differences showed differences were significant: parent reporting of child's activity (1) and father's activity with child (1) $t=4.800$, $df=33$, $p < 0.000$ and parent

reporting of child's activity (1) and mother's activity with child (1) t=3.845, df=41 at p <0.000. A significant relationship was found between the mile,walk/run and the parent's reporting of the child's activity (2) with a correlation of .404 at p<0.009 for Paired Samples Correlations.

The teacher developed written test reported a mean of 6.20 for test 1 and 6.43 for test 2. Both medians and modes for test 1 and 2 were 6.0.

CHAPTER 5

Discussion

The purpose of this project was to determine the effectiveness of interventions on student activity. Due to the time of year that this project was undertaken and other activities at the school which were taking time away from the project itself, only very modest, if any associations between the activities and the student activity patterns could be predicted.

Students seemed motivated by monitoring their heart rate when it was connected to the activity they were doing, even if it was just walking or running. This was something that they could feel. They also could feel the difference in their heart beat in mild activity or strenuous activity.

The response to the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) showed a slight increase in MET/h/wk from the pre-test of 71.53 MET/h/wk to the post-test score of 73.76 MET/h/wk. The percentage of males increased who reported that they often engaged in regular activities long enough to work up a sweat, from 26.4% (pre-test) to 45.2% (post-test), despite a fewer number of students reporting scores for the post-test. Female scores dropped in the often category from 33.3 % to 29 %, a 4% drop, but increased in the sometimes category

from 59.6% to 65.9%, an increase in 6%. Both male and female rarely scores were lower in the post-test, possibly indicating that they were now exercising more.

Paired Sample Correlations showed a .417 difference at $p < 0.000$ for weekly leisure sweat (1) and weekly leisure sweat (2). Weekly leisure sweat (2) and the mile (walk/run) showed a correlation of .357 at the $p < 0.001$ level. This could indicate that those who had good mile scores exercised often and those who did not, did not have good mile times.

The t-scores for Paired Differences also showed differences for weekly leisure sweat (1) and the mile $t=39.325$, $df=93$, $p < 0.000$. It also showed differences for weekly leisure sweat (2) and the mile ($t=45.385$, $df=79$, $p < 0.000$).

The MAQA (Aaron et al., 1993) total scores for hard and light activity (1) was 8.5 days/2 wk. This dropped to 6.4 days (hard and light activity 2). The total frequencies were difficult to compare since there were 107 scores valid in the pre-test and only 80 were in the post-test. Thus, the comparisons of valid percentages were used to report differences. The largest percentage of students 38.3 (1) and 40% (2) reported exercising 3 to 5 days in a two week period. The increase in percentage of students exercising is encouraging. Also, those who reported that they did no

hard or light dropped. No *hard exercise* fell from 2.8% (3) to 2.5% (2); no *light exercise* fell from 13% (14) to 7.3 (6).

The Chi-Square scores for the MAQA (Aaron et al., 1993) hard activity (1) and hard activity (2) and the MAQA score for adolescent sports (2) were significant.

The MAQA (Aaron et al., 1993) for student TV watching showed means of 3.4 (1) and 3.2 (2) showing a slight drop in TV watching. The Parent Survey (Ross & Pate, 1987) seemed to corroborate the scores as the parents reported their children watched 3.05 hours of TV on a week day. The Paired Samples Correlation confirmed this, showing a correlation of .478, $p < 0.004$, between the MAQA adolescent TV (2) and the parent report of child's TV watching (2).

When hours of total leisure activity were studied, the HRSWKT1 and the HRSWKT2 showed a significant z score ($z = -5.135$. $p < 0.000$). When compared to the mile each HRSWK score was significant. (HRSWKT1/mile $z=-5.601$, $p<0.000$; HRSWKT2/mile $z = -3.712$ $p < 0.000$)

The parent report seemed to show that mothers' activity reported and the children's that was reported were correlated (-2.540 $p < 0.014$). Also both mother's and father's mean score for exercise with the child increased:

mother's (1) 1.5 h/wk (2) 2.5 h/wk; father's (1) 1.26 h/wk (2) 2.16 h/wk.

The low test scores for the written test were not surprising. The students who were good students seemed to do well on both the pre-test and the post-test. Others did not try. Some could not read the test and put down the answers of their friends. More explanation could have made the concepts clearer. Time constraints and program team teaching limited time with the students involved in the project.

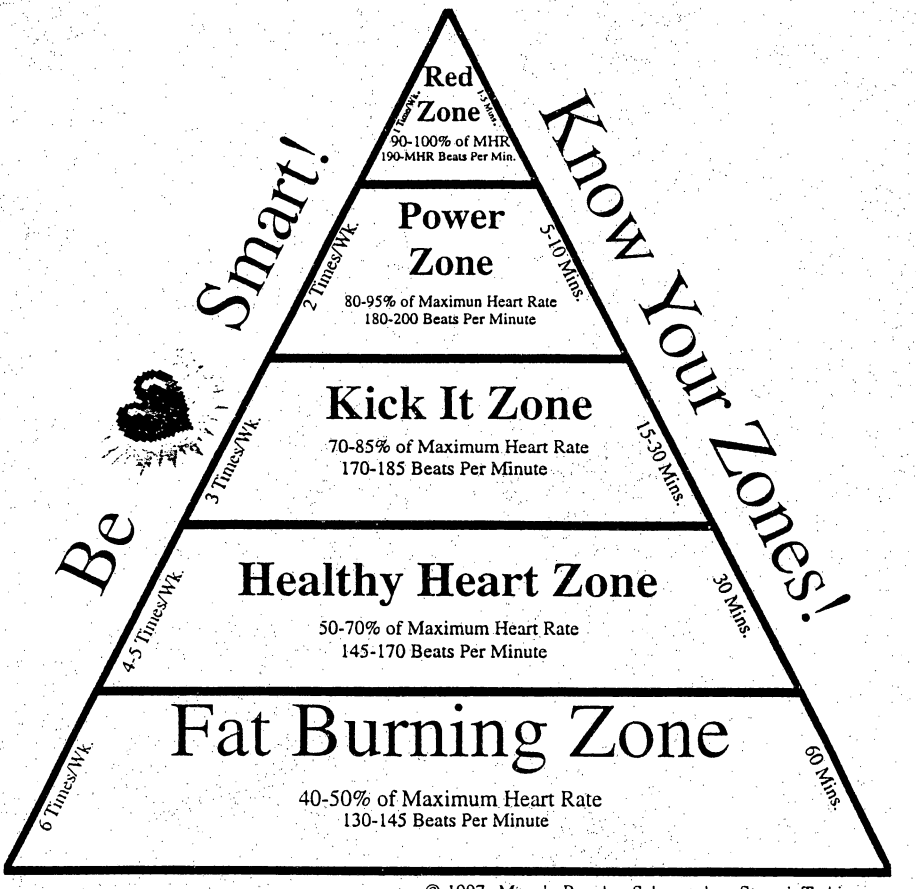
The fact that so many students reported being involved in activities outside of school was encouraging. For some, getting their parents involved through the Parent Survey (Ross & Pate, 1987) and newsletters was helpful. Whether the students could write down the answers to the written test was not as important as the fact that they seemed to understand that there were ways to be active that did not include competitive sports. They could fit activity into their life. They did not have to go to the gym, do aerobics, and get really tired and sweaty. They could exercise slower, but do it longer. Hopefully, this will translate into a lifelong activity style.

This study was completed because of a need to motivate a percentage of the adolescent population, middle school

students who are inactive, to become active before they enter high school and decide that they do not have time for exercise or they do not need to exercise. Using the interventions with this group of students was successful in some ways, enough to continue their use in a sequential manner for a longer period of time. Using more detailed explanations, repeating concepts for better student understanding, and using hands-on technology that will actually give the student a picture of the heart in action (heart rate monitors) are interventions that need further study. The area of adolescent activity translating into adult activity has become an area of concern for physical educators and will continue to be until our country as a whole becomes aware of the consequences of inactivity and takes steps to change behavior patterns and become more active.

APPENDIX A: The Fitness Education Pyramid and Work Sheets

The Middle School Fitness Education Pyramid



© 1997, Mauch, Roesler, Schumacher, Strand, Terbizan

Terbizan, Bradford, Roesler, Mauch, and Schumacher, 1997, p.47.

Physical Activity and Heart Rate Monitor Work Sheet

Name_____Number_____Period/Day_____

1. We talked about our maximum heart rate (MHR). It is calculated by the formula 220 minus your age. Calculate your MAX heart rate below.

220
- your age
MHR

If you are 11, your MHR should be 209, 12 should be 208 and 13 should be 207.

2. Below is a chart that will show you your heart rate zones by percentage. You figure these out by taking your MHR minus your resting heart rate (called the Heart Rate Reserve (HRR)), (see chart below) times the percentage (intensity) you want to work out at, then adding your resting heart rate back on. Example, if you wanted to find out what your target heart rate was at 70% and you are 11 years old, you would do the following:

[(209 - 85) x 70%] + 85 = 70% of your MHR.

Here is the whole formula worked out:

220-11(age) - 85 (average resting heart rate for middle/jr. high) x 60% (intensity) = 172 Beats Per Minute

220-11=209-85=124
X .70
000
+ 868
86.80

Then add the resting heart rate. 86.80 + 85 = 171.80 rounded off would be 172 Therefore, if you wanted to work out at 70% of your MHR you would get your heart rate up to 172 BPM.

Here is a chart for you, however, you should know how to figure your percentages for the test so practice at home.

Age	MHR	HRR	40%	50%	70%	80%	85%	95%
11	209	124	135	147	172	185	190	203
12	208	123	134	146	171	183	190	202
13	207	122	134	146	170	183	189	201
14	206	121	133	146	170	182	188	200

If you are 12, what would 85% of your MHR be?_____BPM
If you are 11?_____BPM If you are 13?_____BPM

Terbizan, Bradford, Roesler, Mauch, and Schumacher, 1997, pp. 61-64.

Terms: The F.I.T. Principle

Frequency:_____
Intensity:_____
Time:_____

NOW, LETS TALK ABOUT THE FITNESS ZONES!

On the bottom of the pyramid is the FAT BURNING ZONE. This zone uses fat calories rather than carbohydrate calories for its fuel and as a result helps individuals lose weight. The workout provides a more leisurely type of workout and is a good workout for those concerned with weight management or with weight loss. It is effective when used as a recovery workout following an intense workout such as training for a sport when a recovery is needed. It is also good to use after an injury because it is of a low intensity, yet long enough, (time) so that you get a beneficial workout. The FAT BURNING ZONE is also good when learning and perfecting new activities and skills.

6 TIMES PER WEEK / 40%-50% MHR / 60 MINUTES
ACTIVITIES might include: walking, recreational swimming, biking, volleyball and badminton

130-145 Beats Per Minute
FAT BURNING ZONE!

The HEALTHY HEART ZONE strengthens the heart and gives it the opportunity to work at its optimum level with a steady, pain-free, moderate pace. This workout allows you to accelerate the development of a specific body part by having them work harder for a shorter period of time. The intensity level, while strengthening the heart, is still, however, at a pain-free level

4-5 TIMES PER WEEK / 50%-70% MHR / 30 MINUTES
ACTIVITIES might include: moderate movement such as continuous tag games, biking, rollerblading and team handball

145-170 Beats Per Minute
HEALTHY HEART ZONE!

Which zone is best if you want to lose weight?_____
What percentage of your MHR should you be at for the healthy heart zone?____
Which zone is best for developing your heart?_____
What is the time needed for the fat burning zone_____and what is the frequency?_____.
What would the intensity be for the healthy heart zone?_____
What is the time needed at the healthy heart zone?_____ and what is the frequency?_____.

The KICK IT ZONE

The KICK IT ZONE benefits both the heart and the respiratory system. From this aerobic training zone, you will enhance your body's ability to move oxygen to and carbon dioxide away from the muscle being used. You will feel some of the discomforts of the training, but it is not painful. Your breathing will be strong, you will be working hard, and you will feel the exertion on your body.

3 TIMES PER WEEK / 70%-85% MHR / 15-30 MINUTES
ACTIVITIES might include aerobics, running, working on the tread mill or ski machine, playing basketball or soccer

170-185 Beats Per Minute
KICK IT ZONE!

The POWER ZONE allows you to cross over and begin anaerobic training. Anaerobic training means without oxygen. There is no exchange between oxygen and carbon dioxide in your muscles. The main benefit of this training is that you increase your body's ability to metabolize lactic acid, and thus allowing your muscles to train harder before crossing into the pain of lactate accumulation and oxygen debt, another words, the pain of working out! The intensity of this training is hard. You will experience tired muscles, heavy breathing, and fatigue. This level is generally used if you are training for competition. If you are untrained or out of condition, you will feel discomfort.

2 TIMES PER WEEK / 80%-95% MHR / 5-10 MINUTES
ACTIVITIES might include weight lifting or
a series of 100 m. dashes.

180-200 Beats Per Minute
POWER ZONE!

The RED ZONE is only for those individuals considered extremely fit. With this training, you will have crossed into the anaerobic threshold and will be working in oxygen debt. The training is extremely difficult, and you will feel like you cannot breathe fast enough and that the heart is working so hard that it wants to jump out of your chest! This level is generally used by individuals training for serious competition. Untrained or unprepared individuals who participate in these workouts will suffer great discomfort and could even suffer injury.

1 TIME PER WEEK / 90%-100% MHR / 1-5 MINUTES
ACTIVITIES might include: jumping rope fast for 1-5 minutes and sprinting or running very fast for short distances

190-MHR Beats Per Minute
RED ZONE!

Let's Review

Which zone is best if you want to develop the strength in your heart and your respiratory system?_____

What percentage of your MHR should you be at for the kick it zone?_____

Name an activity for the power zone_____

Which zone is best for metabolizing your lactic acid and thus allowing you to train harder without pain?_____

What is the time needed for the kick it zone_____and what is the frequency_____

What would the intensity be for the power zone?_____

What is the time needed at the red zone_____and what is the frequency?_____

Name an activity for the kick it zone_____

What would the intensity be for the kick it zone?_____

What would the intensity be for the fat burning zone?_____

What is your physical activity goal?_____

* Let's remember, the power and red zones are enhancements to the kick it zone. You want to choose a "fitness zone" that fits your physical activity goal. Choose from the fat burning, healthy heart, or kick it zones.

What fitness zone do you see yourself working at?_____

What intensity would be used for your zone?_____

What is the time needed in your zone?_____

What is the frequency used in your zone?_____

Some of the levels overlap in Maximum Heart Rate. What I would like you to understand is the "feeling" of what each level is like. It should be easy then to set up your home fitness program.

APPENDIX B: Questionnaires

Modifiable Activity Questionnaire for Adolescents

DATE_____ NAME_____ ID ____

SCHOOL _____ CLASS

1. How many times in the past 14 days have you done at least 20 minutes of exercise hard enough to make you breathe heavily and make your heart beat fast? (Hard exercise includes, for example, playing basketball, jogging, or fast bicycling; include time in physical education class)

   ( ) None
   ( ) 1 to 2 days
   ( ) 3 to 5 days
   ( ) 6 to 8 days
   ( ) 9 or more days

2. How many times in the past 14 days have you done at least 20 minutes of light exercise that was not hard enough to make you breathe heavily and make your heart beat fast? (Light exercise includes playing basketball, walking or slow bicycling; include time in physical education class)

   ( ) None
   ( ) 1 to 2 days
   ( ) 3 to 5 days
   ( ) 6 to 8 days
   ( ) 9 or more days

3. During a normal week how many hours a day do you watch television and videos, or play computer or video games before or after school?

   ( ) None
   ( ) 1 hour or less
   ( ) 2 to 3 hours
   ( ) 4 to 5 hours
   ( ) 6 or more hours

4. During the past 12 months, how many team or individual sports or activities did you participate in on a competitive level, such as varsity or junior varsity sports, intramurals, or out-of-school programs.

   ( ) None
   ( ) 1 activity
   ( ) 2 activities
   ( ) 3 activities
   ( ) 4 or more activities

   What activities did you compete in?

   _____
   _____
   _____
   _____
   _____
   _____

PAST YEAR LEISURE PHYSICAL ACTIVITY

Check all activities done **MORE THAN 10 TIMES IN THE PAST YEAR**. Do not include time spent in school physical education classes. Make sure you include all sport teams that you participated in during the past year.

____ Aerobics	____ Gymnastics	____ Swimming (Laps)
____ Band/Drill Team	____ Hiking	____ Tennis
____ Baseball	____ Ice Skating	____ Volleyball
____ Basketball	____ Roller Skating	____ Water Skiing
____ Bicycling	____ Running for Exercise	____ Weight Training
____ Bowling	____ Skateboarding	____ Wrestling (Competitive)
____ Cheerleading	____ Snow Skiing	Others
____ Dance Class	____ Soccer	_____
____ Football	____ Softball	_____
____ Garden/Yard Work	____ Street Hockey	_____

List each activity that you checked above in the "Activity" box below, check the months you did each activity and then estimate the amount of time spent in each activity.

Activity	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec	Months Per Year	Days Per Week	Minutes Per Day

LEISURE PHYSICAL ACTIVITY CALCULATIONS

1. For each activity:

$$\frac{(\text{\# months/yr}) \times (4.3 \text{ wks/month}) \times (\text{\# days/wk}) \times (\text{\# minutes/day})}{(60 \text{ minutes/hr}) \times (52 \text{ wks/yr})} = \text{hrs/wk of activity}$$

2. Sum the hrs/wk for each activity to determine the total physical activity estimate for the past year.

3. To express the results in MET-hrs/wk, multiply the hrs/wk for each activity (derived in step 1 by the activity's MET equivalent (obtained from existing charts).

Example: Basketball (MET equivalent = 9)

$$\frac{(4 \text{ months/yr}) \times (4.3 \text{ wks/month}) \times (4 \text{ days/wk}) \times (60 \text{ minutes/day})}{(60 \text{ minutes/hr}) \times (52 \text{ wks/yr})} = 1.3 \text{ hrs/wk}$$

(9 METS) x (1.3 hrs/wk) = 11.9 MET-hrs/wk, or 11.9 $kcal/kg^{-1}/wk^{-1}$

Aaron, Kriska, Dearwater, Anderson, Olsen, Cauley, and LaPorte, 1963, p.852-853.

Godin Leisure-Time Exercise Questionnaire

Considering a **7-Day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your **free time** (write on each line the appropriate number).

Times Per Week

a) **STRENUOUS EXERCISE**
(HEART BEATS RAPIDLY)
(i.e. running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling) _____

b) **MODERATE EXERCISE**
(NOT EXHAUSTING)
(i.e. fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing) _____

c) **MILD EXERCISE**
(MINIMAL EFFORT)
(i.e. yoga, archery, fishing from river band, bowling, horseshoes, golf, snow-mobiling, easy walking) _____

2. Considering a 7-Day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

OFTEN	SOMETIMES	NEVER/RARELY
1. ☐	2. ☐	3. ☐

Adapted from Godin, G. and R. J. Shephard. A simple method to assess exercise behavior in the community. Can. J. Appl. Sport Sci. 10:141–146 1985.

INSTRUCTIONS

The individual is asked to complete a self-explanatory, brief four-item query of usual leisure-time exercise habits.

CALCULATIONS

For the first question, weekly frequencies of strenuous, moderate, and light activities are multiplied by nine, five, and three METs, respectively (5). Total weekly leisure activity is calculated in arbitrary units by summing the products of the separate components, as shown in the following formula:

$$\text{Weekly leisure activity} = (9 \times \text{Strenuous}) + (5 \times \text{Moderate}) + (3 \times \text{Light})$$

The second question is used to calculate the frequency of responses to the question regarding the frequency of weekly leisure-time activity "long enough to work up a sweat" (see questionnaire).

EXAMPLE

Strenuous = 3 times/wk

Moderate = 6 times/wk

Light = 14 times/wk

Total leisure activity score = $(9 \times 3) + (5 \times 6) + (3 \times 14) = 27 + 30 + 42 = 99$

Godin and Shephard, 1985, p.146.

National Children and Youth Fitness Study II:

Parent Survey

To assist in understanding the physical fitness of your child, we would appreciate your taking a few minutes to answer several questions about your child. You are not required to complete the survey, but doing so will provide more complete information. Answers will be kept strictly confidential.

1. Compared to other children of the same age/sex, is your child: CHECK ONE.

46 [1] A lot more physically active than most
[2] A little more physically active than most
[3] A little less physically active than most
[4] A lot less physically active than most
[5] Average—same as most

2. How much television does your child usually watch on the typical school day? CHECK ONE.

47 [1] 1 hour or less
[2] 2 hours
[3] 3 hours
[4] 4 hours
[5] 5 hours
[6] 6 hours or more
[7] None

3. How much television does your child usually watch on the typical weekend day? CHECK ONE.

48 [1] 1 hour or less
[2] 2 hours
[3] 3 hours
[4] 4 hours
[5] 5 hours
[6] 6 hours or more
[7] None

4. In the past 12 months, did your child get exercise or physical activity at least three times through any of the following organizations? CHECK ALL THAT APPLY.

49 [1] Public park or recreation center
50 [1] Church or other place of worship
51 [1] Sports teams or leagues
52 [1] YMCA, YWCA, or similar organization
53 [1] Health club, private spa, or private lessons
54 [1] Cub scouts, brownies, or other scouts
55 [1] 4-H or other farm club

5. What types of exercise or physical activity did your child receive through the places you checked above in Question 4? LIST UP TO FIVE.

1. _____ (56-57)
2. _____ (58-59)
3. _____ (60-61)
4. _____ (62-63)
5. _____ (64-65)

6. In the typical week, on how many days do the child's parents or guardians (whomever the child lives with) get exercise that causes rapid breathing and a fast heart beat for 30 continuous minutes or more? LIST NUMBER OF DAYS PER WEEK FOR EACH PARENT. PUT NA IF CHILD DOES NOT LIVE WITH THIS PARENT.

Mother or Female Adult: 66 ☐ Father or Male Adult: 67 ☐

7. Compared to other adults of the same age and sex, how physically active are the child's parents (whomever the child lives with)? CHECK ONE FOR EACH PARENT.

Mother or Female Adult	Father or Male Adult
68 [1] A lot more physically active than most	69 [1] A lot more physically active than most
[2] A little more physically active than most	[2] A little more physically active than most
[3] A little less physically active than most	[3] A little less physically active than most
[4] A lot less physically active than most	[4] A lot less physically active than most
[5] Average—same as most	[5] Average—same as most
[6] NA	[6] NA

8. In the typical week, on how many days do the child's parents or guardians (whomever the child lives with) exercise with the child for 20 minutes or more? LIST NUMBER OF DAYS PER WEEK FOR EACH PARENT.

Mother or Female Adult: 70 ☐ Father or Male Adult: 71 ☐

Ross and Pate, 1987, pp. 49-96.

Teacher Test

Multiple Choice Directions: Read the statement. Choose the best answer from those given and write the letter of your choice on the line to the left.

_____1. Your heart rate or pulse when you are sitting watching TV is _____?
a. slower than when moving
b. faster than when moving
c. same as when moving
d. none of the above

_____2. The fitness zone called fat burning, requires your heart to beat at _____% of your maximum heart rate?
a. 50-70%
b. 40-50%
c. 70-85%
d. 80-95%

_____3. The fitness zone that you should use as a guide for good health is _____?
a. Kick It Zone
b. Fat Burning Zone
c. Power Zone
d. Healthy Heart Zone

_____4. The fitness zone that you should use as a guide for good health requires exercise at _____% of MHR.
a. 50-70%
b. 40-50%
c. 70-85%
d. 80-95%

_____5. The fitness zone that you should use as a guide when learning new skills or recovering from an illness are ____?
a. Kick It Zone
b. Fat Burning Zone
c. Power Zone
d. Healthy Zone

_____6. When working in the Fat Zone you should exercise _____ times/week?
a. twice/week
b. 3 times/week
c. 4-5 times/week
d. 6 times/week

_____7. When exercising for good health you should exercise _____ times/week?
a. twice/week
b. 3 times /week
c. 4-5 times/week
d. 6 times/week

_____8. What is the time needed to exercise in the Healthy Heart Zone?
a. 60 minutes
b. 30 minutes
c. 15-30 minutes
d. 5-10 minutes

_____9. What is the time needed to exercise in the Fat Burning Zone?
a. 60 minutes
b. 30 minutes
c. 15-30 minutes
d. 5-10 minutes

____10. Which zone is the best if you want to lose weight?
a. Fat Burning Zone
b. Healthy Heart Zone
c. Kick it Zone
d. Power Zone

____11. Doing a lifestyle activity means___?
a. going to aerobics
b. going to P.E.
c. riding your bike to school
d. doing an activity not normally considered exercise.

____12. Which zone is best if you want to develop strength in your heart and respiratory system?
a. Fat Burning Zone
b. Healthy Heart Zone
c. Kick It Zone
d. Power Zone

____13. An example of a lifestyle activity is _____?
a. an aerobics class
b. riding your bike to school
c. really pushing and pulling when vacuuming
d. both b & c
e. both a & b

____14. When using lifestyle activity you should exercise for _____?
a. 60 min. at one time
b. 30 min. at one time
c. 15 min. at one time
d. may accumulate 30 min. over the day

____15. Lifestyle activity can be done
a. in the mall
b. coming home from school
c. when cleaning the house
d. when brushing your teeth
e. all of the above

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