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TEST OF A SOCIAL COGNITIVE THEORY-BASED EDUCATIONAL TREATMENT TO INCREASE THE FREQUENCY OF VOLUNTARY MODERATE AND VIGOROUS PHYSICAL EXERCISE AMONG ADOLESCENTS SCHOOL STUDENTS

Volume I

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Eric Ross Winters, M.S.

*****

The Ohio State University
2001

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Rick Petosa, Advisor
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2001
ABSTRACT

The purpose of this study was to test a Social Cognitive Theory-based educational treatment to increase the frequency of volitional moderate and vigorous physical exercise among adolescent students attending introductory high school physical education classes. Social Cognitive Theory constructs upon which this educational treatment was based include self-control, social situation, outcome expectation, and strength of self-efficacy. Within this study are evaluations of treatment implementation, treatment construct validity, and behavioral impact upon the frequency of both moderate and vigorous physical exercise.

Implementation evaluation is used in order to determine what educational experiences the subjects were exposed to and how closely the implemented educational treatment mirrored the designed educational treatment. Implementation evaluation is also useful in providing a context within which the treatment construct validity evaluation can be interpreted. The treatment construct validity evaluation is used in order to determine the degree to which the targeted Social Cognitive Theory constructs changed following the implementation of the educational treatment. From this type of evaluation it is
possible to examine the degree to which the educational experiences that were designed
to impact theoretical constructs were effective. Behavior evaluation is used in order to
determine the degree to which the frequency of volitional moderate and vigorous physical
exercise changed following the implementation of this educational treatment.

Results from this study indicate that the implemented Social Cognitive
Theory-based educational treatment is effective at increasing student self-controlling
actions for physical exercise and the frequency of volitional moderate physical exercise.
This study does not provide evidence that the implemented educational treatment was
effective at increasing student perceptions of outcome expectations, social situation,
strength of self-efficacy, or frequency of volitional vigorous physical exercise. Results
from the implementation evaluation provide a possible explanation for the failure to have
impact upon the perceptions of outcome expectation, social situation, and strength of self-
efficacy. The exercise incentive program component of the educational treatment was
delivered, however not as expected. The exercise incentive program was designed to
provide students with an opportunity to develop, monitor, and control a personalized
exercise program. Rather than mandating student involvement in the exercise incentive
program teachers encouraged students to participate.

Clearly this study demonstrates that it is unwise to assume that the constructs
targeted by an educational treatments will necessarily be altered. It appears that
educational treatments must be refined through repeated implementation trials before
such an impact can be realized.
This study provides information that adds meaningfully to the study of exercise promotion among adolescent school students. This study is one of only a few studies in which the primary purpose was to determine the impact upon exercise behavior following the implementation of an educational treatment. The observed increase in exercise participation was larger than previously published reports. Results of the treatment construct validity evaluation along with the results of the behavior evaluation demonstrate a correlation between the Social Cognitive Theory construct self-control and frequency of volitional moderate physical exercise.
ACKNOWLEDGMENTS

I would like to express my gratitude to Dr. Rick Petosa. His vision, guidance, and confidence enabled me to accomplish this work. I look forward to using the skills he teaches as I continue to progress. Two dedicated committee members, Dr. William Loadman, and Dr. Janet Buckworth also guided this work. I am grateful to you for your thoughtful comments and assistance as this study was implemented and reported.

Brian Hertz and Emily Krause who in my absence has shouldered an extra burden within our athletic training program have assisted my effort in ways I can not forget. To the students who have allowed me to talk about this study, I thank you.

I wish to thank my family members. Ron Winters, my father and role model. Pat Winters, my mother who at the best times offers quiet words of encouragement. These are individuals who have known the most meaningful ways to support me at each step in this process.

To my wife, Melissa Winters, I can not say enough. A more loving, caring person can not be found. In times of joy she is there, in times of distress she also is there. I will never be able to express my love for you well enough. Faith, Hope, and Love. To my daughter Vanessa Kaye Winters, I am proud of you, live courageously, you are loved.
VITA

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FIELD OF STUDY

Major Field: College of Education
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CHAPTER 1

INTRODUCTION

Regular physical exercise has been demonstrated to decrease the prevalence of a myriad of diseases not limited to, but including cardiovascular disease, osteoarthritis, and non-insulin dependent diabetes. This potential for disease reduction prompted the Office of the United States Surgeon General to endorse physical exercise as a primary preventative measure through which these chronic diseases could be deterred (USDHHS, 1996). The purpose of this study was to increase the frequency of volitional moderate and vigorous physical exercise among high school students. An educational treatment derived from the Social Cognitive Theory served as the mechanism by which the frequency of physical exercise participation was improved. Theoretical constructs targeted by the educational treatment included self-control, social situation, outcome expectation, and strength of self-efficacy. Implementation evaluation was used in order to determine the degree to which the educational treatment was delivered to, and received by students. Treatment construct validity evaluation was incorporated in order to examine the impact upon the targeted theoretical constructs. Behavioral evaluation enabled the determination of the impact of the educational treatment upon the frequency of volitional moderate and vigorous physical exercise.
Statement of the Health Related Behavioral Problem

According to results from a review of the Healthy People 2000 initiative twenty-three percent of American adults indicate that they engage in thirty minutes of any type or intensity of physical activity five times each week (NCHS, 1999). This figure drops when American adults are questioned on their participation in vigorous physical exercise. Results indicate that only sixteen percent of American adults participate in vigorous physical exercise three times each week (NCHS, 1999). Results from this survey demonstrate that far fewer adults participate in regular physical exercise than is desirable according to the expectations laid out by the United States Department of Health and Human Services (2000). In this report it is hoped that by the year 2010 the percentage of Americans who participate in moderate physical exercise on at least five days each week will be 30%. By this same year it is desired to have thirty percent of adults participating in vigorous physical exercise on at least three days each week (USDHHS, 2000). Clearly much work remains in order to achieve these goals pertaining to physical exercise participation.

This author believes that the largely sedentary lifestyles to which many adults have become accustomed can be traced directly to bad habits formed during youth. Data from the National Youth Risk Behavior Survey (CDC, 1998) demonstrate a downward trend in vigorous physical exercise as the student progresses through the high school years. Ninth graders engaging in vigorous exercise at least three days in a week was found to be 72.7%, tenth grade students 65.9%, eleventh grade 60%, and twelfth grade 57.5%.
These studies indicate that the American population fails to participate in adequate physical exercise. Furthermore there is evidence that indicates that the trend away from physical exercise participation begins during the period of adolescence.

**Behavioral Link: Physical Fitness, Heart Disease, Cancer, and Mortality**

The risk of premature death from all causes for a sample drawn from the general population drops as fitness improves (Blair, et al., 1989). This result holds separately for both men and women after controlling for age, smoking, blood cholesterol, systolic blood pressure, fasting blood glucose, and parental history of coronary heart disease. Using the same analysis, mortality rates from cardiovascular heart disease and combined site cancer was reduced as fitness levels increase (Blair et al., 1989). It was concluded that all-cause mortality rates are strongly and independently linked to physical fitness levels. This relationship was thought to be due to reduced rates of cardiovascular disease and cancer (Blair et al., 1989).

Blair et al. (1996) provided evidence that pertain to the magnitude of the relationship between physical fitness and all-cause mortality. After controlling for smoking, abnormal electrocardiogram (ECG), chronic illness, elevated cholesterol and increased blood pressure, it was revealed that men with low fitness measures are 1.52 times as likely as men with high fitness levels to die prematurely. Women with poor cardiovascular fitness measures are 2.10 times more likely to die than are women with high fitness measures. Blair et al. (1996) concluded that sedentary persons should become more physically active.
Blair, et al., (1995), demonstrates that when men improve their cardiovascular fitness measure during a five year period their risk of death was less than that for men who do not improve. Men who were unfit at both pretest and posttest had the highest mortality rate, 122 / 10,000 person years. Men who had poor cardiovascular fitness at the pretest but had adequate cardiovascular fitness at the posttest had a mortality rate of 67.7 / 10,000 person years. Men who had adequate cardiovascular fitness at both the pretest and posttest had the lowest mortality rate at 39.6 / 10,000 person years. It was concluded that physicians should encourage men who have low cardiovascular fitness to begin a physical activity program (Blair et al., 1995).

Behavioral Link: Physical Activity and Premature Mortality

Paffenbarger and Hennekens (1997) published a review of major epidemiological studies conducted around the world on the link between moderately intense physical exercise, physical fitness and all-cause mortality. It was concluded that moderately intense physical exercise provides protection from premature mortality and extends longevity (Paffenbarger & Hennekens, 1997). These authors recommended that public health officials around the world promote both moderate and vigorous forms of physical exercise.

Statement of the Health Problem

Strong causal relationships have been documented between inadequate physical exercise and mortality and morbidity from chronic diseases of the heart (Blair, et al., 1989). Societal costs of inadequate physical exercise are reflected in outcomes that are associated with heart disease. In 1996, an estimated 733,834 Americans died from heart related diseases, creating an age adjusted death rate of 135 for every 100,000 persons (Ventura, et al., 1997). Heading the 1996 list of causes of death within the American population was heart related diseases (USDHHS, 1999). These diseases impose a substantial negative economic impact costing an estimated $286.5 billion (USDHHS, 1999).

Summary of Physical Exercise Epidemiological Evidence

Prevalence of sedentary lifestyle and the link between sedentary lifestyle and mortality provide empirical support for public health programs. Public health programs should target the promotion of regular moderate and vigorous physical exercise. An especially important time for such intervention is during the high school years, a time in which participation in physical exercise becomes increasingly less common (Chapter one, page 2).

A most useful setting for adolescent physical exercise promotion is within the physical education curriculum. School physical education programs provide existing resources and educational time within which new methods of exercise promotion can be incorporated. The Centers for Disease Control (1998) documents a trend away from multi-level physical education participation. This diminished yet compulsory curriculum
provides access to most high school students. Exposure to the physical education curriculum will increase the likelihood that each cohort of students entering adulthood will have already developed the physical, psychological, and social skills associated with regular exercise.

**Purpose of this Study**

This investigation was designed to increase the frequency of volitional moderate and vigorous physical exercise among adolescent school students attending introductory physical education classes. Increased frequency of volitional physical exercise was accomplished using an educational treatment. The educational treatment was based upon the Social Cognitive Theory. Implementation evaluation was conducted in order to determine the degree to which the designed educational treatment was delivered. Treatment construct validity evaluation was conducted in order to determine the degree to which the targeted Social Cognitive Theory constructs were influenced. Behavioral evaluation was conducted in order to examine the changes in the frequency of volitional moderate and vigorous physical exercise after the implementation of the educational treatment.

Subjects were drawn from pre-existing introductory physical education classrooms. Students in the experimental and comparison groups were exposed to a ten-week curriculum in which sport skills were taught and daily exercise was accomplished through sporting activities. Experimental students were exposed to an additional curricular component developed from Social Cognitive Theory constructs that include self-control, self-efficacy and outcome expectations. Lessons within this experimental
educational treatment were delivered in mini-lesson format. One mini-lesson was delivered each week for ten weeks. Each mini-lesson lasted for approximately fifteen minutes and consisted of lecture and paper-pencil worksheets. Homework was assigned on several occasions.

In this work it is postulated that students within the experimental group would score higher at posttest on the Social Cognitive Theory constructs targeted by the educational treatment. It is also postulated that students within the experimental condition would report at posttest a greater frequency of volitional moderate and vigorous physical exercise.

**Summary of Determinants of Physical Exercise: Children & Adolescents**

Educational interventions are most effective at enabling students to increase the frequency of their physical exercise participation when teachers are able to identify useful educational targets. Review of the descriptive literature pertaining to child and adolescent exercise promotion provides such useful educational targets. In this section is a brief review of the child and adolescent exercise determinant literature. A more nearly complete review of this literature will be presented in chapter two.

Examination of child and adolescent exercise determinant literature indicates that the behavioral theory most often utilized has been the Social Cognitive Theory. Individual constructs yielding significant associations with exercise include environmental factors such as home exercise equipment, sporting supplies, and safe exercise locations (Butcher, 1985; Stuck-Ropp & DiLorenzo, 1993; Garcia, et al., 1995; Craig, et al., 1996; Sallis, et al., 2000). Social situational factors were also associated
with child and adolescent physical exercise. These social situational factors include parental exercise and encouragement, social support of friends, and a strong belief that exercise is an expected normal behavior (Pate, et al., 1990; Moore, et al., 1991; Stuchy-Ropp & DiLorenzo, 1993; Zakarian, et al., 1994; Garcia, et al., 1995; Biddle & Goudas, 1996; Sallis, et al., 2000; Raudsepp & Viira, 2000). Personal characteristics have been identified as intra-individual factors that enable children and adolescents to engage in physical exercise. One such personal characteristic is strength of self-efficacy. Strength of self-efficacy is the belief that one can overcome common barriers and engage in regular physical exercise. Within the descriptive literature, strength of self-efficacy has been identified as a determinant of child and adolescent physical exercise (Butcher, 1985; Pate, et al., 1990; Reynolds, et al., 1990; Zakarian, et al., 1994; Garcia, et al., 1995; Biddle & Goudas, 1996; Craig, et al., 1996; Bungum, et al., 2000; Sallis, et al., 2000). An additional personal characteristic is one’s outcome expectation. Outcome expectation is the perception a person holds that engaging in physical exercise will result in some desirable end product. There is some evidence which provides support for outcome expectation for exercise (Stucky-Ropp & DiLorenzo, 1993; Garcia, et al., 1995; Craig, et al., 1996). Other authors have concluded that outcome expectation for physical exercise is not associated with child or adolescent physical exercise patterns (Butcher, 1985; Saunders, et al., 1997).
Summary of Current Efforts to Promote Exercise: Child and Adolescents

This paper reports the experimental efforts to increase physical exercise participation among children and adolescents. The educational methods used in the educational treatment are briefly reviewed in this section. Educational targets and their underlying theoretical constructs are reviewed. Magnitude of exercise behavior change is also summarized in this section. Each of the educational treatments reviewed here utilized the Social Cognitive Theory.

Know Your Body is a curriculum that is conducted during the elementary grades and extends throughout the school year (Marcus, et al., 1987; Bush, et al., 1989; Walter, 1989; Resnicow, et al., 1992). Know Your Body addresses the health related behaviors of smoking, exercise, and diet and is typically implemented by teachers in the science areas rather than employed by teachers in the health or physical education disciplines. Psychosocial determinants addressed include expectations for healthful outcomes, goal setting and behavioral capability. No evidence was provided that would indicate that educational experiences are effective at altering the theoretical constructs. Primary outcome measures employed in the program evaluation included fitness and physiologic variables. While no fitness effects were observed, marginal positive program effects were observed for cholesterol and blood pressure measures.
The Child and Adolescent Trial for Cardiovascular Health (CATCH) curriculum targets the Social Cognitive Theory constructs of perceived positive social support, perceived negative social support for exercise, exercise self-efficacy, behavioral capability, outcome expectations, and self-monitoring (Parcel, et al., 1989; Edmundson, et al., 1996; Leupker, et al., 1996; Nader, et al., 1996; Webber, et al., 1996). CATCH lessons address the health-related behaviors of exercise, smoking and diet. Teachers of health education implement classroom experiences while physical educators conduct experiences that are designed to develop behavioral capacity. Experiences are provided to third grade students in fifteen lessons over five weeks. Fourth grade students are exposed to the curriculum for twenty-four lessons over twelve weeks. Fifth grade students experience sixteen lessons over eight weeks. Fifth grade lessons target only smoking behaviors. Primary outcome variables include educational, behavioral, and physiologic variables. Among third and fourth grade students the CATCH curricula demonstrated partial construct validity of the treatment. Third grade students exposed to the CATCH curricula demonstrated improvements in the theoretical constructs of positive social support and strength of self-efficacy. Fourth grade students exposed to the CATCH curricula demonstrated improvements in self-efficacy scores. Behavioral evaluations indicate that the CATCH curriculum has only a small effect upon self-reported exercise.
Fargo/Moorehead-250 was implemented among eighth grade students and was based upon the Social Cognitive Theory (Kelder, 1993). Educational targets addressed by this curriculum included social support, behavioral capability, reinforcements, goal setting, and self-monitoring. No educational assessment was conducted. Behavioral assessment demonstrated a significant gender effect such that females exposed to the curricula reported greater exercise participation than females in the comparison group. No physiologic evaluation was conducted.

The Heart Smart Cardiovascular School Health curriculum (Arbeit, et al., 1992) is a one year intervention in which the behaviors of healthful diet and cardiovascular fitness are targeted. During the course of the year-long program twelve didactic lessons within which students were presented with content pertaining to exercise physiology and guidelines for exercise. Students were also assisted in, and educated upon, methodologies and preventative measures designed to minimize the risk of injuries associated with exercise. The Social Cognitive Theory constructs that are targeted included behavioral capability, self-efficacy, and social situation. Additionally the self-regulation sub-function of self-monitoring was targeted. Subjects included fourth and fifth grade students. No educational assessment was conducted. Fitness measures indicated that experimental fifth grade boys achieved greater cardiovascular condition when compared with the comparison fifth grade boys. Experimental fifth grade boys at posttest bettered their counterparts on a timed run/walk test by 16.6%. Similar results were observed among experimental fifth grade girls. At posttest the experimental fifth grade girls bettered their counterparts on a timed run/walk test by 13.8%.
The Stanford Adolescent Heart Health Program (Killen, et al., 1989) is an intervention designed to address the healthful behaviors of diet, regular exercise, and smoking prevention. Subjects included tenth grade students. The Stanford Adolescent Heart Health Program was designed to address Social Cognitive variables that included outcome expectancies, self-efficacy and social situation. The goal setting sub-function of the self-regulation construct was also targeted. No educational assessment was conducted. Behavioral assessment was conducted using an instrument that indicated the exercise status of each student. Among experimental subjects classified as non-exercisers at pretest 30.2% began exercising by the posttest. Among comparison subjects classified as non-exercisers at pretest twenty percent initiated exercise by the posttest. The 10.2% difference between groups in exercise initiation was determined to be significant. At the two-month follow up resting heart rate (RHR) was measured. The experimental boys had significantly lower values of RHR indicating a significant improvement in the cardiovascular conditioning (Killen, et al., 1989).
Definition of Terms

**Physical Exercise:** Caspersen et al. (1985) defined physical exercise to be any physical activity that improves or maintains one’s level of physical fitness. To the degree that improvement of physical fitness requires relatively higher exercise intensity than simply maintaining physical fitness, the current study recognizes two types of physical exercise. These two types of physical exercise are differentiated by levels of intensity and are referred to as either moderate or vigorous. Physical exercise was measured using the daily reporting system, Previous Day Physical Activity Recall, which was previously developed and validated (Weston, et al., 1997).

**Physical Activity:** Physical activity is any bodily movement caused by skeletal muscle contraction requiring the expenditure of energy (Caspersen, et al., 1985). Physical activity encompasses many behaviors not targeted by this project. Physical activity can be unplanned actions that are tangentially associated with healthful outcomes. This project has as specific focus only those planned physical activities that result in the maintenance or improvement in physical fitness. The type of physical activities targeted by this study are referred to as physical exercise.
Volitional Physical Exercise: Volitional physical exercise is any physical movement that is engaged in during non-school hours which is not sanctioned by the school or other organized group. By "physical exercise" is meant activity chosen by the individual and participated in during the individual's discretionary time. The Previous Day Physical Activity Recall instrument was a self-reporting instrument designed to elicit responses on all student activities during a single day. The Previous Day Physical Activity Recall instrument was previously developed and validated (Weston, et al., 1997). Only physical activity numbers twenty-one through twenty-five and numbers twenty-seven through thirty-three and thirty-five as listed on the activity list page of this instrument qualified as volitional physical exercise.

Moderate Physical Exercise: Moderate physical exercise is any planned physical activity engaged in so as to maintain fitness yet does not result in rapid or labored breathing, heavy sweating or a pulse rate exceeding sixty-five percent of maximum heart rate. The physical activity must be sustained for a minimum of fifteen consecutive minutes. The Previous Day Physical Activity Recall (Weston, et al., 1997) was used to measure frequency of volitional moderate physical exercise.
**Vigorous Physical Exercise:** Vigorous physical exercise is any planned physical movement engaged in so as to improve physical fitness and which results in rapid or labored breathing, heavy sweating and pulse rate that exceeds sixty-five percent of maximum heart rate. Physical movement must be sustained for a minimum of fifteen consecutive minutes. The Previous Day Physical Activity Recall (Weston, et al., 1997) was used to measure frequency of volitional vigorous physical exercise.

**Sedentary:** Any student who reports zero bouts of physical exercise in a week is described as sedentary. This requires that the student report no bouts of moderate physical exercise and no bouts of vigorous physical exercise during the week. Bouts of physical exercise were determined using the Previous Day Physical Activity Recall instrument (Weston, et al., 1997).

**Social Cognitive Theory:** A psychological theory of human behavior that postulates that human behavior is actively shaped by personal, behavioral and environmental forces. These forces act in reciprocal and dynamic relationships (Perry, et al., 1990). The Social Cognitive Theory was operationalized using the constructs strength of self-efficacy, social situation, outcome expectation for physical exercise, and self-control.
**Outcome Expectation:** Outcome expectation is the probability perceived by a subject for some occurrence or aftermath that results from participation in physical exercise. A multidimensional instrument developed in the current work was be used to measure each of the seven instrumental purposes for physical exercise. Framework for this instrument was developed by Gerald Kenyon (1968), extended by Simon and Smoll (1974) and extended again by Schütz (1981). Each of the seven dimensions are measured using a six-point Likert type scale in which the numeric one represents “never happens”, and the numeric six represents “always happens”. Outcome expectation for physical exercise is determined by the linear combination of scores obtained upon the relatively independent dimensions of social growth, social continuation, thrills, relaxation, competition, beautiful movement and fitness. Higher values indicate greater subject outcome expectation for physical exercise.

**Strength of Self-efficacy:** Strength of self-efficacy is the degree of belief one holds in their ability to overcome common barriers to regular physical exercise. Strength of self-efficacy was measured using an instrument developed by Saunders (1997). This instrument prompts students to respond to four statements that reflect perceived ability to overcome common barriers to regular physical exercise. An assumption of the instrument is that increasing numeric values are indicative of higher magnitudes of strength of self-efficacy.
**Self-control:** Self-control is the activity one uses to direct or regulate one's own behavior. Self-control was measured using an instrument previously developed and validated by Petosa & Kirby (1993). This instrument prompts students to respond to multiple items that reflect regularity and intensity of goal setting, self-monitoring and reinforcing behaviors that are associated with regular physical exercise. Items are included that indicate the degree to which students seek and actively manipulate their social environment. Additional items are included that indicate the degree to which students identify potential barriers to physical exercise and plan methods by which these potential barriers can be overcome. Each item was responded to using a six point Likert type scale. Higher scores of self-control are indicative of increasing magnitudes of self-control.

**Social Situation:** Social situation is the perception one holds for the congruency between their social environment and regular physical exercise. Social situation was measured using an instrument that was previously developed and validated by Saunders (1997). This eight-item instrument utilizes a five point Likert type scale. Higher numeric values are indicative of increasing magnitudes of social situation.

**Adolescent:** Any individual enrolled in ninth through twelfth grade.

**Classroom:** Any room in a school in which classes are taught. Within this study, a classroom was any intact group of ninth through twelfth grade students participating in school physical education.
Study Hypotheses

\( H_0: \) Group membership does not account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

\( H_A: \) Group membership does account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

\( H_0: \) Group membership does not account for significant variance in posttest measures of outcome expectation for physical exercise after variance that is shared with the pretest is controlled.

\( H_A: \) Group membership does account for significant variance in posttest measures of outcome expectation for physical exercise after variance that is shared with the pretest is controlled.

\( H_0: \) Group membership does not account for significant variance in posttest measures of social situation after variance that is shared with the pretest is controlled.

\( H_A: \) Group membership does account for significant variance in posttest measures of social situation after variance that is shared with the pretest is controlled.

\( H_0: \) Group membership does not account for significant variance in posttest measures of strength of self-efficacy after variance that is shared with the pretest is controlled.

\( H_A: \) Group membership does account for significant variance in posttest measures of strength of self-efficacy after variance that is shared with the pretest is controlled.

\( H_0: \) Experimental group posttest frequency of volitional moderate physical exercise is equal to the pretest value.

\( H_A: \) Experimental group posttest frequency of volitional moderate physical exercise is different than the pretest value.

\( H_0: \) Comparison group posttest frequency of volitional moderate physical exercise is equal to the pretest value.

\( H_A: \) Comparison group posttest frequency of volitional moderate physical exercise is different than the pretest value.
$H_0$: Experimental group posttest frequency of volitional vigorous physical exercise is equal to the pretest value.

$H_A$: Experimental group posttest frequency of volitional vigorous physical exercise is different than the pretest value.

$H_0$: Comparison group posttest frequency of volitional vigorous physical exercise is equal to the pretest value.

$H_A$: Comparison group posttest frequency of volitional vigorous physical exercise is different than the pretest value.

$H_0$: The proportion of students identified as sedentary at posttest is expected to be equal between groups.

$H_A$: The proportion of students identified as sedentary at posttest is expected to be lower among experimental group subjects than comparison group subjects.
The purpose of this study was to test the ability of a Social Cognitive Theory-based educational treatment to increase the frequency of volitional moderate and vigorous physical exercise among adolescent school students. Educational methods were used within physical education classrooms. Experimental and comparison groups were presented with ten weeks of a traditional physical education curriculum that convened for approximately 225 minutes each week. This traditional physical education curriculum focused on the development of sport motor skills and compulsory exercise within an atmosphere of athletic competition. During this traditional curriculum students were exposed each week to a new sporting event, rules of the sport were presented, specific sport skills were practiced and extended periods were devoted to sport participation. In addition to the traditional curriculum of physical education experimental students were presented with a fifteen-minute mini-lesson each week. Each mini-lesson targeted a specific theoretical construct that was derived from the Social Cognitive Theory. Specific theoretical constructs included strength of self-efficacy, social situation, self-control and outcome expectation. Each mini-lesson utilized the lecture format with paper and pencil worksheets. Often these mini-lessons had a homework assignment. Experimental students were also given an opportunity to participate in four weeks of an exercise incentive program. This exercise incentive program was designed to provide students an opportunity to develop a personalized exercise program within which skills discussed during the mini-lessons could be put to practice. Students participating in and successfully completing each of the four episodes of the exercise incentive program were provided with a small reinforcement, the cost of which was between five and ten dollars.
It was postulated that students exposed to both the traditional physical education curriculum and this experimental educational treatment would report at posttest higher scores on the targeted theoretical constructs. It was also postulated that students who were exposed to both the traditional physical education curriculum and this additional educational treatment would report at posttest more frequent participation in volitional moderate and vigorous physical exercise.
CHAPTER 2
REVIEW OF LITERATURE

This chapter provides an extensive review of the professional literature pertaining to exercise promotion within the adolescent school population. The first section of this chapter reviews descriptive studies. This first section identifies specific educational targets that predict physical exercise. These predictor variables provide information which the experimental educational treatment was based. Experimental studies reviewed for this work focused on educational treatments designed to increase adolescent exercise participation. Review of experimental exercise promotion studies provides a description of current practices that guided the development and evaluation procedures incorporated in this study. Following this review of the experimental literature a presentation of the methods by which Social Cognitive Theory constructs and physical exercise are currently measured is presented. This chapter concludes with an overview of the Social Cognitive Theory in order to clarify the theoretical foundations of this study.
Purpose of the Study

The purpose of this study was to increase the frequency of volitional moderate and vigorous physical exercise among high school students attending introductory high school physical education classes. Educational methods were used to establish the desired increase in frequency of volitional physical exercise. The educational treatment used here is derived from the Social Cognitive Theory. Constructs within the Social Cognitive Theory that were targeted by educational methods included self-control, social situation, outcome expectation, and strength of self-efficacy. Implementation evaluation was conducted in order to determine the degree to which the educational treatment was delivered to students and received by students. Construct validity of the treatment evaluation was conducted in order to examine the degree to which the theoretical constructs changed after the educational treatment was implemented. Behavioral evaluation examined the degree to which the frequency of volitional moderate and vigorous physical exercise changed following the implementation of the educational treatment.
Introduction to the Review of Exercise Determinants: Children and Adolescents

Within this section an extensive review of the determinants of physical exercise among children and adolescents is presented. Only those studies that were determined to be most applicable to the specific purpose of this document were reviewed here. The following articles should be considered as the most direct line of empirical evidence to date that pertains to the adoption of physical exercise among children and or adolescent persons. Specific inclusion criteria for this section required each study to have as primary purpose the explanation or prediction of physical exercise within a child or adolescent population. Only those articles that were located within a peer reviewed professional journal were considered. Only articles published within the previous eighteen years were included in this review.

Many articles selected for review were identified using computerized searches of databases, medline and psychliterature. Others were identified during hand searches of the most influential exercise promotion journals, *Medicine and Science in Sports and Exercise, Health Education Quarterly, Preventive Medicine, Journal School Health, Health Education,* and *Health Values.* Finally colleagues within the exercise promotion field were consulted in order to identify additional articles.

After considering the review of this literature there were some conclusions that were apparent. Very often support from family or friends for physical exercise was found to be a correlate of child/adolescent physical exercise. Authors have operationalized this construct differently, yet each time family and friend support was found to be a significant determinant. Similarly the physical environment was consistently determined to be a significant predictor. Subjects who perceive their
environment to be dangerous or have little access to exercise equipment were less likely to exercise than those with safer locations and more equipment. Subjects with a stronger belief in their capacity to overcome barriers to exercise were more likely to engage in physical exercise. Older subjects tended to exercise less often than young subjects, and male subjects exercise more often than female subjects. Inconclusive results were noted as to the similarity in physical exercise correlates for females and males. This literature survey makes it clear that relatively little work has been conducted in order to discover potential differences in exercise determinants between children and adolescents. Most of the correlates between physical exercise and the psychosocial constructs were determined within studies involving children. Relatively few studies have been conducted within the adolescent population.
Pate et al. (1990) conducted an investigation in order to determine which variables among a list of potential environmental, sociological, personal factors are most influential at determining childhood exercise. Indication of exercise behavior was determined using the timed 1.6 km walk/run, and the sum of three subcutaneous skinfold measurements. Specific predictor variables included self-reported items completed by schoolteachers, parents, and children. Items completed by teachers included information pertaining to the school's physical education curriculum, and perception of child's physical activity level. Parents were requested to provide information regarding their child's participation in community physical activity programs, and television watching behavior. Parents were also asked to provide an amount of time in which they spend exercising with their child. Parents were also asked to provide an overall rating of their child's physical activity level. Parental participation in physical exercise was gathered.
Sample population included subjects in the National Children and Youth Fitness Study II. Subjects were 2352 third and fourth grade students, 1150 male, and 1202 female. Each of the predictor items was subjected to a factor analysis that revealed eight independent factors. These factors were then entered into a stepwise regression analysis for each dependent fitness variables. Results indicate that the predictor variable global measure of child activity level, mother’s exercise behavior, vigorous community activities, gender, and age predicted eighteen percent of child sum of three skinfold score. Using the same technique twenty-one percent of the 1.6 km walk/run measure was predicted from information on global rating of child activity level, vigorous community activities, private lessons and club membership, school physical education, gender, and age.

This study provides empirical evidence that constructs derived from the Social Cognitive Theory are potential targets for educational intervention. For instance, physical environment was reflected within the dimension of vigorous community activities and private lessons or club membership. Social situation was reflected within the dimension mother’s activity level. This article has provided evidence that an exercise promotion intervention would do well to address the physical environment or the perceptions of the physical environment, and incorporate parental involvement.
Reynolds et al. (1990) utilized a prospective correlation study design in order to document the predictive validity of several theoretical variables. Predictor variables included exercise self-efficacy from the Social Cognitive Theory, intention to exercise from the Theory of Planned Behavior, stress from the Stress Theory, and direct social influences taken from Social Cognitive Theory. Internal reliability of instruments were described as satisfactory, eight item self-efficacy .89, three item intention .68, two item social influence .55. Exercise behavior was measured using an instrument on which nineteen common exercises were listed. Students were asked to respond by indicating the frequency with which they engaged in each exercise during a typical week for at least twenty minutes. Adequate concurrent validity was provided for this exercise self-report instrument. Subjects within the study included 680 adolescent school students, males = 356, females = 324. Data were subjected to a hierarchical regression technique in order to determine the strength of relationship between the postulated psychological variables and exercise behavior.

Primary analysis was conducted at four months following initial pretest data collection. Subjects included 283 males, and 174 females. Using correlation analysis on the data collected for males and females, significant correlations were observed between exercise behavior and each of the following predictor variables, intentions .20 and .45, social influences .18 and .44, and self-efficacy .28 and .46. Using regression analysis after controlling for body mass index and baseline exercise none of the variables improved prediction of exercise in males. In females the variables of intention, direct social influence, and stress improved the exercise participation prediction.
Secondary analysis occurred at sixteen months following initial pretest data collection. Again using regression analysis the authors evaluated the importance of each psychosocial construct to exercise behavior (Reynolds, et al., 1990). Indication was provided that among males intention alone improves the exercise participation prediction. Among females the variable self-efficacy and intention improves the exercise participation prediction. The authors conclude that the study indicated that in order for males to begin an exercise program intent must be developed. Among females intent to exercise must be developed, stress managed, social influence incorporated, and self-efficacy heightened. These results clearly support the use of intention, self-efficacy, and social influences in the promotion of exercise.

Saunders et al. (1997) developed six psychosocial instruments that were based upon constructs within the Social Cognitive Theory. The authors utilized a correlation design in order to provide predictive validity and reliability measures for each of the six instruments. Predictor variables were scores derived from each of three dimensions of self-efficacy, social influences, and two dimensions of outcome expectations. Internal reliability for each measure of self-efficacy was reported to be satisfactory: support seeking .71, strength .71, and positive alternative .54. Internal reliability for the social influence scale was satisfactory .72. Both measures of outcome expectation had satisfactory coefficients of internal reliability: physical .58, and social .75.
Dependent variables were derived from the Previous Days Physical Activity Recall (PDPAR) and an exercise intention instrument, both of which are self-report instruments. Both instruments yield measures that have been demonstrated to be valid and reliability (Weston, et al., 1997). Subjects were 336 rural fifth grade students. Data were subjected to a correlation procedure in which each predictor variable was assessed for associations with each of the predicted variables. Results indicated that each predictor had significant associations with exercise intention. Correlation magnitudes ranged from .17 for social outcome expectation to .33 for social influences. Correlation between physical exercise and the predictor variables were significant only for strength of self-efficacy .20 and social influence .13.

The authors concluded that each of the six analyzed instruments provide valid and reliable measures of the psychosocial constructs for which they were developed (Saunders, et al., 1997). Additionally these instruments may also be utilized as a standard against which other instruments that measure the specific constructs could be evaluated (Saunders, et al., 1997). Empirical evidence was provided within this article for the inclusion of strength of self-efficacy and social influences into an educational intervention to promote exercise behavior among preadolescent children. While outcome expectation failed to maintain significant association with self-report measures of behavior, there was evidence that the construct functioned as postulated by the Social Cognitive Theory. The Social Cognitive Theory postulates that outcome expectations are used in order to develop behavioral intent.
Moore, et al., (1991) conducted an investigation in order to determine the degree to which parental physical activity participation influences child physical activity. These authors provided a basis for the study as a test of the Social Cognitive Theory construct, social situation. Ninety-nine mothers, ninety-two fathers, and one hundred children ranging in age from four to seven years were subjects. Study duration was one year. During the study each mother, child, and father's physical activity was measured using the Caltrac-accelerometer. Physical activity data was obtained after each subject had worn the accelerometer for at least ten hours each day for a series of days. Mothers wore the accelerometer for $8.3 \pm 2.1$ days, children $8.6 \pm 1.8$ days, fathers $7.7 \pm 2.3$ days.

Results indicated that children of active mothers, those, who had accelerometer measures above the median, were twice as likely to be active as children of inactive mothers. Children of active fathers were 3.5 times as likely to be active when compared to children of inactive fathers. Children from active families were 5.8 times as likely to be active when compared to children from inactive households.
Biddle and Goudas (1996) conducted an investigation of potential determinants of childhood and adolescent physical exercise. Subjects were 147 school students both male and female. Subjects ranged in ages from 13 to 14 years. These subjects completed five paper and pencil instruments. Adequate measures of reliability and validity were provided for each instrument. The five paper and pencil instruments reflected the variables goal orientation, perceived sport competence, perceived adult physical activity, adult encouragement, and exercise knowledge. Exercise behavior was measured using a modified Godin Shephard's Leisure-Time Exercise Questionnaire. This instrument provides opportunity for each student to self-report the number of vigorous exercise bouts occurring during a typical week.

Results indicated that vigorous exercise is significantly correlated with knowledge of exercise .25, perceived sport competence .30, adult encouragement .38. Non-significant correlations were observed for the variables perceived adult physical activity .04, and goal orientation .13. Structural equation modeling suggested that perceived adult encouragement had a direct and indirect influence upon the child's exercise behavior. The indirect influence of adult encouragement functions by mediating the perception of sport competence which in turn directly effects the child's physical exercise.

Biddle and Goudas (1996) conclude that adult encouragement is potentially an efficacious construct in promoting physical exercise among school aged students. Results are important to the Theory of Planned Behavior within which perceived ability is predicted to be mediated by social norms. Conclusions could also be interpreted from a Social Cognitive perspective. Any positive encouragement provided to a child or adolescent by a socially relevant adult should improve the child's social situation for
physical exercise. When social situation is high effort in the behavior becomes more desirable and a sense of self-efficacy should be heightened. To the degree self-efficacy is similar to perceived behavioral capability the results can be generalized with confidence.

Garcia, et al. (1995), conducted an investigation in order to determine the efficacy of the Health Promotion Model to explain frequency of adolescent exercise. Predictor variables were age, self-esteem, perceived health status, self-efficacy, perceived barriers/benefits, self-schema, previous exercise, exercise role models, social support, perceived norms, environmental support, and sedentary behavior. Each predictor variable was reported to have strong reliability measures. Specific area of interest was to determine differences between sexes on psychosocial determinants of exercise. Physical exercise was measured using the child/adolescent exercise log, a self-report instrument with reported validity and reliability. The exercise log was administered each day over seven consecutive days.

Results of multiple analysis of variance statistic indicated that females exercised less than males, had lower levels of self-esteem, poorer perceived health, lesser amounts of exercise history, and lower exercise self-schema. Older students were less likely to exercise than younger students. Multiple regression analysis indicated that exercise behavior was explained using environmental support, gender, and exercise barriers/benefits. Using path-analysis twenty-nine percent of the variance in exercise barriers/benefits was predicted using the variables age, perceived health, exercise self-efficacy, social support, and exercise norms. This indicated that these variables have an indirect influence upon exercise behavior. No prediction direct or indirect was accomplished using self-esteem, previous exercise, or exercise self-schema.
These authors conclude that exercise promotion programs targeting the environment, social situation, exercise self-efficacy, exercise barriers, and benefits are likely to provide a most optimal impact upon the adoption of exercise (Garcia, et al., 1995). Results from this article provide support for the use of constructs environment, social situation, and strength of self-efficacy.

Stucky-Ropp and DiLorenzo (1993) conducted a study in which psychosocial variables derived from the Social Cognitive Theory were used in order to explain childhood exercise behavior. The sample included 121 girls and 121 boys from grades five and six mean age 11.2 years. The mothers of each student were also included as subjects. Predictor variables include exercise self-efficacy (perceived competency), Direct parental modeling, friend and family support, enjoyment as an outcome, amount of home equipment available (environment), behavioral knowledge (behavioral capability), and sedentary activities. Measures for both mothers and children were obtained using paper and pencil questionnaires, and oral interview. Using these techniques three instruments were used the Physical Activity Interview, Children’s Physical Activity Questionnaire, and the Parental Physical Activity Questionnaire. No information was provided pertaining to the validity or reliability of the instruments. Predicted variable was total metabolic equivalent (MET) for vigorous exercise activities engaged in over a three-day period.

All measures were subjected to correlation analysis results of which were not reported. This unreported correlation analysis was used in order to determine the order in which each predictor variable was entered within a hierarchical regression procedure. Results indicated that for males thirteen percent of variance in exercise MET units are
explained. Of the thirteen percent of variance that was explained nine percent was attributed to the child’s exercise enjoyment, friend and family support explained two percent, mother’s barriers to exercise explained one percent, and mother’s report of family support explained one percent. Similar results were obtained for females. Among female subjects twelve percent of exercise MET units were explained. Of the twelve percent of variance explained, the child’s exercise enjoyment explained six percent, home exercise equipment explained two percent, mother’s report of family support explained two percent, mother’s report of exercise barriers explained one percent, and direct parental modeling explained one percent. The authors concluded that this study supported the role of specific Social Cognitive variables to influence exercise behavior. These educational targets include social situation, outcome expectations, environment, and strength of self-efficacy (Stucky-Ropp & DiLorenzo, 1993). Learning experiences that effect parental encouragement and support, involvement of friends, promotion of exercise as an enjoyable activity, knowledge of exercise equipment, and actions by which barriers to parental and child exercise can be overcome should be incorporated into exercise promotion interventions.
Craig et al. (1996) conducted a project in order to determine the ability of constructs derived from the Theory of Planned Behavior to explain exercise intent among children. An additional purpose of this study was to discover the determinants of perceived behavioral control. Sample population for this study included 310 fifth and eighth grade students. Students from grade five were 154, students from grade eight were 151. Male subjects comprised fifty-three percent of the sample. Predictor variables were subjective norms, attitude, and perceived behavioral control. No information was provided in reference to the validity of any measure obtained on these predictor variables. Each predictor variable was documented to possess adequate levels of two-week test-retest reliability. Exercise intent was measured using a one item semantic differential instrument in which no information was provided in regard to its validity. Stability measure for this instrument was determined by two-week test-retest. This analysis indicated that eighty percent of students responded to the item with no more than a one-unit differential. Results of correlation analysis indicate that all primary Planned Behavior variables were significantly associated with exercise intent the magnitude of correlation ranged from .24 to .45. Regression analysis of Planned Behavior variables onto exercise intent indicated that only attitude and perceived behavioral control captured significant amounts of the variance in the exercise intent.

The authors conclude that little is known about perceived behavioral control and therefore additional effort was expended in order to determine the determinants of perceived behavioral control. Postulated determinants of perceived behavioral control included perception of competence, availability of safe space for exercise, access to safe location for exercise, sufficient social encouragement, personal interest, expense of
exercise, availability of equipment, adequate amount of time, and potential for injury. No indication was provided that would support either the validity or reliability of these measures. Regression of variables onto perceived behavioral control was conducted. Results of this analysis indicate that determinants of perceived behavioral control include perception of competence, safe location for exercise, access to safe location, sufficient encouragement, and personal interest. This study indicates that an individual’s perceptions of environmental and social factors influence the belief that one can be successful in exercise. Also conclusions from this study demonstrate that having positive expectations for valued outcomes are factors that influence perceptions of successful exercise participation.
Butcher (1985) conducted a study in which the associates of exercise among adolescent girls were explored. In this study adolescent girls were surveyed each of five consecutive years. Data were initially collected during grade six and extended through grade ten. Quantity of exercise was measured using a self-report instrument in which the subject indicated the number of inter-school teams, intramural activities, community organized exercise, and average amount of time spent exercising each day. Predictor variables were measures of personal attributes, socializing agents, and socializing situations. Personal attributes included, self-esteem, body catharis, movement satisfaction, tomboyism, attitude toward seven domains of exercise, image of female athlete. Socializing agents were father, mother, significant others’ participation, significant others’ encouragement. Socializing situations were socioeconomic status, and sports equipment available. No indication was provided as to the validity or reliability of any of these measures.

Correlation analysis was demonstrated that as girls progress through adolescence exercise activity slightly declines until the ninth grade whereupon all measures of exercise declines rapidly. In addition consistent associations were identified between exercise activity and selected psychosocial predictors. These associations were between exercise activity and significant others’ participation and support (social situation), satisfaction with sport ability (exercise self-efficacy), sports equipment available (environment), preference for active over sedentary activities, independent self-description, father’s and mother’s socialization influence (social situation). While the makes no attempt to reflect these results onto any theory of human behavior, clearly these results bear upon the Social Cognitive Theory. Psychosocial variables demonstrated in
this study to have significant associations with exercise activity are consistent with other studies with similar purposes. The variables environment, social situation, and self-efficacy are found to be consistent and significant associates of exercise activities. Exercise attitudes, previously an inconsistent correlate, was not identified in this study to have a significant association with exercise. This indicates from a Social Cognitive perspective that expectation of outcomes perceived to be of value are heavily mediated by more immediate factors such as the environment, social acceptance and support, and perceptions of personal ability.

Zakarian et al. (1994) conducted a study to identify correlates of vigorous exercise among minority and low-socioeconomic-status adolescents. Subjects were 1,634 grade nine and eleven students attending school within San Diego County. Predicted variable, vigorous exercise performed outside of school physical education classes was measured using student responses to a single item. Evidence was presented which substantiated both construct validity and reliability for this exercise self-report instrument. Predictor variables under study were derived from the Social Cognitive theory. Social Cognitive Theory constructs targeted were social situation, environment, strength of self-efficacy, and outcome expectancy value. Social situation included measures of family support & modeling, friend support & modeling, teacher support & modeling, coach support & modeling. Environment included items pertaining to facilities available, and safety of environment. Strength of self-efficacy measured exercise barriers, and ability to overcome common barriers. Internal consistency for these core Social Cognitive Theory variables ranged from .50 to .86.
Correlation analysis was conducted for males and females independent of each other. Results from this analysis indicated that males had significant associations with the variables of strength of self-efficacy, friend support, and expectations for benefits. Female analysis indicated that significant associations were present for the variables of strength of self-efficacy, barriers to exercise, and family support. Expectations for benefits had a non-significant but potential association, p<.055. The authors conclude that both males and females within this sample had similar determinants of leisure time exercise (Zakarian, et al., 1994). Among the similar determinants are family and friend support, strength of self-efficacy, and expectations for benefits.

Conclusions: Physical Exercise Determinant Literature

Theoretical foundation for the reviewed articles was predominantly provided by value expectancy theories. Most common among these were the Theory of Planned Behavior, and Social Cognitive Theory. Social situational factors are consistently demonstrated to be significant determinants of child and adolescent exercise. Specifically, parental exercise, parental support and encouragement, social influence, and exercise norms. Parental exercise within this review was demonstrated to be a strong determinant of child exercise (Pate, et al., 1990; Stucky-Ropp & DiLorenzo, 1993; Moore, et al., 1991). In families with both parents identified as exercisers, children are 5.8 times as likely to exercise as a child raised by two sedentary parents. Children raised with only an exercising mother are twice as likely to exercise. And a child raised only with an exercising father was 3.5 times as likely to exercise (Moore, et al., 1991). The efficacy of parents to promote exercise by means of support and encouragement was
demonstrated (Biddle & Goudas, 1996; Garcia, et al., 1995; Zakarian, et al., 1994; Stucky-Ropp & DiLorenzo, 1993; Craig, et al., 1996; Butcher, 1985). The influence of friends was also demonstrated to be of value in promoting adolescent exercise activity (Saunders, et al., 1997; Zakarian, et al., 1994; Reynolds, et al., 1990). Finally an appreciation of exercise norms were associated with adolescent exercise, (Garcia, et al., 1995). It is clear that the beliefs and actions of other people are important determinants of adolescent physical exercise participation.

Differences between sexes on these social situational factors were unclear. While Moore et al. (1991) and Reynolds et al. (1990) found slight differences between males and females Garcia et al. (1995), Stucky-Ropp & DiLorenzo (1993), and Zakarian et al. (1994) concluded that male and female children adolescents have similar correlations between physical exercise and social situation.

As postulated by many theories of human behavior environmental elements are consistently demonstrated to be correlated with physical exercise. Environmental elements such as home exercise equipment, sport equipment, or safe location for exercise were identified environmental associates of exercise (Garcia, et al., 1995; Stucky-Ropp & DiLorenzo, 1993; Butcher, 1985; Craig, et al., 1996). In addition to a safe location for exercise, Craig et al. (1996) also concluded that safe transportation to and from the exercise location was important to exercise behavior. Availability of community exercise activities, special club memberships, and participation in private lessons can be of value while encouraging physical exercise participation (Pate, et al., 1995).
Review of the exercise determinant literature also provides the conclusion that a strong positive perception of one's ability to exercise and to overcome common barriers to exercise was a factor in exercise behavior (Pate, et al., 1995; Biddle & Goudas, 1996; Garcia, et al., 1995; Craig, et al., 1996; Butcher, 1985; Zakarian, et al., 1994; Reynolds, et al., 1990).

The value of the cognitive variable, outcome expectation, was difficult to determine. At times this construct was identified as a significant determinant to adolescent exercise activity, while in other articles this construct was only associated with exercise intent. Butcher (1985) and later Saunders et al. (1997) did not find evidence that supported the construct outcome expectation. In the articles written by Garcia et al. (1995), Stucky-Ropp & DiLorenzo (1993), and Craig et al. (1996) the construct was supported. Zakarian et al. (1994) explored the relationship between outcome expectation and physical exercise participation and determined the correlation to be non-significant but ambiguous, p<.055. The role of this construct has not been effectively clarified through empirical work. Theoretically any work founded upon an expectancy value theory can not deny the role of outcome expectation. This construct serves as primary motivational factor in the development of behavior.

Other conclusions from this descriptive literature reveal information that may be useful during later stages. According to work accomplished by Garcia et al. (1995) and Pate et al. (1990) males exercise more often than females. Garcia et al. (1995) further added that as children age they are less likely to exercise. Specifically according to Butcher (1985) females have only a slight decrease in exercise behavior until the ninth grade. Following this period exercise activities become much less frequent.
Weaknesses in this literature include those measures of psychosocial and behavior which have questionable levels of validity and reliability. Errors in measurement may contribute to errors in understanding in that poor measurement contributed substantial error which is unexplainable using the psychosocial variables. To date the connection between hypothesis testing, measurement, and evaluation remains largely disconnected from theory. Theory should be more prominent in the direction of future descriptive efforts. Many authors have also focused upon the childhood population. Children are limited in their discretion of exercise activity, parents and other adults are responsible for making available time for childhood exercise. When childhood exercise is possible it often takes the form of unplanned and undirected play. Contrary to childhood play, planned purposeful exercise is consistent with adult exercise. Future exercise descriptive studies should therefore focus upon a slightly older population of adolescents. The very low percentage of exercise behavior captured within these descriptive studies leaves one to conclude that currently childhood and adolescent exercise is poorly understood.

The body of literature reviewed within this section was impressive in its consistency, strength, and logic of identified adolescent physical exercise determinants. When this literature was summarized it was clear that consistently physical exercise is correlated with factors such as environment, social, and strength of self-efficacy. Results of the outcome expectation construct remains ambiguous within the empirical literature but is strongly supported by the most commonly used theory of human behavior within adolescent exercise promotion the Social Cognitive Theory.
Introduction: Current Efforts to Improve Exercise: Children & Adolescents

Within this section the experimental literature pertaining to exercise promotion among adolescent students is of primary concern. Specifically these experimental reports were reviewed for information pertaining to effective educational methods, magnitude of behavioral impact, and the magnitude of impact the educational treatments had on physiological health indicators. Potential articles were identified using searches of computer databases Medline and Psychliterature. Additional hand searches were conducted within prominent health education journals. Specific journals included Health Education Quarterly, Preventive Medicine, Medicine and Science in Sports and Exercise, Journal School Health, and Journal of Health Education. Following this hand search colleagues within health education and exercise promotion were consulted in order to identify any additional pertinent articles.

Each identified article was then subjected to an analysis of content in order to determine the degree of salience to the purpose of this project. Inclusion of each article was based upon several criteria. Each article had as its stated purpose, the promotion of exercise within a population of elementary, junior high, or high school aged children. Each sample must have contained children attending in-school classroom sessions. Research methods required a minimum design of quasi-experimentation with incorporated comparison group. Educational experiences were to be based in part upon the Social Cognitive Theory. Each article was to be published between the years 1987 and 2000.
Analysis of the articles selected for inclusion revealed that the National Institutes of Health funded five investigated curricula. Each of the curricula selected for inclusion addressed multiple health behaviors some of which were, diet, tobacco use prevention, stress management, in addition to exercise.

Each article was reviewed according to the curriculum that it evaluated. Using this technique an overall effectiveness of each curriculum can be determined based upon the differing methods and targets used by each author. Specific review strategy was to assess the content, duration, and frequency of learning experiences. Research design of each study was reported, instrumentation assessed and all salient results reviewed. Differences between author styles, and requirements of differing journals, resulted in the absence of some information specified as pertinent to this review.
Review of Curricula

Know Your Body Curriculum

Primary investigation into the Know Your Body curriculum was conducted by Marcus, who used a quasi-experimental research design (Marcus, et al., 1987). Eighteen schools from the Los Angeles area were assigned to four treatment conditions. Seven schools, students = 668, were assigned to the curriculum plus medical screening treatment. Three schools, students = 333, were assigned to a medical screening only condition. Five schools, students=253, were assigned to curriculum only condition. Three schools, students=234, were assigned to a no treatment condition. Study design was pretest posttest quasiexperimental comparison group design. The purpose of this study was to determine the degree to which improvements in health knowledge, and behavior could be achieved from each of these four conditions. Regular homeroom teachers for all schools except two implemented the curriculum. Within the two schools that did not use regular homeroom teachers to implement the curriculum a public health nurse taught the curriculum at the request of the school district. During this study the teachers taught nine of the ten Know Your Body curriculum modules. Didactic modules included lessons on self-esteem, clinical assessment, principles of prevention, health decisions, physical fitness, nutrition, substance use, circulation, and respiration. The module on dental health was excluded due to constraints on time. Each module required two lessons of 45 minutes to complete. During each week students were presented with two lessons.
Three self-report questionnaires were used to collect relevant educational data. Content of these questionnaires included, health knowledge thirty items, eight of which were devoted to cardiovascular health and fitness. Health attitudes/beliefs, twenty-nine items none of which addressed exercise. Self-reported health behavior one item that differentiated students not exercising from those exercising more often than three times each week. Only the health attitudes/beliefs instrument was reported to have construct validity by factor analysis, however there were no factors that addressed exercise, fitness, or cardiovascular health. Health knowledge instrument had face validity that was judged by pretest data obtained on sixty students no measure of reliability was presented. No validity or reliability data were presented for the self-report of health behavior instrument. Results from linear multiple regression statistical analysis indicates which regression coefficients, RC, were of significance. Using this technique Marcus concludes that the curriculum (RC=. 435) and curriculum plus medical screening (RC=. 39) groups scored significantly higher than comparison group on knowledge of cardiovascular health, p<. 001, and physical fitness, p<. 05, respectively. Students assigned to the curriculum plus medical screening group (RC=.139) reported significantly more aerobic exercise behavior at posttest than those within the no treatment group, p<.05. No other group was observed to have this differential in exercise behavior. Data was not provided for groups that would allow calculation of effect sizes.
Marcus (1987) concluded that this assessment provides evidence upon which educational policy regarding health education can be based. Primary finding was that behavior can be changed when parents and community members become involved in the behavior change strategies. Further discussion pertains to the differences between quasi-experimental studies and true experimental methods.

Bush et al. (1989) published an evaluation of the Know Your Body curriculum conducted within nine predominantly black elementary schools in Washington D.C. Study design was a longitudinal quasi-experimental pretest posttest comparison group. Students were initiated into the study during grade three and followed with posttest measures at the completion of grades four, five, and six. At baseline experimental group consisted of 729 students and comparison group had 334 students. Group membership was determined by convenience and was based on the school.

The regular classroom teacher within study elementary schools conducted implementation of the Know Your Body curriculum. During middle school a health education or science teacher implemented the curriculum. Each class module was implemented during two, weekly class periods which lasted 45 minutes. Learning experiences included value clarification, goal setting, modeling, rehearsal, feedback of screening results, and reinforcement. Parents were included into the curriculum through the use of two newsletters that were sent to the home.
Assessment of curricular effect required that students complete three instruments, health knowledge, health attitudes/beliefs, and self-report of health behavior. In addition students had a wide range of physiological measures taken during the medical screening. No information was provided which would indicate that any of these measures had validity or reliability. Regression analysis was conducted upon the dependent variables of total serum cholesterol, total serum HDL cholesterol, systolic and diastolic blood pressure, exercise recovery, and ponderosity. Results of this analysis indicate that following grade four experimental students exhibited significantly lower diastolic blood pressures, difference of -2.8 mmHg, effect size of -.35. Following grade five experimental students exhibited significantly lower systolic and diastolic blood pressures, differences -3.5 and -3.7, effect sizes -.37, and -.40 respectively. At the conclusion of grade six students in the experimental group had significantly lower systolic and diastolic blood pressures with difference scores of -3.4 and - 3.9, effect size calculated -.30, and -.51 respectively. Differences between these groups did not hold for other measures, ponderosity (Kg / meters^2), triceps skin fold (mm), or exercise recovery index (sum of pulse at 1, 2, and 3 minutes post exercise).

Bush concludes that the curriculum was not implemented as intended across teachers or schools and the lack of research design to account for these variations makes it impossible to determine the exact effect of the intervention. Administrators who did not hold teachers accountable for teaching the curriculum correctly compounded this difficulty. Primary reason provided for this was that the curriculum was too long and took too much time away from other subjects. Even with the implementation difficulties, Bush does report favorable effects and was encouraged that the curriculum remains a
viable method that may alter physiological risk factors. The absence however of a behavioral assessment makes it impossible to determine which behavior or behaviors were responsible for the observed physiological alteration. Indeed the alteration in blood pressures without concomitant changes in other fitness measures indicate that exercise behavior was unaffected by the intervention. In regard to exercise promotion, questions remain as to the degree to which the intervention was effective.

Questions also remain regarding the degree to which the Social Cognitive Theory was incorporated, and influential at altering the observed physiological variables. Minimal description of the actual implemented learning experiences and absence of educational assessment makes it impossible to determine the degree or quality of Social Cognitive use. Further from a review of the original conceptualization of the Know Your Body curriculum it was clear that this is a curriculum focusing largely upon content knowledge development rather than upon development of Social Cognitive Theory constructs.
H.J. Walter authored an evaluation of the Know Your Body curriculum among lower socioeconomic, and middle to upper socioeconomic status students (Walter, 1989). Within each trial a longitudinal, quasi-experimental, pretest posttest, comparison group design was utilized. Schools from the New York City served as study population and were assigned to a level of the treatment by convenience. Students within the experimental groups were exposed to the “Know Your Body” curriculum throughout grades four, five, six, seven and eight.

The implementation of the Know Your Body curriculum consisted of three components, teacher lead classroom lessons, parent education, and medical examination of student risk factors for cardiovascular disease. Classroom component was implemented twice each week; each lesson had a duration of 45 minutes. Behavioral targets of the curriculum included promotion of healthful diet, regular aerobic exercise, and cigarette smoking prevention. Learning strategies included role modeling, skill development, behavioral rehearsal, monitoring, contracting, reinforcement, and cues to action. No additional information was provided by Walter that would permit any further indication of learning experiences. Parental component of the curriculum incorporated the support of parents for their child’s behavior modification by conducting a self-assessment of behavioral risk factors. In addition parents were mailed two newsletters that indicated the learning activities within the curricular component. Parents were also encouraged to come to seminars conducted by the Know Your Body staff. Within the third and last component of the curriculum each child was evaluated by a health care practitioner in order to determine the quantity and magnitude of cardiovascular disease risk factors.
As with the Bush study, dependent variables included systolic, diastolic blood pressures, total plasma cholesterol, HDL plasma cholesterol, exercise recovery index, and ponderosity index. In addition to these physiological variables a measure was also obtained for cardiovascular risk reduction knowledge, health attitudes, and self-reports of physical exercise. No information was provided that would indicate the level or kind of validity attained by any of these measures. Reliability measures were reported only for the self-report of exercise instrument. Each dependent measure was obtained at grade four pretest and grade eight posttest, each group’s pretest-posttest mean change score was determined and differences between experimental and comparison group were calculated. Confidence intervals, ninety-five percent, were calculated for this between group difference score in order to determine if observed changes could be attributed to the intervention.

Results of the lower socioeconomic status intervention indicate that the experimental group, n=14 schools, did not differ from the comparison group, n=8 schools, on any of the physiological dependent variables. A between group mean change score was however detected for the cardiovascular risk factor content examination. Effect sizes, which represent differences between groups on mean change scores, are presented below. Cardiovascular risk factor content examination, +.12 points. Systolic and diastolic blood pressure, -1 and +.4 mg/dl respectively. Exercise recovery, 0 bpm. Ponderosity, -.1 kg/m$^{2}$.
Walter’s assessment of the middle to upper socioeconomic status trial was conducted upon experimental group, n=8 schools, and comparison group, n=7 schools. Results of this trial indicated a significant between group change score only for the variables of total plasma cholesterol and cardiovascular risk factor content examination, effect sizes -1.7 mg/dl and +.14 points. No significant between group change scores were detected for the following dependent variables, systolic blood pressure, -.2 mmHg, diastolic blood pressure, 0 mmHg, plasma HDL cholesterol, +.1 mg / dl, exercise recovery index, +.7 bpm, ponderosity index, -.1 kg / m$^2$. Walter concludes that the curriculum was not implemented as intended due to resistance from teachers and school administrators. Again, as with Bush, no methods were utilized by which implementation errors could be controlled. Walter does discuss the potential of the Know Your Body curriculum and that even without rigorous control of implementation, has yielded some positive results. These positive indicators were for the variable knowledge of cardiovascular risk factors and total plasma cholesterol. Walter does discuss the difficulty in altering the theoretical variables, it was explained that without alteration of the theoretical variables there was no reason to believe that the curriculum was as powerful as it could be.

Walter’s presentation however could be viewed as providing further evidence that the, Know Your Body curriculum, was limited at influencing physiological variables associated with cardiovascular disease. When a physiological variable was altered, it was impossible to disentangle which factor was responsible for the improvement. Without a behavioral assessment it could easily be claimed that the reduction in risk was not due to increases in exercise activity but rather from smoking prevention.
Recognizing the weakness in evaluating the "Know Your Body" curriculum in which teacher implementation has been reported as problematic, Resnicow et al. (1992) incorporated a new assessment methodology. Within this evaluation Resnicow et al. (1992) hypothesized that curriculum effects were dependent upon the fidelity with which teachers implemented the curriculum. Elucidation of this hypothesis required that student exposure to the curriculum be identified as "high", "medium", "low", or comparison, during the longitudinal assessment of a three-year treatment period.

Resnicow et al. (1992) discussed characteristic of the administered curriculum in passing. This description indicates that students were presented with the curriculum throughout grades two, three, and four. Pretest measures obtained during grade one and posttest measures obtained following grade four. The intervention was conducted within two locations, the classroom, and throughout the school. Within classroom component was based upon the Social Cognitive Theory although no information was provided that would indicate what specific learning experiences were used or which theoretical constructs targeted. Teachers were asked to utilize the curriculum at least once each week for thirty to forty minutes throughout the entire school year. Portions of the intervention that targeted the entire school included, alterations in the food selection provided by the school cafeteria, food tasting parties, drug and nutrition poster contest, student aerobics, and special health lectures.
The project coordinator at the conclusion of the study conducted assessment of teacher implementation. Teachers were rated by this person to be "low implementers", "medium implementers", or "high implementers". Validity of this categorization was documented using the Spearman rank correlation coefficient equaling a moderate .68. Students assigned to a teacher were categorized accordingly as receiving a low, medium, or high magnitude of the curriculum.

Dependent variables utilized within this study included, total plasma cholesterol, body mass index (kg / m²), systolic and diastolic blood pressures, and cardiovascular risk factor knowledge. Internal reliability for the content knowledge instrument for grades one and two was reported to be .54, grade three .73, and grade four .89. Stability of the content knowledge test was documented by one-week test-retest correlation, and was calculated to be .62, .73, .76 for each of the three sub-scales. A multivariate analysis of variance, MANOVA, procedure was used in order to drive comparison statistics. At posttest the high exposure group was determined to include ninety-eight students, moderate exposure group 184 students, low exposure group 557, comparison group 370 students. Results of the MANOVA procedure indicated that a dose response effect was present for the variables of total plasma cholesterol, and systolic blood pressure. Posttest measures on total plasma cholesterol for the high exposure group was 10.6 mg / dl less than that of the comparison group, and 7.6 mg / dl lower than measures for low and moderate exposure groups. Upon the measure of systolic blood pressure, low exposure group had measures 2.7 mmHg less than comparison group. Moderate exposure group 3.4 mmHg less than comparison group. No between group differences was found on body mass index. An unexpected negative effect of the curriculum upon cognitive
development was discovered at posttest. On the cardiovascular risk factor examination students within the high exposure group scored 47.5, moderate exposure group scored 48.8, and low exposure group scored 49.2, all of which were significantly lower than the 54.9 score attained by the comparison group.

Within the same paper, Resnicow et al. (1992) reported a second study conducted among students receiving about two and one half years of the "Know Your Body" curriculum. Research design for this study was a cross sectional posttest only quasi-experimental comparison group design. At posttest, students ranged in grade level from grade two through grade six. Dependent variables included self-efficacy to resist peer pressure ten items, health attitudes ten items, cardiovascular disease content knowledge. Internal consistency for self-efficacy and health attitudes was reported to be .70 and .71 respectively. Health impact dependent variables were each of the previously mentioned physiological measures. Resnicow et al. (1992) reports that for this posttest only study the comparison group was comprised of 915 students, low exposure group had 1,067 students, moderate exposure group had 585 students, and high exposure group had 478 students. Results of multiple analysis of variance procedure indicated that the high exposure group differed significantly, p<.05, from the comparison group on the variables of total plasma cholesterol (-4.8 mg / dl), systolic blood pressure (-4.1 mmHg), and cardiovascular disease content knowledge (+9.9 points). No differences were noted between high exposure group and comparison group for the variables of body mass index (-.3 kg / m**2), self-efficacy (+.2 points), health attitudes (-.2 points).
Resnicow et al. (1992) concludes that program effects appear to be dependent upon the fidelity with which the classroom teachers implement the curriculum. There was strong support for process evaluations to take place within all educational interventions. This process of documenting the fidelity with which teachers implement the curriculum would prevent errors of attribution in assigning causation to an educational intervention. In the current example it was clear that program impact was dependent upon the degree to which teachers implement the educational program. When this program was implemented to a high degree, positive alterations in total plasma cholesterol and systolic blood pressure are effected. If however all levels of teacher implementation are grouped within the same data pool, one may erroneously conclude that the program had no effect upon the dependent measures. Inconsistent influences upon the targeted educational construct of content knowledge likely are due to the poor psychometric characteristics of the measurement. This was especially true among first and second grade students. Failure to establish an effect upon the variables of self-efficacy, and health attitude serve to question the construct validity of the “Know Your Body” curriculum. This finding was consistent with the conclusions of other investigators who have evaluated the Know Your Body curriculum. Walter discussed the possibility that the educational experiences of the curriculum are too far removed from the targeted constructs, and as such the curriculum could be made stronger by closing such a gap. Conclusion on this point was that the “Know Your Body” curriculum,
regardless to the fidelity with which it was implemented, has questionable validity for the Social Cognitive Theory. Absence of behavioral evaluation makes it impossible to determine whether the physiological effects observed should be attributed to increases in exercise behavior or some other behavioral alteration.

**Child and Adolescent Trial for Cardiovascular Health**

Parcel et al., (1989) conducted an investigation of the Child and Adolescent Trial for Cardiovascular Health, C.A.T.C.H., curriculum. This health education curriculum was based upon the theoretical foundation of the Social Cognitive Theory, and implemented within school over three settings. Health education curricula consisted of six modules. Each module was to be presented over four continuous weeks. Within the health education classroom students were provided with information upon which content knowledge of cardiovascular health is based. Students were also presented with learning experiences that were intended to develop skills such as, behavior capabilities, self-efficacy, and expectations for positive outcomes. Specific learning experiences used within the health education classroom include role-modeling, self-monitoring, behavioral contracting, verbal praise, material rewards, cues and reinforcing messages. Physical activity experiences were separated into three two-week modules. These physical activity modules were to be implemented at three distinct times of the school year and synchronized with the physical education component. Two four-week healthy diet modules were developed and implemented during the fall and spring. Both the physical activity and healthful diet modules were developed to have one primary lesson, thirty minutes, at the beginning of the week. This primary lesson was then to be followed by
one of four, ten to fifteen minute reinforcing activities that were to be conducted each of  
the remaining days of the week. Within the physical education classroom students are  
presented with additional content pertaining to cardiovascular fitness, and regular  
vigorous exercise. The physical education component lasted throughout two semester  
units in which students were taught to engage in exercise for cardiorespiratory endurance,  
muscular strength, muscular endurance, flexibility, agility and balance. Each physical  
education class was structured so that there was a warm up, fitness development and cool  
down period. School Lunch programs are monitored to ensure that sodium content of  
food was no more than 600 mg, total fat accounted for no more than thirty percent of  
caloric content and saturated fat accounted for no more than ten percent of caloric  
content.

A quasi-experimental, pretest posttest, comparison group design was utilized.  
Third grade students, \( n=174 \), and fourth grade students, \( n=174 \), were exposed to the  
C.A.T.C.H. curriculum for one year. These experimental students were compared with  
other third grade students, \( n=130 \), and fourth grade students, \( n=157 \), who did not receive  
the curriculum. Variables of interest during this cross sectional study included the Social  
Cognitive Theory variables of behavioral capability and exercise self-efficacy.  
Behavioral capability, twelve items, was measured using a content knowledge  
examination, while exercise self-efficacy, five items, was measured using an affective  
self-report questionnaire. Both instruments have no information pertaining to their levels  
of validity. Internal reliability for each instrument was calculated, behavioral capability  
.66, and exercise self-efficacy .57. Multiple analysis of variance statistics were utilized  
in order to discover significant differences between groups. Results indicate that there
are no differences between groups on either behavioral capability, (Experimental = 9.49) (Comparison = 10.57), or exercise self-efficacy, (Experimental = 12.79) (Comparison = 12.21), variables at the conclusion of the third grade. An educational effect was determined for the fourth grade intervention that was mediated by the unit of analysis. Using the school as the unit of analysis results indicate that the experimental group scored significantly higher on behavioral capability, p<.05. Descriptive data was not provided. When the student was considered the unit of analysis an effect was noted for exercise self-efficacy, group mean score difference was .78, effect size was .32 (mean score experimental group subtracted from mean score comparison group divided by standard deviation of comparison group). In addition to the educational assessment, a longitudinal assessment was conducted to determine relative behavioral impact of the curriculum over the two-year exposure to the C.A.T.C.H. curriculum. Assessment of behavior was conducted using a one-day self-report instrument that was administered over five consecutive days. No information was provided by Parcel regarding this instrument’s validity. Reliability data for this exercise self-report instrument indicate that about eighty-six percent of the activities reported by children were observed by a teacher. The difficulty with this measure of reliability was that it only provides information of within school exercise behavior, therefore the reliability for out of school exercise was undetermined. Results of the behavioral assessment indicate non-significant, p>.05, differences between groups. The comparison demonstrating the largest difference in frequency of exercise bouts was the first posttest in which the intervention group
exercised 3.94 times each week, and comparison group exercised 3.43 times each week. Differences between groups equaled 0.51 days. Dividing the between group difference by the comparison group standard deviation, a standardized effect size was calculated to be .22.

Parcel et al. (1989) concludes that the lack of consistent program effects on cognitive and behavior outcomes can be attributed to high variability, and therefore inadequate sample size. However the authors are encouraged that Social Cognitive Theory constructs targeted within the intervention were influenced thereby providing evidence for the construct validity of the C.A.T.C.H. curriculum. As with the Know Your Body intervention, implementation between teachers and schools differed. Parcel discussed this problem as a potential mechanism by which treatment effects could be minimized.

Luepker et al. (1996) authored an assessment of the C.A.T.C.H curriculum. Study design was a longitudinal true experimental, pretest posttest comparison group. Evaluation design required that students assigned to the treatment be exposed to the curriculum during grades three, four, and five. At the completion of each grade level, students completed all psychosocial instruments. Following grade five all students had physiological variables reassessed. The Child and Adolescent Trial for Cardiovascular Health, or C.A.T.C.H. curriculum was implemented within three settings of the school. These settings included, school food service, physical education class, health education class. Alterations within school food services targeted the reduced use of salt, and fat within school lunches. Within physical education classes teachers were to increase the amount of moderate to vigorous physical activity engaged in by students. This required
that no less than forty percent of physical education time to be spent in some form of exercise. Health education classroom experiences included fifteen lessons over five weeks for third grade students. Grade four students were presented with twenty-four lessons over twelve weeks. Grade five students experienced sixteen lessons in eight weeks. Each of these lessons lasted for thirty to forty minutes and targeted specific psychosocial factors and skills that may lead to healthy diet and regular physical activity. The curriculum was also implemented using a family-based component that included, home curricula and family fun nights hosted at the school. The C.A.T.C.H. home curricula included nineteen activity packets that during the course of three years would be sent home with the students at times corresponding with classroom experiences. Adult involvement was required for these activities and small rewards were provided for those receiving adult participation. No further information on the content of the within classroom experiences or home curriculum was provided. In addition no specific information regarding the learning experiences incorporated within the curriculum was reported.

Theoretical constructs targeted within the curriculum included self-reports for, positive social support for physical activity (PSSA), negative social support for physical activity (NSSPA), and exercise self-efficacy (SE). Each of these instruments has been reported to have adequate levels of validity and reliability. Variables upon which physiologic impact evaluation was based included measures of, systolic and diastolic blood pressure, total and HDL serum cholesterol, triceps and subscapular skinfolds, resting heart rate and body mass index. Each physiologic measure was collected at baseline and after fifth grade follow-up. Exercise behavior was measured using self-
report information. Experimental group included 4019 students while comparison group included 1405 students. Analysis of effect utilized multiple analysis of covariance in which age, race, and sex, served as covariates.

Results of the educational assessment indicate that at the completion of the third grade, student in the experimental group differed significantly on measures of positive social support, (Experimental = 6.4) (Comparison = 5.6) p<.001, and exercise self-efficacy, (Experimental = 2.9) (Comparison = 2.5) p<.006. Mean score difference for positive social support was .8, effect size was 8.0. Mean score difference on exercise self-efficacy was .4, effect size 4.0. At the conclusion of the fourth grade only exercise self-efficacy was found to be significantly different between groups, (Experimental = 3.0) (Comparison = 2.7) p<.04. Mean score difference of .3, effect size 3.0. Assessment of exercise behavior indicated that the experimental group reported significantly more exercise than comparison group, p=.003. No information was provided that would allow calculation of difference score or standardized effect size, however the authors explain that exercise differences were modest. Evaluation of the physiologic variables after fifth grade follow-up indicated no differences between groups for any measure.

Luepker et al. (1996) conclude that an intervention targeting Social Cognitive variables, family involvement, and school environmental changes can be successful in altering exercise frequency. The value of such an increase in exercise frequency upon the prevalence of cardiovascular disease however remains unclear until long-term follow-up studies can be conducted. A factor that causes some concern was the very large sample utilized within this investigation. The size of the sample naturally created a rather minimal amount of variance. Minimal amount of variance often was an indicator that
statistical power was overwhelming. At times statistical power was so great that meaningless differences between groups becomes statistically significant. This would lead one who is unsuspecting to make an error in interpretation during the discussion of results. Therefore caution must be employed when concluding upon this investigation. Differences between groups in this study are in general small, and may prove to be clinically insignificant.

A collection of researchers conducted an intensive comprehensive evaluation of the C.A.T.C.H. curriculum (Edmundson, et al., 1996; Webber, et al., 1996; Nader, et al., 1996). Initial evaluation was authored by Edmundson et al. (1996) that targeted the evaluation of psychosocial variables. In this assessment, ninety-six elementary schools, twenty-four schools at each of the four geographical locations were identified as the sample. Random assignment was conducted such that for each field site ten schools were included in the comparison group while seven schools administered a school plus family curriculum and seven schools administered only school component. Third grade students enrolled in the ninety-six studied schools were followed through the fifth grade after exposure to the intervention between 1991 and 1994. Webber, et al. (1996) identified the Social Cognitive Theory as the intervention’s theoretical foundation. Specific theoretical constructs targeted within the intervention included, outcome expectancies, self-control, behavioral capability, self-efficacy, physical and social environment and situation. Alterations within the school environment were made in order to create an environment that was more supportive of healthy diet, and exercise. Within the classroom students
were presented with skill building strategies. Further, students were provided with behavioral modeling, practice and reinforcement, social support, goal setting, improvement in access to the resources needed for exercise and healthy diet.

A repeated measures MANOVA was utilized in order to determine differences between treatment groups on the variables of physical activity positive support, physical activity negative support and physical activity generality of self-efficacy following the first, second, fourth and sixth semesters. The Health Belief Questionnaire, which was comprised of multiple sub-scales, was reported to have both content and construct validity as well as acceptable internal consistency. Perceived support for physical activity, Chronbach alpha third = .68; fifth = .67. Negative support for physical activity, Chronbach alpha third = .60; fifth = .56. Generality of self-efficacy, Chronbach alpha third = .67; fifth = .69. Each of these psychosocial instruments had accepted levels of construct validity demonstrated by factor analysis.

Results indicate that the intervention group scored significantly higher on the variables of positive support for physical activity following the third grade, (Experimental = 6.4) (Comparison = 5.56), effect size = .18. No differences for fourth, or fifth grade, (Experimental = 5.76) (Comparison = 5.62), effect size = .03. Exercise self-efficacy significantly differed between groups, (Experimental = 2.97) (Comparison = 2.52), effect size = .19 for third grade students, but no differences were detected among fourth or fifth grade, (Experimental = 2.79) (Comparison = 2.86), effect size = -.03. Negative support for exercise did not differ between groups for third grade,
(Experimental = 4.34) (Comparison = 3.86), effect size = .15. Negative support for exercise did not differ between groups among fourth or fifth grade, (Experimental = 4.93) (Comparison = 4.66), effect size = .10.

Edmundson et al. (1996) concludes that the psychosocial effects of the curriculum were not maintained due to relatively few number of classroom experiences, and changes occurring as a result of maturation. Continued effort expended at improving social support for physical exercise was suggested to be beneficial to the CATCH curriculum. Measurement of the targeted psychosocial constructs was discussed as being in need of modification. However this article did provide evidence that the CATCH program has construct validity.

Webber et al. (1996) utilized the same sample described above. Webber et al. (1996) identified his investigation to be an evaluation of physiological effects of the C.A.T.C.H. curriculum. Third grade students, (n=5106), enrolled in the ninety-six study schools were followed through the fifth grade year after exposure to the intervention between 1991 and 1994. Multiple analysis of covariance procedures were utilized in order to detect differences between treatment groups on the variables of duration of exercise, systolic and diastolic blood pressure, heart rate, triceps and sub-scapular skinfold, body mass index, serum total cholesterol, and HDL-C. Upon follow-up assessment a group effect was observed among intervention students for the variable vigorous exercise behavior as measured by self-report. Students exposed to the curriculum exercised vigorously about twelve minutes each day longer than students not exposed to the curriculum. Webber however does not supply descriptive data from which actual exercise behavior can be determined.
Results of the increased exercise upon physiologic indicators of health however were minimal. Upon the variable of body mass index no positive effects were noted between groups, however African-American children exposed to the curriculum had significantly higher measures than other ethnic groups, difference of .47 kg/m^2, p<.02. Measures on triceps and sub-​scapular skin folds were significantly similar between experimental and comparison groups. No differences between experimental and comparison groups were observed for the variable of resting heart rate. No main effect was observed for systolic blood pressure, however a site by intervention group effect, p<.005, was observed for systolic blood pressure in which one site scored 1.5 mmHg higher than comparison group and two sites scored lower at 1.1 & .59 mmHg. As with systolic blood pressure, no main effect for diastolic blood pressure was noted, but a site by intervention group effect, p=.04, was observed for diastolic blood pressure in which two sites scored higher than comparison group, 1.2 & .6 mmHg. While two sites scored lower than comparison group, .2 mmHg. No observed differences were noted for either serum total cholesterol, or HDL-C.

Webber et al. (1996) concludes that increases in exercise behavior of twelve minutes may not be sufficient to generate alterations in presented physiologic variables. Other authors presented previously in this review provide an alternate explanation of non-​effect on physiologic variables. They suggest that alterations in exercise behavior may take an extended period of time before any alterations in physiologic measures can be detected (Resnicow, et al., 1989). Immediate and intermediate assessments of educational interventions to increase exercise behavior should focus upon the educational constructs addressed and exercise behavior.
Continuing with the sample utilized within the Edmundson, and Webber three year investigation of the Child and Adolescent Trial for Cardiovascular Health, C.A.T.C.H., was an investigation by Nader et al. (1996). Within this investigation the effect of the C.A.T.C.H. curriculum plus family intervention was evaluated using the student's perceived positive and negative social support and self-efficacy. Research hypothesis was that children with more involved parents would have greater improvements on the construct scores than children with less involved parents. Number of educational activities a parent completed with the child defined the intensity of parental involvement. Multiple regression statistic was used in order to determine the strength of relationship between dose of parental involvement and the resulting student posttest score.

Results indicate that as parental involvement increases the student's perception of positive social support increases, p=.013, as does student self-efficacy, p=.04. There was a significant, p=.022, first order interaction between parental involvement and minority student status in regard to the dependent variable of exercise self-efficacy.

Nader et al. (1996) concludes that the effectiveness of the C.A.T.C.H. curriculum was mediated by parental involvement. This empirically derived conclusion is consistent with expectations based within the Social Cognitive Theory. This theory suggests that through the engagement of social environment, the perception of it, social situation is effected. Social Cognitive Theory also postulates that self-efficacy can be altered through social persuasion and mastery experience, this article provides empirical evidence to support this hypothesis.
Heart Health Curriculum

Arbeit et al. (1992) authored an evaluation of a one year educational intervention targeting the behaviors of diet, and cardiovascular fitness. Four elementary schools in Louisiana comprising fifty-eight percent white, thirty-two percent black, and ten percent other racial background students. Two schools were selected to participate in the comparison group. Comparison group schools included 424 students. Experimental schools included 446 students. The part of the curriculum that targeted physical exercise and fitness is addressed here. Educational experiences were applied for one year to fourth and fifth grade students. Included in this intervention were a cardiovascular risk screening, and twelve didactic lessons. The didactic lessons presented within physical education class taught students about physiology of exercise, recommended guidelines for exercise, prevention of injuries, and monitoring exercise behavior. Students also participated in a number of physical exercise activities such as jogging, power walking, and jump roping. Targeted Social Cognitive constructs included behavioral capability, self-efficacy, and social situation. Multiple analysis of variance statistics was used to analyze differences between boys and girls in fourth and fifth grade.
Results indicate that no substantial differences between groups were observed for content knowledge. Cardiorespiratory endurance, measured by timed run/walk, forty-two experimental girls in the fourth grade had less significant increases in time, five percent, then the comparison girls twelve percent, difference of seven percent, $p<.05$. Thirty-three Fifth grade boys in the experimental group decreased run/walk time by eleven percent, while comparison boys increased time by six percent, difference of seventeen percent, $p<.01$. Thirty-six experimental girls in the fifth grade decreased their times by three percent, while the thirty-four comparison girls group increased their times by eleven percent, difference of fourteen percent, $p<.01$.

Arbeit et al. (1992) concluded that the curriculum has impact upon cardiorespiratory endurance, and all variables to which cardiorespiratory bears. These differences cannot be attributed to the acquisition of knowledge since both groups were reported to have similar values. Potential mediators of these alterations are the constructs of self-efficacy, and social situation, both of which are Social Cognitive variables associated with exercise behavior change. No attempt however was made to evaluate these potential mediators for curricular effects. Without information pertaining to the effect upon self-efficacy and social situation, all knowledge as to the efficacy of the Social Cognitive Theory to promote exercise behavior remains tentative. It behooves health educators to incorporate process evaluations into existing curricular assessments.
Killen et al. (1989) presented an evaluation of a curriculum known as the Stanford Heart Health Program for tenth grade school children. This curriculum was incorporated within the tenth grade population. Research design was quasi-experimental, pretest posttest comparison group. Students from two high schools were enrolled in the experimental group (n=622), and students from two high schools were enrolled in the comparison group (n=508). Targeted health behaviors included promotion of healthy diet, regular exercise, as well as the prevention of smoking. Educational targets included outcome expectancies developed through peer modeling promoted using video tape. Goal setting developed through practice and guidance. Self-efficacy developed through mastery experiences. Social situation and observational learning by role-play experiences. Dependent variables were percent of students classified as non-exercisers, body mass index, triceps skin fold, sub-scapular skin fold, resting heart rate, systolic and diastolic blood pressure. Killen et al. (1989) provided no information that would indicate the validity or reliability of these measures. Classification as an exerciser required that the student report engaging in at least one exercise three times each week in which duration was reported to be at least twenty continuous minutes, and intensity sufficient to alter cardiorespiratory fitness.

Chi-Square statistic was conducted upon exercise behavior, while repeated analysis of variance procedure was conducted upon the physiological variables. Results indicate that thirty percent of treatment group non-exercisers initiated exercise by two month follow-up, while twenty percent of comparison group non-exercisers initiated exercise during the same treatment time, treatment effect ten percent, ($X^2$, p<.0003). At
two month follow up, boys and girls exposed to the intervention had a higher BMI, (Experimental male = 21.7) (Comparison male = 21.3); (Experimental female = 21.9) (Comparison female = 21.4), effect size of .15 and .16 respectively. On the variable of resting heart rate, boys exposed to the intervention had lower measures, (Experimental male = 72.9) (Comparison male = 76.3); (Experimental female = 78.6) (Comparison female = 78.6), effect size of -.29 and 0.00 respectively. No differences were observed between experimental and comparison group boys or girls on the variable triceps skinfold, (Experimental male = 11.2) (Comparison male = 10.6); (Experimental female = 20.0) (Comparison female=20.3), effect size of .13 and .05 respectively. No differences were observed between experimental and comparison group boys or girls upon the measure of sub-scapular skinfold, (Experimental male = 9.6) (Comparison male = 9.1); (Experimental female = 13.4) (Comparison female = 13.0), effect size .15 and .09 respectively. No differences between experimental and comparison boys or girls were observed for systolic blood pressure, (Exp. male = 123.0) (Comparison male = 124.1); (Experimental female = 114.2) (Comparison female = 113.7), effect size -.09 and .05 respectively. No differences were observed between experimental and comparison group boys or girls upon the measure of diastolic blood pressures, (Experimental male = 59.5) (Comparison male = 59.7); (Experimental female = 60.1) (Comparison female = 57.2), effect size -.02 and .35. Analysis of the descriptive data for the measure of female diastolic blood pressure produces a standardized effect size of .35. An effect size this large should have been detected by the statistical analysis utilized.
Killen et al. (1989) concludes that the intervention was able to impact the sedentary student population in such a way as to encourage the adoption of physical exercise. Assessment of exercise promotion interventions should incorporate evaluation of frequency of physical exercise as well as some measure of exercise adoption among previously sedentary subjects. Alterations in the expected direction for the measure of resting heart rate among experimental boys was then attributed to this observed reduction in sedentary rate. This article provides further empirical evidence that supports the use of a complete behavioral evaluation for immediate curricular impact. Exercise promotion studies that incorporate physiological measures to the exclusion of behavior measures demonstrate a severe limitation. Exercise behavior mediates the impact upon physiological measures. Alterations in blood pressure, body mass index, and resting heart rate are all predicated in part upon some training effect. This is to say that an individual must exercise for some amount of time prior to any physiological alteration. If the post-intervention assessment is conducted without allowing sufficient time for the training effect to take place, one is likely to find conflicting or non-significant results leading to erroneous conclusions. This hazard may be compounded within the adolescent population where there is at least one more substantial potential mediator of physiological measures, genetics. Pate has previously demonstrated that among children, physical exercise explains less than twenty percent of the variance found in skinfold measures and cardiovascular endurance (Pate, et al., 1990). This indicates that if any physiological measure is to be used to evaluate an exercise promotion curriculum, very long periods of time should be allowed for the training effect to take place prior to posttest assessment.
This investigation also provides evidence that the Social Cognitive Theory is useful in promoting exercise behavior. Particularly when the constructs of self-efficacy, outcome expectancies, social situation, and self-control are targeted. Again however Killen et al. (1989) fails to incorporate an assessment of educational targets. Without such information, all assumptions regarding the efficacy of the Social Cognitive Theory to mediate the adoption of exercise remains tentative.

Fargo/Moorehead-250

Fargo/Moorehead-250 was a longitudinal cohort study conducted among eighth grade students from Minnesota. Student groups were identified based upon community membership of the participating school. Communities were selected and matched according to population size, economic status, and geographical distance from each other. Students in the treatment community, Fargo, were challenged to accumulate enough exercise so as to reach Minneapolis. The curriculum was based upon the social influences model which in turn was based upon the Social Cognitive Theory. Students were peer lead within classes other than physical education for a total of four weeks. Throughout these sessions students received cognitive development skills that developed ability to monitor heart rate, choose aerobic activity, and promote safety. Further, peer leaders set weekly exercise goals that students would aspire to meet during non-school hours. Reinforcement was delivered through postcards for classes that met these exercise goals. Supplying gift certificates to students recording the most exercise provided further reinforcement. Peer leaders also modeled positive expectations and expectancies for moderate physical exercise. As this curriculum encouraged classroom effort through group activity it was believed that social support was fostered.
In this study Kelder et al. (1993) does not document changes in the educational constructs but does do so for the behavior exercise. Behavioral evaluation was accomplished at the conclusion of the eighth grade. This evaluation indicated the presence of a gender mediated treatment effect. Significant differences were observed between experimental and comparison girls upon self-reports of exercise frequency. Kelder does not provide descriptive data for these measures but does report that girls in the experimental group engaged in exercise activity more often. Additionally on a scale in which intensity and frequency are combined, experimental group girls reported significantly higher scores than the comparison group. As with the exercise frequency measure, no descriptive data was provided for this measure of exercise intensity. Both self-reports of exercise were demonstrated to have adequate levels of validity and reliability. Differences between experimental and comparison boys were both non-significant. No assessment was conducted upon the physiological variables associated with cardiovascular health.
Conclusions: Efforts to Improve Exercise: Children and Adolescents

After reviewing the literature pertaining to adolescent and child educational efforts to promote exercise, certain conclusions can be drawn which serve to guide the development of this study. Primarily the Social Cognitive Theory was used as the theoretical foundation upon which the most rigorously prepared and investigated adolescent exercise promotion curricula are based. Using this theory it was postulated within the descriptive literature, that exercise behavior within a younger population would be influenced by the Social Cognitive Theory constructs of social situation and self-efficacy. Outcome expectations had mixed support for influence over the adoption of physical exercise. Self-control, although not tested as a determinant of physical exercise among children or adolescents was incorporated into many of the educational efforts to improve physical exercise. This summary of educational efforts focuses upon each curriculum’s learning experiences, ability to effect the targeted educational constructs, improvements in physical exercise, alterations in selected physical fitness measures, and alterations within identified health outcome variables.
Summary of Learning Experiences

Among the identified educational targets, no other has as much potential to influence child and adolescent exercise as social situation. Social situation was addressed within Fargo/Moorehead-250, and Stanford Heart Health, by involving peers in the exercise planning and encouragement. Social situation was addressed within the Child and Adolescent Trial for Cardiovascular Health classroom intervention, (C.A.T.C.H. classroom), by encouraging teachers to provide positive social support. Within the Nader study of the C.A.T.C.H. classroom plus family curriculum, the involvement of parents was solicited by having parents participate with their child on specific learning experiences. Within the Know Your Body curriculum student social situation was targeted using a medical screening exam in which medical and parental involvement was required. The author of the Stanford Heart Health program addressed student social situation by using role-play experiences.

The technique of mastery experience was used to address self-efficacy in the Fargo/Moorehead-250, Stanford Heart Health, Heart Health, and C.A.T.C.H. Mastery experiences were developed to have the children actually exercise as a part of the curricular experience. Clearly if the children engage in exercise they will develop a belief in their ability to exercise. The specific component of self-efficacy that was supported within the determinant section was the belief in a person's ability to overcome specific barriers to exercise. The implemented mastery experiences were then inconsistent with the variable identified as useful to an educational intervention. Methods to improve self-efficacy within the Know Your Body curriculum was designed to strengthen the belief that they could resist negative peer pressure.
Even though the educational target of outcome expectancy had mixed support within the exercise determinant literature, each reviewed effort incorporated the construct. Within the C.A.T.C.H curriculum outcome expectancies were addressed using simple information distribution techniques, interviews, and paper writing. Within Fargo/Moorehead-250, the method of self-monitoring was incorporated. Using this method it was postulated that as the children noticed physical alterations in their body, or in their exercise behavior each student's personal outcome expectancies would improve. Stanford Heart Health curriculum included a peer modeling video which served as educational method by which student outcome expectancies were addressed. Each of the other curricula targeted outcome expectancies using information distribution.

Self-control, while not tested as a determinant of physical exercise, was incorporated within the Stanford Heart Health, and the Heart Health curricula. Each of these curricula only used small components of the total self-control construct. The Stanford Heart Health program focused upon the dimension of goal setting, while the Heart Health program incorporated self-monitoring of exercise behavior. Learning experiences within the Stanford Heart Health program provided students opportunity and guidance in setting goals.

Perceived susceptibility was identified by the Know Your Body curriculum as an educational target. In order to alter the student's perceived susceptibility students were exposed to a medical screening designed to identify students who were at risk for cardiovascular disease.
Using lecture format the Heart Health curriculum addressed the constructs of physiology of exercise, recommended guidelines for exercise, and prevention of injuries. The Heart Health program evaluator did not provide information that would indicate specific lecture topics for these broad headings.

Summary of Treatment Construct Validity Evaluations

While each of the reviewed curricula addressed their educational targets, evidence of educational effect was rare. The Know Your Body, and C.A.T.C.H. curricula were the only interventions to conduct such an educational evaluation (Resnicow, et al., 1992; Parcel, et al., 1989; Luepker, et al., 1996; Edmundson, et al., 1996; Nader, et al., 1996).

Results from the educational assessments indicate that for elementary school children, the Know Your Body curriculum did not influence the targeted educational constructs of health attitudes, or exercise self-efficacy (Resnicow, et al., 1992). Within the Child and Adolescent Trial for Cardiovascular Health intervention, elementary school children exposed to the curriculum did experience higher levels of self-efficacy and positive social support following the third grade (Luepker, et al., 1996; Edmundson, et al., 1996). Within the investigation by Luepker et al. (1996) the improvement in exercise self-efficacy was continued through the fourth grade while effects upon the perceptions of positive social support for physical activity diminished following the fourth grade year. Edmundson et al., 1996) investigation indicated that the third grade effect on perceptions of positive social support for physical activity were maintained throughout the fourth grade year but that the exercise self-efficacy effect diminished (Edmundson, et al., 1996). Neither Luepker nor Edmundson detected any significant effects for
perceptions of negative social support for physical activity (Luepker, et al., 1996; Edmundson, et al., 1996). Parcel et al. (1989) investigation indicated that during the third grade no effects were derived on the constructs of behavioral capability, or exercise self-efficacy. During the fourth grade year the experimental group scored significantly higher on both behavioral capability and exercise self-efficacy (Parcel, et al., 1989). Results indicate that the Know Your Body, and the Child and Adolescent Trial for Cardiovascular Health curricula achieve differing levels of construct validity of the treatment (Campbell & Wood, 1979). Construct validity of the treatment requires that evidence be provided which supports the commonly held assumption that educational methods in turn effect the targeted educational constructs. Evidence of this nature provides a gauge by which observed behavioral alterations can be attributed to some experimental intervention. This evidence is therefore fundamental to the discussion of causation. Using the reviewed educational efforts there was little evidence to support a conclusion that the targeted educational constructs were altered by the learning experiences implemented. Without this evidence, any conclusion pertaining to the behavioral effect of the Social Cognitive constructs is tentative. It was with little confidence with which we generalize observed improvements in exercise activity, or lack there of, upon the Social Cognitive Theory.

Failure to achieve construct validity of the treatment in the Know Your Body curriculum may be due to two errors. Educational instruments were not closely linked with the underlying Social Cognitive targets. This error was an error of measurement, an educational assessment must measure the educational constructs targeted within the intervention otherwise the use of educational assessment was questionable at best. Also
it was suggested by each of the authors investigating the Know Your Body curriculum that the implementation of the curriculum was not uniform (Walter, et al., 1989, Bush, et al., 1989) (Resnicow, et al., 1989). This non-uniform application of the curriculum was suggested to be caused by a curriculum designed to be implemented into the schools too many times during the school year. As a result administrators and teachers felt that this intervention was taking time away from other subjects (Bush, et al., 1989; Walter, et al., 1989; Resnicow, et al., 1989). This error was an error of educational design, there must be a high degree of association between a curriculum and the realities within each institution. During conflicts between a curriculum and the needs of the educational environment it is easy to see that the curriculum will be altered in order to fulfill a new purpose. A result of this is the lessening of congruence between what students are taught, and what they are tested on. This lack of congruence destroys efforts to establish construct validity of the treatment.

The Child and Adolescent Trial for Cardiovascular Health curriculum has mixed indications for construct validity of the treatment. While each investigation determined that the learning experiences effected a change in Social Cognitive Theory constructs, these alterations lacked a consistency needed for unqualified validity.

No other educational intervention conducted an educational assessment. Therefore there is no indication which would support that alterations in physical exercise are generated from alterations in educational constructs.
Summary of Behavioral Impact: Alterations in Physical Exercise

Results of behavioral impact indicate that with the exception of the Know Your Body curriculum, exercise behavior was increased in all investigations. Behavioral yields however were minimal in magnitude. Stanford Heart Health reported exercise behavior effects by demonstrating that thirty percent of non-exercisers within the experimental group initiated exercise activity, while only twenty percent of comparison non-exercisers initiated such activity (Killen, et al., 1989). Evaluation of the Fargo/Moorhead-250 intervention demonstrated a positive standardized effect for females of about .19 on the variable, number of exercise hours each week. This standardized effect indicates that the intervention was able to move the average duration of physical exercise among experimental subjects .19 standard deviations higher than comparison subjects. No descriptive data were provided upon which raw differences in exercise duration between groups could be calculated.

As opposed to females, males exposed to the Fargo/Moorehead-250 curriculum did not exhibit any alterations in, hours of exercise hours each week. As such there is a potential that effects may be mediated by gender. The Fargo/Moorehead-250 curriculum was based upon the social-influences model from the Social Cognitive Theory; it may be that females are more readily influenced to exercise by addressing social situation than males. Potential gender effects on social situation were not fully developed within the descriptive literature. Experimental data presented within the intervention literature indicates that females are differentially effected by social influences (Kelder, et al., 1993).
The C.A.T.C.H. curriculum, when measures were presented, demonstrated a .51 increase in exercise frequency each week over comparison subjects. This average of 1/2 of a day in exercise frequency equated to a standardized effect size of .22 (Parcel, et al., 1989). When dependent variable was identified to be duration of exercise each week, students involved in the C.A.T.C.H. curriculum were reported to exercise an average of twelve minutes longer than comparison subjects (Webber, et al., 1996). No data was provided by which description of raw differences between experimental and comparison group could be made. The author simply reports a modest effect that was significant (Luepker, et al., 1996).
Summary of Impact upon Physical Fitness


The Heart Smart Cardiovascular School Health Promotion curriculum was evaluated using measures of a one-mile walk/run. In this study, fourth grade female students exposed to the curricula experienced a net change in time in the expected direction that was seven percent lower than comparison girls. Fifth grade girls had a net change in time in the expected direction of fourteen percent less than comparison girls. Boys in the fifth grade who were exposed to the curriculum demonstrated a similar net change in time that was seventeen percent less than comparison boys.

Fitness assessment of the Child and Adolescent Trial for Cardiovascular Health utilized measures of body mass index, skin fold, and heart rate, all of which were unaltered by the curriculum. Stanford Heart Health curriculum assessed the fitness measures of resting heart rate, body mass index, triceps and sub-scapular skin folds. Only the measure of resting heart rate was influenced, yielding a standardized effect size for boys of -.29, while there was no significant effects observed among study girls.
Summary of Impact upon Cardiovascular Risk Factors

The Know Your Body trial measured physiologic indicators of cardiovascular disease using the variables of total plasma cholesterol and high density lipoprotein cholesterol, as well as systolic and diastolic blood pressure. It is likely that three of four of these indicators were influenced following multiple years of exposure to the curriculum. Systolic and diastolic blood pressure was decreased in the investigation conducted by Bush et al. (1989). Total plasma cholesterol decreased by 1.7 mg/dl (Walter, et al., 1989; Resnicow, et al., 1989). It is however unclear as to which health behavior adaptations were primarily responsible for the observed effect. The lack of effect upon fitness measures stemming from the Know Your Body curriculum makes it less likely that changes in physiological risk factors of cardiovascular disease were generated through increased exercise. Educational interventions of shorter duration, such as Stanford Heart Health, and C.A.T.C.H. failed to produce similar effects upon these physiological indicators.
Summary of Impact from Educational Efforts

Articles presented within this review have utilized an array of measurements in order to document the impact of their respective curriculum. Among these impact measures are educational constructs, self-reports of physical exercise, fitness measures, as well as physiologic risk factors of cardiovascular disease. It is clear that the primary purpose of each effort was to reduce the risk of young persons developing cardiovascular disease.

Documentation of changes in cardiovascular risk profiles require that physiological measures be considered. These changes however require that students be exposed to extensive curricula targeting multiple health behaviors over multiple years. Partial success of this physiological alteration is demonstrated through the Know Your Body intervention trials, contrasting this are the shorter duration interventions of the C.A.T.C.H. and Stanford Heart Health curricula in which no physiological effect is noted.
Measurement Methods for Physical Exercise

Caspersen et al. (1997) considerations that bear upon physical exercise measurement are discussed fully. These authors suggest the primary determination must of the characteristic of physical exercise that is most important to a study. For instance, physical exercise is a behavior that draws upon multiple physical capacities that include cardiovascular endurance, muscular strength, muscular endurance and flexibility. These four dimensions often require different methods of measurement. This study was designed to develop an educational intervention to increase frequency of physical exercise that will in turn prevent cardiovascular disease. Any instrument used to measure physical exercise must therefore be sensitive to the cardiovascular demands of exercise.

Cardiovascular exercise can be measured using many general instrumentation techniques. Three specific techniques are discussed by Caspersen et al. (1997) these include mechanical instrumentation, self-report questionnaire, and direct observation. Interactions between humans and self-report questionnaires can lead to errors in estimating actual physical exercise participation. Interactions between humans and direct observation techniques can lead to errors in estimating actual physical exercise participation. In recognition of these potential errors the mechanical instrumentation method must be considered as the most appropriate method by which physical exercise is estimated. Mechanisms available to researchers were reviewed by Freedson (1991). A brief description of each mechanism used to assess physical exercise is presented within the following paragraphs.
Mechanical Instrumentation

**Pedometry**: The pedometer is an instrument designed to record the accumulated distance covered by a given subject during a unit time. Commonly the pedometer is attached to a garment at the subject’s waist. Upon each stride, the inner workings of the pedometer records the movement upon a scale calibrated according to average stride length. By this method distance covered through walk/run is quantified. Measures obtained by Pedometry have a strong correlation with measures obtained by direct observation and teacher survey questionnaire. Some difficulties associated with the use of Pedometry include the inability to obtain measures of movement intensity. This method is limited in that observed measures can not be categorized as either moderate or vigorous in nature. The use of Pedometry is also limited to use upon a small number of subjects as a result of a minimal but accumulative cost of equipment.

**Large-scale Integrated Sensor**: Similar in nature to the anometer is the large-scale integrated sensor. Using this method the subject is asked to wear the equipment upon the wrist or ankle. During the measurement period the equipment records activity counts such that sixteen movements are recorded as one count. Resulting from the equipment’s inability to detect intensity of motion, the large scale integrated sensor as with the pedometer may only be utilized in studies in which total physical exercise is of importance and there is no need to identify moderate or vigorous bouts of physical exercise. Studies have indicated that the measures derived from this instrument correlate very low with other measures of physical exercise such as self-report and direct observation.
**Anometer:** The anometer has the capacity to detect both bodily movement as well as intensity of such motion. Anometers are placed upon the wrist or ankle and are reported to yield a strong correlation with both direct observation and teacher survey questionnaire. The capacity of the anometer to be incorporated into a subject’s wardrobe and an increased capacity to detect both motion and intensity make the anometer a more attractive instrument than the pedometer. As with the pedometer the draw back to the use of the anometer is that studies with large sample sizes produce prohibitive costs. Further the instrument is incapable of determining whether the registered motion was planned physical exercise or rather incidental motion occurring from unplanned physical activity.

**Caltrec Accelerometer:** This instrument is to be secured at the waist of the subject. From this position the accelerometer is able to record the acceleration of the body’s trunk within three dimensions. Using acceleration values, summated force vectors are calculated which then are utilized to derive total calorie expenditure. The equipment’s ability to detect both motion as well as intensity of motion would permit the accelerometer’s use in measuring both moderate and vigorous intensity physical activities. Difficulty arises when dependent variable is planned physical exercise rather than unplanned physical activity. Intra-individual test-retest correlation coefficients are consistently reported to be low. Substantial correlation coefficients are demonstrated with direct observation when the subjects are about preschool age. Sallis did generate strong test-retest reliability measures among children eight to thirteen years of age.
however, this was within a laboratory environment and does not hold for free living experiences. Costs incurred for the equipment is prohibitive for any sample size greater than just a few. There is great concern regarding the use of accelerometry within a scientific study in which a large sample is required.

**Heart Rate Monitors:** In order to determine a subject’s heart rate throughout a unit of time a monitor with electronic memory is utilized. The monitor is placed across the thoracic cavity at the topical location of the heart. Within the monitor are electrodes that detect electrical activity within the heart indicating cardiac activity. This electrical activity is sampled at a rate typically ranging between a high of one sample every five seconds to a low of one sample every sixty seconds. An assumption used for justification of this method is that increases in heart rate are indicative of increasing physical activity, and relatively independent of other sources of variance such as stress, and environmental temperature. This assumption is not consistent however with intuition, especially when moderate physical exercise is operationally defined to occur at relatively low heart rates. The assumption however may be acceptable for vigorous physical exercise as it is commonly operationally defined to have a threshold heart rate level that is rather rapid. The cause of a rapid heart rate becomes less attributable to stress or temperature, thereby making it rather easy to attribute such an occurrence to physical activity. Again the heart rate monitoring method has serious weaknesses when larger samples are needed. Cost becomes increasingly prohibitive as subjects are added.
Doubly Labeled Water: Perhaps the most promising method by which physical motion can be determined is the use of doubly labeled water. This method requires that a water source be treated with a radioactive substance that is then ingested by the subject. The rate of water absorption within a sedentary population is calculated and utilized as a known quantity, deviations in this quantity are assumed to be a function of energy expenditure. As a result, total expenditure for an individual can be calculated for a unit time, however this method of measurement can not disentangle the energy expenditure resulting from incidental physical activity or planned physical exercise.

While each measurement technique provides possibilities for the measurement of physical exercise, there are also significant problems associated with its use. Possibility of substantial person by instrument interaction is likely in that use of such instrumentation could alter the observed behavior thereby obscuring the causal efficacy of the educational treatment. Further, likely responses to exercise measuring instrumentation within a child and adolescent population would include the measurement of unintended behaviors such as the willful jiggling of equipment, thereby incorporating additional error into the dependent variable. Similar problems may include accidental alteration of instrumentation positioning, or actions that result in the introduction of water into the electronics. However a much more serious consideration is the financial burden which these methods produce when incorporated into large studies. Therefore alternative methods must be contemplated that may allay the presented difficulties.
Direct Observation

Several authors have suggested that the direct observation can be an acceptable measure of child and adolescent exercise behavior. A review of such methods was authored by McKenzie (1991). McKenzie concluded that many of the instruments utilized in direct observation of physical exercise achieve substantial Kappa coefficients of reliability. Validity of each instrument is without question so long as the setting to which generalization is desired is consistent with the settings in which observation occurs. As a great many of the direct observation instruments are utilized within structured settings such as the classroom or home, validity of these instruments must be considered as absent. Among the remaining instruments in which data is gathered throughout the day, one must readily acknowledge the extensive resources required. Each observer would require extensive time in order to collect data on but a single subject. In addition to the necessary resources required of the methodology, the inherent intrusion into the subject's daily activities may bring into question the ethics of such an instrument. Provided that ethical considerations were satisfactorily resolved, considerations regarding the methods reactive potentialities loom as a potent inhibitor. Through observing directly each subject and their resultant physical exercise patterns it can be virtually assured that alterations in behavior will occur. It would be difficult to disentangle the effects derived from the educational intervention from those derived through measurement.
Self-report Method

Caspersen et al. (1997) suggest that the self-report method of exercise measurement be considered. This method provides suitable solution to the problems encountered with electronic and observational instrumentation. Self-report measures of physical exercise are reported to be non-reactive that is the completion of the questionnaire does not alter the behavior. Self-report measures are cost effective in that valid data can be collected at substantially less expense than alternative methods. Finally, both moderate and vigorous physical exercise can be measured.

Sallis (1991) authored a review of the self-report method for child and adolescent exercise within the Journal of School Health. In this article Sallis introduces the reader to two forms of the self-report method. The first classification is interviewer dependent. Using this method each subject is interviewed in order to detect episodes of physical exercise. Interviewer dependent methods fail to retain the economic benefit promised by the self-report method. It is not practical to expect that large populations provide exercise data using the labor intense method of personal interview. Only the interviewer independent method is economically practical for further consideration. In consideration of the interviewer independent method Sallis (1991) reviews favorably two instruments, the Godin-Shepard’s instrument for usual physical exercise, and Sallis’ single item questionnaire (Sallis, 1991).
Caspersen (1997) suggest that the complexity of the interviewer independent questionnaire match the purpose of the study. A single item questionnaire is indicated if the data are to be used to control for the confounding effects of physical exercise. Alternatively when physical exercise is the primary variable of interest, as it is within this study, a multiple item instrument is indicated. Raising the Godin-Shepard instrument further into consideration.

Sallis (1993) presents methods by which the validity of his seven-day exercise recall interview and the Godin-Shepherd questionnaire would be determined. Test-retest reliability measures indicate that the Godin-Shepherd questionnaire is very stable across a two-week period and that reliability increases from the fifth, eighth, and into the eleventh grade. Criterion related validity between the measures obtained using the Godin-Shepherd and seven-day exercise recall resulted in moderate correlation coefficients. Sallis (1993) concludes that the Godin-Shepherd instrument is acceptable for use in fifth, eighth, and eleventh grades subjects, while the seven day exercise recall interview is reliable for use only among older adolescents.
Sallis makes the suggestion that memory may confound behavioral measures among children and adolescents, thus producing a need to collect behavioral data in temporal proximity to exercise. This conclusion is reinforced by Caspersen (1997) that exercise should be measured in close temporal proximity to the behavior and also the duration of the exercise activity. Time frames too short in duration may result in reports of unusual or infrequent behavioral involvement, while time frames of great length may result in the inclusion of error resulting from memory - instrument interaction. It is concluded that behavioral self-report measures among a child and adolescent population should be administered such that behavior is reported daily and does not require the use of an interview format. Such a questionnaire is the Previous Day Physical Activity Recall (PDPAR) previously validated by Weston (1997).
The Previous Day Physical Activity Recall questionnaire was developed to measure all activity engaged in throughout a given day. Each reported day's activities are recorded into seventeen, thirty-minute blocks of time using a selected list of common activities. Subjects are then asked to rate the perceived intensity of each activity, ranging from light intensity through very hard intensity. Following the collection of physical activity data this author was free to select the modes and intensity of activity that is most appropriate. Using these methods subjects are not made explicitly aware of the significance of any particular type of activity, and as such may be more objective in reporting data (Weston, et al., 1997). In a validation study Weston reported results from a study upon 119 junior and senior high school students. Results indicated that the same day test-retest correlation coefficient was substantial, \( r = .98 \). Additionally, criterion related validity was documented using the Caltrec accelerometer, \( r = .88 \), pedometer, \( r = .77 \), and heart rate measures, \( r = .44 \).
Measures of Physical Fitness as Proxy Measures

Pate (1990) provides evidence that physical fitness proxy measures of physical exercise are clinically inadequate for a population of third and fourth graders. Through his work only twenty percent of the variance in measures of physical exercise were explained by fitness measures. These findings are consistent with other authors, such as Claud Bouchard, Perusse, and Ward. Bouchard reviewed the estimates of heritability for sub-maximal and maximal aerobic power. About ten percent of the variance in sub-maximal aerobic power and twenty-five percent of maximal aerobic power is determined by genetic factors (Bouchard, 1992). Perusse determined that thirty percent of the variance in blood pressure is explained by heredity factors (Perusse, 1991). The heritability factors within systolic blood pressure was found to increase with age, accounting for less than six percent among five year old subjects, and less than sixty-one percent of the variance among fifty year old males and females (Ward, 1990).

Conclusions from these works are consistent in that physical fitness measures are poor proxy measures of physical exercise behavior especially among children. These weak associations between physical exercise and physical fitness are suggestive that among children, physical fitness measures should not be used as proxy measures of physical exercise. Limitations in using these fitness measures are compounded when sample size is limited and changes in these fitness measures represent dependent variables.
Summary of Measurement Methods for Physical Exercise

Conclusions of the measurement of physical exercise indicate that methods of electronic instrumentation, direct observation, and proxy measures of physical fitness are inadequate. Only those measurements of physical exercise that rely on self-reports are sufficient. Even with these self-report measures researchers must determine the qualities of the exercise and specific dimensions of fitness to which the exercise is useful. For purposes of this project, exercises that bear upon the cardiorespiratory dimension of fitness was of primary interest. Further this project requires that physical exercise be engaged for a minimum of fifteen continuous minutes. An additional point that must be considered include the mechanisms that used for recording exercise activities. The period of time in which physical exercise activities are reported must also be considered. Due to circumstances presented earlier within this section the method of self-report will be utilized. Exercise data will be collected in immediate temporal proximity to the actual exercise activity. The immediacy with which the data is collected will reduce the possibility of an interaction between memory and subject becoming problematic. Further the satisfactory instrument upon which exercise activities are to be recorded must have satisfactory psychometric characteristics. While there are three exercise self-report instruments that have such characteristics only one allows for immediate twenty-four hour recall of behavior (Weston, et al., 1997). Based upon the psychometric characteristics presented by Weston (1997) and colleagues, the PDPAR has test-retest coefficient equal to .98. Concurrent validity is reported to 0.88, 0.77, and 0.44 with Caltrec accelerometer, pedometer, and heart rate monitor respectively. The current study utilized the PDPAR to measure physical exercise.
Educational Assessment Instrumentation

The measurement and evaluation of theoretical constructs are important. Given the need for educational assessment within the current project one must consider the need to identify instruments that optimally measure such constructs. These instruments provide measures that accurately reflect the theory upon which they are based and the content within the educational intervention (Petosa & Kirby, 1993; and other works cited below). These instruments are used in this work to test treatment construct validity as described by Campbell and Wood (1979). Such convergence requires that acceptable educational measurement instruments be identified prior to development of educational activities.

Each of the targeted theoretical constructs has been demonstrated within the descriptive and experimental literature to be influential at altering the exercise behavior of adolescent school children (Saunders, et al, 1997; and the literature cited above). Evidence pertaining to each instrument’s fidelity to the theoretical framework is presented and psychometric characteristics of each instrument are discussed in this section.
Outcome Expectation

Outcome Expectation is the probabilistic belief that given outcomes will be realized through the participation in specific behaviors. From a Social Cognitive perspective measurement of this construct requires responses upon multiple potential outcomes. This multi-dimensional assessment technique is desirable for it’s ability to capture more fully the diversity of outcomes that can perceived when considering volitional behaviors. Measurement instrumentation for this construct must reflect the multidimensionality of physical exercise outcome expectation. Previous authors (e.g. Steinhart, 1995) have attempted to measure outcome expectation construct using multiple conceptual models. One common method by which outcome expectations are measured requires subjects to respond to Likert type items that reflect a range of outcomes that were most commonly identified within interviews obtained from similar subject populations. While compatible with the Social Cognitive perspective of dimensionality, difficulties are evident. Each targeted dimension is represented by a limited number of items, commonly a single item. Instrumentation such as this is unlikely to adequately sample content from each dimension leaving serious questions pertaining to the true expectations on each dimension. Further psychometric difficulty is apparent in the careless collapse between supposed dimensions into a single construct score. It is unwise for raw dimension scores to be summed. Dimension scores that are based upon a limited selection of items may result in scores that can be considered unreliable, thereby introducing substantial error into the observed construct score. A second difficulty is the unlikely satisfaction that dimension scores have equal variance prior to the cross-dimensional summation. If equal variance between dimensions is not observed the
resultant linear combination will yield a construct score that is overly influenced by the dimension that has the least variance. For these reasons the multidimensional outcome expectation instruments and the treatment of the data obtained using these instruments must be considered inadequate.

Human forethought and its translation to intent and subsequent behavior can not be viewed as occurring within a vacuum. Human intent is molded by many possible outcomes, some of which are negative. The suggestion that a simplistic measure from a single dimension can provide meaningful insight into behavior is unsatisfying and will not be used in this study.

A much more satisfying instrument was developed by this author. This outcome expectation instrument was adapted from a conceptual model historically used within the human attitude literature (Kenyon, 1968). Kenyon (1968) proposed a multidimensional model upon which measures of attitudes toward physical activity can be gathered. In his presentation Kenyon (1968) characterized physical exercise as a sociopsychological phenomenon. Kenyon (1968) based his work upon the assumption that "physical exercise can be reduced to more specific components ... and that a meaningful basis for such a procedure is the instrumental value physical exercise is perceived to have for the individual." (Kenyon, 1968). Six sub-domains were identified using factor analysis. The six sub-domains are social-experience, health and fitness, pursuit of vertigo, aesthetic experience, catharsis, and ascetic experience. Construct validity was demonstrated using factor analysis upon measures obtained by Likert type scales for college age subjects. Measures of reliability for each of the six dimensions were calculated using, Hoyt r coefficients that ranged between 0.68 and 0.89. Construct independence was judged to
be adequate with correlation coefficients raging between 0.02 and 0.57. Kenyon (1968) concluded that construct independence might be accentuated through the identification of additional sub-domains. Kenyon (1968) also concludes that the proposed model must not be considered as final but rather an evolving framework.

Kenyon's model of physical exercise being a multi-dimensional sociopsychological object was recognized and expanded upon by Shultz and Smolz (Shulz, 1973). These authors utilized the conceptual model identified by Kenyon in order to create the Child and Adolescent Attitudes Toward Physical Activity, C.A.A.T.P.A., instrument. During the process however the Likert type scales of Kenyon were altered to a semantic differential scale in which specific physical exercises were presented. Each physical exercise was associated with five combinations of adjectives designed to measure the dimensions of health and fitness, pursuit of vertigo, aesthetic experience, catharsis, and ascetic experience, as described by Kenyon in 1968. Shultz and Smolz however believed that the dimension of social experience was comprised of two independent sub-domains, social growth, and social continuation. These two dimensions were added to the five previously presented, and factor analysis was utilized to confirm the presence of seven rather than six relatively independent physical exercise dimensions.

In developing again this instrument, the author of this paper took the conceptual model presented by Kenyon and expanded upon by Shulz, and Smolz and developed an acceptable instrument to measure the theoretical construct of outcome expectation for physical exercise among school children. This instrument provides measures of outcome expectation for social growth, social continuation, fitness, thrills, beautiful movement, relaxation, and competition. Each dimension is operationally defined:
**Outcome Expectation for Social Continuation:** Social continuation is the degree of probability perceived for the occurrence of a keeping up or moving forward with friendship or companionship that results from participation in physical exercise. Outcome expectation for social continuation is measured using an instrument that contains five items utilizing a Likert type scale in which the numeric one represents, “never happen”, and the numeric six represents, “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for social continuation derived from physical exercise.

**Outcome Expectation for Social Growth:** Social growth is the degree of probability perceived by a subject for the occurrence of the formation of friendship or companionship resulting from participation in physical exercise. Outcome expectation for social growth is measured using an instrument that contains five items utilizing a Likert type scale in which the numeric one represents, “never happen”, and the numeric, six represents “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for social growth derived from physical exercise.
**Outcome Expectation for Competition:** The degree of probability perceived by a subject for the occurrence of striving among persons for the same object, position, or prize to occur as a result of participation in physical exercise. Competition usually will occur in accordance with certain fixed rules. Outcome expectation for competition is measured using an instrument that contains five items and utilizes a Likert type scale in which the numeric one represents, “never happen”, and the numeric six represents, “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for competition derived from physical exercise.

**Outcome Expectation for Thrills:** The degree of probability perceived by a subject for the occurrence of sharp excitement resulting from participation in physical exercise. Outcome expectation for thrills is measured using an instrument that contains five items and utilizes a Likert type scale in which the numeric one represents, “never happen”, and the numeric six represents, “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for thrills derived from physical exercise.
**Outcome Expectation for Beautiful Movement:** The degree of probability perceived by a subject for the occurrence of motion or action that approximates one’s ideal, and is pleasing to the senses. Outcome expectation for beautiful movement is measured using an instrument that contains five items and utilizes a Likert type scale in which the numeric one represents, “never happen”, and the numeric six represents, “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for beautiful movement derived from physical exercise.

**Outcome Expectation for Relaxation:** Is defined as the degree of probability perceived by a subject for rest, relief from worry, or relief from effort, which will occur as a result of engaging in physical exercise. Outcome expectation for beautiful movement is measured using an instrument that contains five items. This instrument utilizes a Likert type scale in which the numeric one represents, “never happen”, and the numeric six represents, “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for relaxation derived from physical exercise.

**Outcome Expectation for Fitness:** Is the degree of probability perceived by a subject for the occurrence of physical wellbeing that occurs as a result of engaging in physical exercise. Outcome expectation for health and fitness is measured using an instrument that is comprised of five items. This instrument utilizes a Likert type scale in which the numeric one represents, “never happens”, and the numeric six represents, “always happens”. An assumption of this instrument is that increasing numeric values represents increasing magnitudes of outcome expectation for health and fitness.
These dimensional items have been assessed to have adequate content validity, and construct validity using item response theory procedures (Wright, 1982) (Wright, 1979). Following confirmation of appropriate validity, each dimension score was judged to have adequate reliability. Total construct score is calculated by converting each dimension score so that the potential range is from a minimum of zero to a maximum of 100 following this all dimensions are summed in linear fashion.

Self-efficacy

Self-efficacy is defined as the belief one holds that a performance will match all pertinent performance standards for a given behavior. Albert Bandura discusses this construct to be a multidimensional cognitive object in which sub-domains include, generality, level, and strength (Bandura, 1986). Among these three sub-domains, only strength of self-efficacy has been demonstrated within the adolescent exercise promotion literature to be of instrumental value. Strength of self-efficacy for physical exercise is the belief one holds that they can overcome common barriers in order to exercise regularly.

The current intervention will therefore incorporate experiences that enable students to identify potential barriers to personal exercises and mechanisms by which such barriers can be overcome. In keeping with the educational evaluation, an acceptable strength of self-efficacy instrument must be identified. This instrument must be sensitive to the adolescent student and the barriers that they commonly confront. One strength of self-efficacy instrument having documented psychometric properties was presented by Saunders et al. (1997) and colleagues. These seventeen dichotomously scored items of self-efficacy were developed for use within a late childhood population and contains
three-dimensional measures. The three dimensions include self-efficacy for, support seeking, barriers, and positive alternatives. Psychometric properties of the dimension self-efficacy for barriers provide an acceptable measure of strength of self-efficacy. Construct validity was established using principal component factor analysis with subsequent varimax rotation upon measures obtained from 336 fifth grade students, males=171, females=165. Using this confirmatory method, four items loaded above the minimal level of .35. Concurrent validity was established using the observed scores of self-efficacy for barriers and measures of self-reported exercise behavior. Correlation coefficient was significant, 0.20. Internal reliability measures observed for this sub-scale was 0.71. Single week test-retest reliability was 0.82 for a sub-sample of fifty-seven subjects. Each item within this self-efficacy instrument was scored upon a dichotomous scale due to the relative young age of subjects. As the current educational assessment will be conducted upon adolescents rather than preadolescent children, the extension of these observed psychometric properties may be questionable. In the absence of alternative instrumentation developed upon an adolescent population, one is left with few choices. One is to develop a new instrument, the second is to cautiously extend the use of available instruments. Sufficient evidence is presented that supports the cautious extension of this strength of self-efficacy instrument into the current intervention study.

Prior to the incorporation of this strength of self-efficacy instrument, it is desirable to incorporate a six point Likert type scale in place of the dichotomous scoring structure. This action is in response to the increased age and supposed expansion of the subjects' cognitive capacity.
Social Situation

Review of exercise promotion literature pertaining to the adolescent school population is clear, social situational factors are powerful mediators of exercise adoption (Saunders, et al., 1997; and other citations presented above). Bandura (1986) discusses the social situational construct to be a perception one holds for the supportive capacity of influential persons toward a targeted behavior. Among adolescents the persons most influential, include parents, guardians, and peers. Therefore this intervention will target parental and friend involvement and their support for exercise activities. Inclusion of this construct necessitates the identification of an appropriate instrument through which accurate measurement can be obtained. Saunders et al. (1997) has developed such an instrument and presented the instrument’s psychometric characteristics. This instrument was assessed using a sample population of 319 fifth grade students, 160 male and 159 females. Subjects responded to eight-items using a dichotomous scale. Construct validity was determined using a confirmatory factor analysis with subsequent varimax rotation. The eight-item instrument was confirmed to be comprised of a single dimension, social situation, in which all items loaded above 0.40. Single week test-retest reliability was measured to be 0.78 for a sample of fifty-seven subjects drawn from an original sample. Internal reliability for the instrument 0.75, was determined using Cronbach’s alpha statistic upon measures obtained on 319 subjects.
As with the instrumentation for strength of self-efficacy there are problems with this social situation instrument. Given that this social situation instrument was validated using a sample of fifth grade students the age appropriate content of the instrument can be questioned for use among high school students. Alternatives to this instrument however are unsatisfactory. Therefore for the purposes of this study the social situation instrument presented by Saunders (1997) will provide a most appropriate measure for examination of this construct.

Self-control

Self-control construct is the final theoretical construct that is targeted within this intervention. Bandura (1986) discusses self-control to be the ability to regulate one’s own goal directed activity. In the promotion of exercise behavior the individual is thereby encouraged to engage in goal setting, self-monitoring, and gaining reinforcements for exercise. While these sub-functions serve as basis for self-control, additional targets are not precluded from falling within the personal sphere of influence. When such a target is identified as potentially malleable and effective at promoting exercise behavior one may utilize this newly identified target as part of the self-control construct. Efforts such as these extend self-control construct beyond the minimum and create an ever evolving, increasingly complex process through which the individual becomes capable of asserting greater self-control over a desirable action.
As discussed in previous sections social environment and social situation are both constructs associated with exercise behavior adoption. Manipulation of these constructs can occur in part through self-derived effort, and therefore are potential sub-functions within self-control intervention. A similar potential sub-function of the self-control construct is one’s ability to self-generate solutions to problems associated with regular exercise. This sub-function is closely tied to the construct of strength of self-efficacy. There can be little doubt that a person is limited in potential for mastery experiences in overcoming barriers to regular exercise unless potential barriers are identified and specific strategies developed that ensure success. To the degree that a person receives such mastery experiences strength of self-efficacy will improve (Bandura, 1986). Therefore methods by which potential barriers can be overcome are addressed within this exercise promotion intervention.

Petosa and Kirby (1993) incorporated the measurement of goal setting, self-monitoring, reinforcement, gaining and maintaining social support, and planning to overcoming potential barriers within their self-control instrument. Using this instrument self-control is measured by items pertaining to self-controlling behaviors engaged in during the preceding four weeks. Each item is scored using a five point Likert type scale. Original instrument developed underwent process by which content and construct validity was confirmed and reliability noted (Petosa & Kirby, 1993). A panel of experts established content validity. Construct validity was established using factor analysis. Minor adaptations were made in the items of this self-control instrument in order to more specifically address adolescents and shorten the response times. Further the reporting
scale was shifted from a five point to a six point Likert type scale in order to maximize variance. These alterations will no doubt effect the validity and reliability of the instrument however this author is unaware of alternative measures of the self-control construct.

Theoretical Overview of the Social Cognitive Theory

Exploration of literature discussed in previous sections revealed that the preeminent theoretical foundation for adolescent exercise promotion is the Social Cognitive Theory. Development of the Social Cognitive Theory is traced to work accomplished by Miller and Dollard (1941) at that point the theory was originated in order to explain imitation behavior of both animals and humans. Postulated constructs included physiological drives, cues, behaviors, and reinforcements (Miller & Dollard, 1941). Formalization of this new theory was accomplished by Rotter (1954) within a text entitled, Social Learning and Clinical Psychology. In order to raise the level of sophistication of the social learning theory, Rotter (1954) presented his readers with a series of theoretical postulates with associated corollaries that served to guide the appropriate use of this emerging theory of human behavior. Later, in 1964 Rotter developed the theory by incorporating the first cognitive construct, locus of control (Rotter, 1964). Using this construct Rotter (1964) explained that the specific technique required to accomplish any given behavioral alteration must be determined following assessment of the subject's beliefs pertaining to their capacity to control reinforcements.
In 1969, Albert Bandura, in his publication, *Principles of Behavior Modification*, draws heavily upon Rotter's Social Learning Theory, however certain breaks with tradition should not be overlooked (Bandura, 1969). Bandura (1969) substitutes for behavioral imitation, vicarious learning, in so doing recognition is granted for a generalization of observed behaviors to unique situations. Additionally, Bandura (1969) proposed the seminal idea of reciprocal determinism that will later be utilized as the primary framework through which behaviors may be altered. Finally Bandura (1969) discusses the importance of the cognitive function of goal setting in which goals become most powerful when they are temporally proximal and sequentially advanced in ever increasing complexities. In 1977, reciprocal determinism was fully developed into triadic reciprocally, in which the person, behavior, and environment exert simultaneous influence over and dependency upon each other (Bandura, 1977).

Triadic reciprocally specifies that alteration of any one object may be initiated through the influence of the other two points. An illustration of this relationship may best be realized through an imaginative desire to decrease the behavioral prevalence of high fat diets. Utilizing triadic reciprocally, the health educator initiates interventions to target both the environment and personal characteristics. Environmental intervention may be to limit the availability of commonly consumed foods that have high amounts of saturated fats. Simultaneously the health educator provides work-shops in which individuals are taught the necessary skills needed to prepare meals with lower amounts of fat. At posttest the health educator discovers that the behavior is less prevalent additionally, it is noted that these persons value the low fat diet and additional grocers are carrying foods with lower amounts of fat.
In the 1969 book, *Principles of BehaviorModification*, Bandura argues that the degree to which each of these three outcomes will be maintained over time depends upon the degree to which favorable reinforcements are established (Bandura, 1969). As such the health educator is inclined to nurture the impact of these secondary effects by preparing a self-contained system through which each effect is perpetuated by new activities.

In 1986, Bandura authored the book, *Social Foundations for Thought and Action: A Social Cognitive Theory*, in this text each construct that influences triadic reciprocally is identified (Bandura, 1986). Glanz et al. (1990) reviews each and provides formal definitions.

**Environment**: Factors that are physically external to the individual.

Environmental factors include physical structures such as buildings and social objects such family members and friends. No comment is made in reference to the subject’s perceptions or beliefs regarding these objects, rather these factors are important in their own right. For instance if one were asked to ride a bicycle, when the subject had no access to a bicycle it would seem unlikely that the behavior would follow regardless to the subject’s perceptions. Indeed the attempt to influence behavior change among persons lacking basic resources is not only foolhardiness but the development of preparedness without necessary environmental factors will lead directly toward frustration.
Situation: The perception one holds for the supportive capacity of the immediate environment or influential persons toward a targeted behavior. It is within this construct that the person's perceptions of their environmental factors are recognized. A necessary condition for situation construct is an environment pertinent to the desired behavioral target. Using the above example of riding a bicycle, and assuming that the individual has access to a bicycle, the behavior is more likely to follow among persons holding a higher, more positive perception of the bicycle. Social situation may assume that there is a person who suggests that bicycling behavior be incorporated. The qualities pertaining to the requester as well as the request itself would be the purview of social situation construct. Bandura in a discussion of personal standard setting makes repeated references to social situation, (Bandura, 1986). Among the most pointed references include, “individuals are rare who regard their behavior so highly that the reactions of their associates have no effect on their self-evaluation.” This quotation makes the point clear that according to the Social Cognitive Theory the actual and/or anticipated reactions of valued associates will influence a person's self-evaluation, and in so doing impact overt behavior. Vicarious influence, also referred to as observational learning, is presented by Bandura as a mechanism by which subjects learn about socially accepted standards that members are reinforced for accepting. “Seeing performers publicly recognized for upholding excellence aids emulation of high standards...(Bandura, 1986).” Careful consideration of social situation and Bandura's discussion, present the reader with additional theoretical constructs including, observational learning, reinforcements, outcome expectation, outcome expectancy, and self-control.
Observational Learning: Development of behavior that is accomplished through the watching of others perform tasks. Social cognitivists hold that humans do not simply imitate the behaviors of other individuals, rather we identify with the actor, derive implicit standards, witness relevant reinforcements, and generalize the obtained information to similar actions in unique settings and future times through symbolic activity. If humans were not capable of such vicarious learning and symbolic generalization the human race would likely never advance (Evans, 1989). Observational learning can be viewed as a mechanism by which other Social Cognitive Theory constructs are effected.

Taking up the bicycle-riding example once again allows for a simple illustration of this point. If the owner of a bicycle were to witness a role model caring for, or in some other way valuing an identical bicycle, it is likely that the owner’s perception of the bicycle will improve. As such the owner’s physical situation has been effected through observational learning. And as mentioned within the above discussion of situational construct, the higher the relevant situational factors the greater the likelihood that the behavior of bicycle riding will occur.
Outcome Expectancies: Relative value an individual holds for a given outcome. As with other expectancy value theories, the Social Cognitive Theory presumes that humans are capable of and engage in the act of forethought to guide intentional behavior. This type of symbolic activity, forethought, enables persons to motivate themselves and guide their actions anticipatorily (Bandura, 1986). A person must then determine the desirable characteristics of a future event or product. Following the symbolization of these desirable products a search is conducted in order to discover actions that are most likely to result in the realization of the desired condition. For each action pondered, a probabilistic belief that such action will result in the desired condition is calculated. These probabilistic beliefs are defined within the construct of outcome expectation.

Outcome Expectation: Probabilistic belief a person holds that a given outcome will be brought about through the engagement in a specific behavior. It can be assumed within the Social Cognitive Theory that only actions that are likely to produce events consistent with a symbolized future condition are pursued. Therefore in order to predict a given behavior, one must have information pertaining to the subject’s beliefs that the behavior will lead to a desirable future event. The relationship between outcome expectancies and outcome expectation is believed to be a multiplicative function.

In order to determine if the subject within the bike riding example will actually ride the bicycle we must determine the beliefs pertaining to the efficacy of bicycle riding to bring about certain outcomes, and multiply these beliefs by the relative value the subject has for each.
**Self-efficacy:** Belief that individual performance will match all pertinent performance standards for a given behavior. A person's strong outcome expectancy and high outcome expectation for a behavior may be mediated by a self-efficacy belief. Typically, realization of a symbolized future condition depends upon an action being conducted to the satisfaction of some standard. Self-efficacy therefore is a person's belief in their ability to perform an action with the necessary skill to achieve the standard. It may be expected that magnitudes of positive outcome expectations may be diminished if self-efficacy is low. Relatively few behaviors will be engaged if there is little hope of a successful performance.

Bandura specifies that self-efficacy expectations consist of three dimensions, strength, generality, and level. Strength of self-efficacy is a personal belief in ability to overcome common barriers to a behavior. Generality of self-efficacy is one's perceptions regarding ability to engage multiple similar behaviors satisfactorily. Level of self-efficacy is the degree or intensity to which a behavior can satisfactorily be engaged. It is believed that self-efficacy expectations are malleable through manipulation of four mechanisms, mastery experiences, observational learning, verbal persuasion, reinterpretation of physiological cues (Bandura, 1986). Presumably the most powerful of these mechanisms is the mastery experience. Observational learning, as presented within the above discussion of social situation, may also be utilized in order to enhance self-efficacy expectations.
Behavioral Capability: Knowledge and skills necessary to perform a specific behavior. Volitional behavior requires that the actor possesses or develop the requisite knowledge and skills. While these attributes do not guarantee behavioral participation, the absence, or minimal development of them makes it less likely that social standards will be met and therefore limit protracted behavioral involvement (Green, 1990).

Reinforcements: Those factors that serve to influence a desirable behavior to be continued or a negative behavior to be discontinued. This construct can refer to any feeling, object, or outcome that serves to continue or discontinue a specific behavior. One variety of reinforcement is the anticipated product or outcome of specified behaviors. In these cases the reinforcements are intrinsically derived through the behavior itself. If the subject has lower levels of outcome expectancies for expected outcomes it is unlikely that the behavioral outcomes will promote continued participation. In these cases some alternate tangible or intangible reinforcement must be identified. Examples of intangible alternate reinforcements are, self-praise, and goal accomplishment. Tangible reinforcements may include money, social recognition, prizes, or awards. In all cases of protracted involvement there must be some reinforcement that upon its receipt will tend to perpetuate the behavior.

The interconnected constructs discussed above, represent one of two mechanisms by which individuals derive motivation for self-change. This first mechanism can be described as a representation of future outcomes for contemplated behavior (Bandura, 1986). Through this symbolism and the constructs defined previously, an individual may
develop the intent to engage a specific behavior. Secondly, motivation is derived through the action of goal setting and subsequent self-evaluation (Bandura, 1986). This action represents self-controlling activity through which motivation is enhanced and forethought, or intent, can be translated into action (Bandura, 1986). Therefore this self-control construct may be described as the point at which symbolic representation becomes observable behavior, as such the association between intent and behavior is strengthened, as self-controlling mechanisms become refined. This forward causality proposes that the greater individual forethought and proficiency at self-influence lead to greater degrees of personal freedom. Required components for behavioral freedom are skills which are malleable within a psychological intervention (Bandura, 1986).

**Self-control:** Ability to self-regulate goal directed activity.

It may be said that the self-control construct has a minimum of three significant dimensions. These dimensions are goal setting, self-monitoring, and self-evaluation. Primary among these however is the act of goal setting. One must have a current, and specific intent for which they wish to carry on to behavioral fruition. Bandura makes specific requirements for appropriate behavioral goals within his text entitled, *Social Foundations for Thought and Action: A Social Cognitive Theory*, these are each discussed below (Bandura, 1986).
A goal must be under the control of the individual. Self-control mechanisms can not generate self-influence if the behavior prescribed is non-volitional. Goals created to address non-volitional behavior serves to only frustrate, as there are no opportunities for success. For a goal to be most powerful in generating self-influence, the goal must be meaningful to the person incorporating it. The person for whom the goal is intended must self-determine both the targeted behavior, and relative intensities pertaining to the behavior. A goal must be stated such that all elements of the goal are self-evident and unambiguous. An unambiguous goal statement allows self-evaluation to follow without difficulty. Temporal proximity for goal statements should be proximal in nature. Proximal goals permit immediate feedback for the self-evaluation process and assist in refining subsequent goal statements. Additionally, successful accomplishment of each goal is a mastery experience that is postulated to improve self-efficacy. High degrees of self-efficacy lead to a desire for greater challenge. An optimal goal, according to Bandura, should have a probability of successful outcome at 0.5. Proximal goals can lead to proximal alterations in self-efficacy that result in an ever-increasing complexity and expansion of behavior. (Bandura, 1986)

Self-monitoring is required of self-control efforts, the need for information pertaining to goal accomplishment in order for self-evaluation, information pertaining to the enjoyment derived from and effort required of the targeted behavior are important. Problems that systematically remove personal control for goal accomplishment must be recognized prior to any alteration in planning. Physical and social environments effect upon the actor should be monitored in order to actively manipulate problems that may inhibit goal accomplishment.
Self-evaluation is therefore made possible in part by successful goal setting and self-monitoring, this however, while necessary is insufficient to ensure that self-evaluation takes place. Self-evaluative influences do not operate unless activated (Bandura, 1986). Many factors may be present which exercise selective control over the activation of self-evaluation. Self-evaluation for instance has associated with it possibilities for demonstrated personal failure. As these personal failures may threaten our self-perceptions, self-evaluative mechanisms may temporarily be disengaged. Specific behaviors may not be valued by our social environment thereby limiting external reinforcement for failure or success followed by little need for self-evaluation.

When self-control is used there can be little doubt that success or movement toward success will be derived. Health Educators should address self-control skills across behaviors and over time for without such ability the social cognitivist must conclude that the individual has little behavioral freedom. Further all constructs within the Social Cognitive Theory must not be viewed as independent from each other, rather a reciprocal deterministic relation flows directly from the theoretical literature. Given the nature of this theory a most powerful population based intervention requires the manipulation of multiple constructs.
CHAPTER 3
METHODS

This chapter describes the methods and procedures that were used to conduct this study. Here the study methodology is presented using four major sections, Population, Design, Educational Content and Process, Statistical Procedures, and Potential Conclusions. Of particular importance in the discussion of the Population are the size and selection criteria for the study subjects. The discussion of the Research Design Section is intended to place in proper context the analysis of uncertainties associated with the process of group comparisons. In the Educational Process and Content Section information pertaining to the experimental and comparison curricula is presented. The criteria for program implementation are presented in the Statistical Procedures Section. Study hypothesis and the logic for proposed statistical procedures are included in the Statistical Procedures Section. Finally, by presenting the Potential Conclusions, interpretation of statistical analysis is foreshadowed.
Purpose of this Study

The purpose of this study was to test the ability of a Social Cognitive Theory-based educational treatment to increase the frequency of volitional moderate and vigorous physical exercise among high school students. Educational methods were used as the mechanism by which physical exercise participation can be enhanced. Theoretical constructs targeted by the educational treatment here include self-control, social situation, outcome expectations, and strength of self-efficacy. Implementation evaluation was used to determine the degree to which the educational treatment was delivered to students and received by students. Treatment construct validity evaluation was used to examine the degree to which the targeted Social Cognitive Theory constructs changed after implementation of the educational treatment. Behavioral evaluation examined the degree to which the frequency of volitional moderate and vigorous physical exercise changed following the implementation of the educational treatment.
Study Hypotheses

H₀: Group membership does not account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

Hₐ: Group membership does account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

H₀: Group membership does not account for significant variance in posttest measures of outcome expectation for physical exercise after variance that is shared with the pretest is controlled.

Hₐ: Group membership does account for significant variance in posttest measures of outcome expectation for physical exercise after variance that is shared with the pretest is controlled.

H₀: Group membership does not account for significant variance in posttest measures of social situation after variance that is shared with the pretest is controlled.

Hₐ: Group membership does account for significant variance in posttest measures of social situation after variance that is shared with the pretest is controlled.

H₀: Group membership does not account for significant variance in posttest measures of strength of self-efficacy after variance that is shared with the pretest is controlled.

Hₐ: Group membership does account for significant variance in posttest measures of strength of self-efficacy after variance that is shared with the pretest is controlled.

H₀: Experimental group posttest frequency of volitional moderate physical exercise is equal to the pretest value.

Hₐ: Experimental group posttest frequency of volitional moderate physical exercise is different than the pretest value.

H₀: Comparison group posttest frequency of volitional moderate physical exercise is equal to the pretest value.

Hₐ: Comparison group posttest frequency of volitional moderate physical exercise is different than the pretest value.
**H₀**: Experimental group posttest frequency of volitional vigorous physical exercise is equal to the pretest value.

**H₁**: Experimental group posttest frequency of volitional vigorous physical exercise is different than the pretest value.

**H₀**: Comparison group posttest frequency of volitional vigorous physical exercise is equal to the pretest value.

**H₁**: Comparison group posttest frequency of volitional vigorous physical exercise is different than the pretest value.

**H₀**: The proportion of students identified as sedentary at posttest is equal between groups.

**H₁**: The proportion of students identified as sedentary at posttest is lower among experimental group subjects than comparison group subjects.
Experimental Methods

This investigation of the impact of a Social Cognitive Theory-based educational treatment on increasing the frequency of volitional moderate and vigorous physical exercise among adolescent school students utilized quasi-experimental methods. In the following discussion of quasi-experimental methods the strengths and limitations of these methods are discussed.

The optimal method by which the study hypotheses should be evaluated is through the use of true experimental methods. True experimentation requires that large numbers of subjects be randomly assigned to study groups so that any pretest biases are uniformly distributed over the groups. In addition to the process of random subject assignment, the researcher must randomly assign the experimental treatment to one or more of the groups (Campbell & Stanley, 1963). Many true experimental designs provide strong control against both internal and external sources of invalidity (Campbell & Stanley, 1963). Unfortunately most often in educational research such strong control is unlikely. Educational practice does not often allow for individual students to be randomly assigned to a particular type of education. Only rarely would a school’s administration permit intact classrooms to be randomly assigned to different types of education. More commonly, students are assigned to classrooms according to other criterion unrelated to the experimental research. This limitation severely narrows the scope of research control and often precludes the use of true experimentation. Usually such work requires identifying alternative methodologies requiring lesser control but retaining the potential for legitimate comparison between educational techniques. Quasi-experimental research methods retain the possibility of legitimate comparisons while
relaxing the requirement for random assignment. With great care quasi-experimentation can be utilized when circumstances prohibit the use of true experimentation. The relaxed research control however places upon the researcher responsibility of assessment of various types of errors that weaken the validity of research conclusions. These sources of error have been separated into two general classifications, internal and external (Campbell & Stanley, 1963). Internal sources of error are those that limit the confidence in conclusions that identify a given treatment as the cause of a given effect (Campbell & Stanley, 1963). Internal sources of error include history, maturation, testing, instrumentation, statistical regression, experimental mortality, and selection maturation interaction (Campbell & Stanley, 1963). External sources of error limit the confidence with which we generalize results from one study to alternate populations, at other locations, in differing times (Campbell, 1963). Potential sources of external error include reactive effect of testing, selection experimental variable interaction, reactive arrangements of experimentation, and multiple-treatment interference (Campbell, 1963).
Explanation and Control for Threats to Internal Validity

Historical threats to internal validity are occurrences that act as spurious treatments and therefore render questionable all study interpretations. These spurious treatments might be active during the study time-frame and would then serve as potential modifiers of a dependent variable. Control for the history threat is often accomplished through the inclusion of a comparison group. One can select subjects in such a way as to permit the assumption that unplanned occurrences acting as treatments will more or less equally effect the entire population from which the potential subjects in this study are drawn. Thus the inclusion of a comparison group permits the determination of relative impact of the planned treatment independent of other spurious treatments (Campbell & Stanley, 1963).

Maturation is a source of potential internal invalidity as a function of the aging process. Alterations of the dependent variable may be caused not by the implemented treatment but rather by the biologic and psychological processes of maturation. Experience is often a teacher capable of changing our actions and thoughts. Assuming that subjects are of similar age, the inclusion of a comparison group provides an acceptable solution. In this case all subjects will age in a similar fashion, and such time-dependent changes on the dependent variable for comparison group subjects are attributable to the maturation process. As such the researcher can determine the effect of the treatment independent of the maturation process. Further, maturation sources of invalidity can be limited by utilization of a study period which is relatively short in duration, thereby limiting the effects of aging while under study (Campbell & Stanley, 1963).
Campbell and Stanley (1963) explain that testing of subjects may create an atmosphere in which alterations observed in the dependent variable confuse all interpretations. The process of testing may influence the observed scores obtained upon subsequent episodes of testing. Commonly this threat occurs within studies that utilize pretest data or repetitive posttest data. In some cases the most appropriate solution to this threat is to randomize subjects in terms of the level of treatment. This approach should make all groups equivalent in the context of the effects of testing because it dispenses with any benefits derived from the pretest. This solution is not available to most educational interventions. As presented previously, random assignment is riddled with problems of implementation. Another potential control for the testing threat is the incorporation of a comparison group that is given a pretest and posttest along with the experimental group. Using this method the effect of testing can be disentangled from the effect of treatment thereby strengthening subsequent conclusions.
Changes in testing instrumentation can lead to questions of internal validity. This may occur if an instrument is developed and validated at a time much earlier than its use (Campbell & Stanley, 1963). The period between validation and application may be great enough to bring doubt upon the current validity of the instrumentation. Additionally the length of time between applications within a single study may bring to question the current validity of the instrumentation. Further, if a given instrument is validated in a population dissimilar to a study population one must question the appropriateness of its use. One solution to the instrumentation threat to internal validity is to utilize measurement instruments that have evidence of current validity for the population under study. Additional control can be assured when a comparison group is included in the study design and both pretest and posttest are administered to both the experimental and comparison group (Campbell & Stanley, 1963).

When research questions address populations that can be considered outliers, a potential threat to internal validity is one of regression. On any measure obtained, scores can be considered to contain two distinct components, true score and error score. As such, all persons being measured when tested a second time will tend to regress closer to their true score (Campbell & Stanley, 1963). When a study population is determined according to scores which are at the extremes of a testing distribution it is more likely that the error score is directed such that the error serves to accentuate the rarity of the score. One must recognize that pretest scores on low functioning participants are likely to improve at posttest. This may not be due to the intervention but rather is a normal correction of the error score component of an observed score. In such a case the researcher would be incorrect to conclude that improvements observed among subjects,
particularly low scoring subjects, resulted from intervention. Control for this regression threat may be accomplished through the use of a comparison group and testing at both pre and post intervention. Assuming that both groups are equivalent at the pretest and that the degree of regression remains constant through posttest, differences would indicate a true treatment effect (Campbell & Stanley, 1963).

Subject mortality describes the dropping out or removal by the researcher of subjects from the study. Systematic removal of subjects who respond less substantially to the treatment condition thereby creates differential in dependent variable measures. Such differential may falsely indicate effectiveness of the imposed treatment resulting in diminished internal validity. The comparison group provides a mechanism by which biased subject removal can be detected. The mortality for each group must be measured against that of the comparison group (Campbell & Stanley, 1963). Because the comparison group is unaffected by the treatment, differential mortality is indicated by differences in mortality between the experimental and comparison groups.

When experimental and comparison groups consist of persons not equivalent upon measures of interest there exists a threat to internal validity. This occurs because differences on dependent variable measures may be falsely attributed to the imposed treatment. One must remember that observed differences may be attributable to characteristics not associated with the treatment. This is a threat that is readily corrected using the process of randomization between at least two levels of treatment. Problems associated with this method have previously been discussed in this paper (page 130) and in the literature (Cook & Campbell, 1979). Thus, randomization is a process available
only to laboratory researchers. An alternative solution is to gather data prior to as well as following application of the treatment. Any significant differences observed at the pretest serves to caution against the selection threat (Campbell & Stanley, 1963).

The selection threat may also interact with subject mortality. Subjects may be admitted into the experimental group after they have completed all treatment requirements. Subjects who feel that the requirements are applicable to their needs may be the predominant subjects that complete these requirements. In this case selection bias is a very real threat to internal validity. Rather than the educational treatment causing an improvement on the dependent variable it is some characteristic among the accepted experimental subjects that effected the observed change. Exploration of this potential selection threat, which stems from subject mortality, requires that differences between subjects who completed the experimental treatment be compared with the subjects who failed to complete the experimental treatment.

The selection threat may operate within this study as a result of a group differential in the percentage of athletic subjects. Within this study the primary dependent variables are frequency of volitional moderate physical exercise and frequency of volitional vigorous physical exercise. The term volitional indicates that for a bout of physical exercise to be recorded it must have been engaged in during non-school hours and not been associated with an organized sporting activity. It may be that athletic experimental and comparison subjects engage in physical exercise, however this physical exercise does not meet the definition for volitional physical exercise. In this case the athletic subjects may appear to be inactive when truly they are very active. In order to
explore the magnitude of the athletic bias in physical exercise frequency, athletic subjects must be identified, the percentage of athletes in each group calculated, and the quantity of volitional exercise examined between athletes and non-athletes be conducted by group.

The selection threat may also interact with the rate of maturation. Groups of subjects may appear to be similar at pretest but substantially different at posttest. Such an observation may incorrectly be attributed to treatment success if subjects between groups matured at a different rate. Within this study the selection maturation interaction threat to internal validity is not likely. This study was conducted over approximately fifteen weeks. Fifteen weeks is not likely to be enough time for meaningful physical, cognitive, or emotional maturation to take place.

**Issues Pertaining to External Validity**

External validity, or the confidence with which we generalize study results to additional populations, is often problematic in early-stage educational research. Brian Flay (1992) proposed a staged development for health education intervention efforts. Early efforts at behavioral intervention fall within the prototypical stage of development. Prototypical studies sacrifice external validity in order to develop programs that show promise. During early stages of intervention development effort is expended upon internal validity. As promising interventions are identified and further developed, additional money and effort may be allocated in order for external validity to be realized.
Design of this Study

The current study is classified as a prototypical study. Therefore a research design that provides substantial internal validity is used. Such a research design involves the use of a non-equivalent control group (Campbell, 1963). As presented earlier in this section the non-equivalent control group design provides ample control against the history, maturation, testing, instrumentation, mortality, and some forms of selection threats to internal validity.

Statistical Tests

Study hypotheses presented within this chapter are phrased such that hypothesis testing requires some form of analysis of variance statistic (ANOVA). Certain points, including the number of hypothesis which are to be tested and factors upon which conclusions are to be drawn, must be reviewed in order to determine specifically which type of ANOVA should be conducted.

At first glance, it appears that the number of study hypotheses in the present work requires multivariate analysis of variance (MANOVA). As the number of statistical tests required increase, the risk of making an alpha error is elevated. An alpha error is a probabilistic error in which a true null hypothesis is rejected in favor of it's false rival hypothesis. This effect can be controlled by an appropriate choice of the alpha level before the initiation of the study. Commonly in the behavioral and social sciences the alpha level is set at five percent. In setting the alpha level at five percent the risk of rejecting a true null hypothesis occurs five times out of one hundred trials. Conversely, ninety five percent of the time rejection of the null hypothesis can be attributed to the null
hypothesis being false. Given the probabilistic nature of hypothesis testing one must assume that when the data are subjected to more than one statistical test the risk of committing an alpha error at least once increases. This risk continues to increase each time the data are subjected to an additional statistical test. If the number of statistical tests to which the data will be subjected is greater than one, it is possible to control for an escalating alpha level through the use of a multivariate analysis of variance, (MANOVA). The MANOVA examines differences in variance between groups on multiple dependent variables simultaneously. In the current study where there are six study hypotheses, the risk of making an alpha error is of the order of twenty percent (assuming a .3 correlation between each pair of dependent variables and a five percent alpha level for each hypothesis). This is of the order of what one would expect in serially testing six hypotheses each involving one pair of the six variables using the bivariate analysis (assuming no correlations among the pairs of variables). Hence, in this study, the much simpler bivariate analysis was chosen rather than the multivariate analysis.

In testing the study hypotheses using the pretest posttest non-equivalent comparison group design, one must consider the chance that the experimental and comparison groups differ significantly from one another at the pretest. This is an indication that the study groups are truly non-equivalent. If this is so one must be concerned with the selection threat to internal validity. There are three possible courses of action if true differences between groups are present at pretest. One may choose to discontinue the study in favor of finding a more appropriate study population. The researcher may also choose to make known the differences between groups and utilize an analysis of variance (ANOVA) statistic. A third solution is to utilize the analysis of
covariance (ANCOVA). Using the ANCOVA the researcher is able to control for pretest differences prior to determination of posttest differences. This latter solution also makes known the potential for a selection threat to internal validity to which all quasi-experimental studies are susceptible. Therefore the current study controlled for pretest differences using the ANCOVA.

The statistic derived from an analysis of covariance procedure indicates the amount of variance that is explained by covariant and grouping factors. In this study the quantity of variance explained by the "group" factor is set against the magnitude of variance that remained unexplained by either the covariant or group factor. If the resulting proportion is large it can be concluded that the implemented treatment resulted in a group difference. Specific study design is a one-factor ANCOVA in which pretest measures on each dependent variable serve as the covariant. The analysis of covariance statistic was used to analyze the following study null hypotheses.

\( H_0: \) Group membership does not account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

\( H_0: \) Group membership does not account for significant variance in posttest measures of outcome expectation for physical exercise after variance that is shared with the pretest is controlled.

\( H_0: \) Group membership does not account for significant variance in posttest measures of social situation after variance that is shared with the pretest is controlled.

\( H_0: \) Group membership does not account for significant variance in posttest measures of strength of self-efficacy after variance that is shared with the pretest is controlled.
While the analysis of covariance statistic is an optimal procedure for this study the statistic requires that the pretest to posttest correlation for the experimental and comparison group be equivalent on each dependent variable. During this study it was observed that the experimental and comparison group pretest to posttest correlation was not equivalent for the variables frequency of volitional moderate physical exercise and frequency of volitional vigorous physical exercise. Having recognized this inconsistency it was determined that the use of the analysis of covariance statistic was not desirable for use upon the variables of physical exercise. Preference was given to the paired t-test. Using this type of t-test the significance of within group difference between pretest and posttest physical exercise was possible. Evaluation as to the effectiveness of the experimental educational treatment depended on the statistical comparison of behavior change within each group as well as a logical analysis of differences in physical exercise participation between groups. The paired t-test statistic was used to analyze the following study null hypotheses.

\[ H_0: \text{Comparison group posttest frequency of volitional moderate physical exercise is equal to the pretest value.} \]

\[ H_0: \text{Experimental group posttest frequency of volitional vigorous physical exercise is equal to the pretest value.} \]

The study hypothesis that examines the distribution of sedentary subjects between groups requires the use of the Chi-Square test of independence statistic. This statistic is used in order to determine if the distribution between groups on nominal variables is different. In the current case, whether the distribution of sedentary subjects after the
implementation of the educational treatment is different between the experimental and comparison groups. An individual is identified as sedentary if at posttest they report zero bouts of either moderate or vigorous physical exercise. The Chi-Square test of independence statistic was used to analyze the following study hypothesis.

\[ H_0: \] The proportion of students identified as sedentary at posttest is equal between groups.

**Population**

Participation within this study was requested of all public high schools that offered physical education in Franklin County, State of Ohio. A recruitment letter was developed and mailed to the physical education curriculum director at each high school. Within this letter the purpose of the study was presented and expectations explained. A self-addressed stamped envelope was included so interested directors could respond. Follow up with interested teachers took place in person at the teacher's place of employment. Preference was given to high schools that had multiple entry level physical education classrooms, and to teachers demonstrating a high degree of interested in implementing the educational treatment. Further, preference was given to high schools that were similar in regard to other interested high schools on the demographic variables student sex, race and socioeconomic status. It was expected that by giving preference to these high schools the degree to which participating high schools would differ at pretest would be limited thus controlling for the selection threat to internal validity.
Calculation of Sample Size

Prior to the implementation of this study an estimation of the number of subjects that were necessary to adequately test the study hypotheses. This estimate required the magnitude for statistical power to be chosen, calculation of the expected treatment effect, commitment to an alpha level, and specification of the degrees of freedom that were to be used in the numerator of the resulting F ratio. Within this section these values are provided and an estimate of the necessary number of subjects determined.

In order to appropriately test the study hypotheses there must be reasonable confidence that an expected treatment effect can be detected. The confidence that an expected treatment effect can be detected is referred to as statistical power (Murphy, 1998). Most often within the behavioral and social sciences the desired level of statistical power is eighty percent (Murphy, 1998). When statistical power is of this magnitude there is an eighty percent chance that a false null hypothesis will be identified and subsequently rejected. Within this study the desired statistical power was set at eighty percent.
Using the literature reviewed in an earlier section of this paper it is not uncommon for educational treatments to have a minimal treatment effect on adolescent physical exercise participation. Treatment effect is a term used to describe the percent of the total variance in the dependent variable that is explained by a treatment and is abbreviated PV (Murphy, 1998). When a treatment explains between one and ten percent of the variance in a dependent variable, PV is between .01 and .10, the magnitude of the treatment effect is said to be small (Murphy, 1998). Using this convention it was anticipated that the treatment effect for this study on the primary dependent variable, frequency of volitional moderate and vigorous physical exercise, would be small. Specifically the anticipated treatment effect was .05. Five percent of the variance in frequency of volitional moderate and vigorous physical exercise should be attributable to the educational treatment.

Another factor used to estimate the number of subjects needed to adequately test the study hypothesis is the alpha level. The alpha level indicates the risk one is willing to take when rejecting a null hypothesis. Commonly in behavioral science the alpha level is set at .05. This alpha level indicates that when a null hypothesis is rejected in favor of its rival the researcher is willing to be incorrect five times in one hundred. Within this study the alpha level was set at the .05 level.

Finally in order to estimate the number of subjects needed to adequately test the study hypotheses it was necessary to know across how many groups the subjects were to be divided. When the subject population is divided between a greater quantity of groups it is necessary to include additional subjects. Within this study there are two treatment conditions, experimental and comparison. Thus the group factor in this study was expected to have one degree of freedom.
In summary, to estimate the number of subjects needed to adequately test the study hypotheses, it was necessary to set a desirable level of statistical power, anticipate the magnitude of treatment effect, set the alpha level, and determine the degrees of freedom for the group factor. Within this study the desired level of statistical power was eighty percent, estimated treatment effect was .05, alpha level was set at .05, and there was one degree of freedom for the group factor. Using the values described it was possible to estimate the necessary number of subjects to be 154 (Murphy, 1998). Estimation is accomplished using a chart of tabled values (Murphy, 1998).

In consideration of subject mortality it was desirable to engage in over-sampling in order to secure at posttest the necessary number of subjects. Common causes for subject mortality include student absenteeism and teacher implementation non-compliance. School districts targeted in this study were expected to have low teacher implementation non-compliance but substantial student absenteeism. It was estimated that fifty percent of students who complete the pretest would not complete the requirements necessary to be considered satisfactorily treated. Students not meeting these requirements were not to be included in the posttest analysis. In order to offset subject mortality every attempt was made to ensure that at pretest both the experimental and comparison groups consisted of 154 subjects. This degree of over-sampling was expected to allow for substantial subject non-compliance while preserving the necessary seventy-seven subjects in each group for posttest analysis.
Educational Content and Process

Teachers of introductory physical education classes were recruited to voluntarily participate in this study. All classrooms participating in this study were within Franklin county, state of Ohio. Participating classes were divided into two groups, experimental and comparison. Comparison and experimental groups were determined by convenience. Students within each group were exposed to similar physical education curricula but the experimental students experienced an additional curricular component that was derived from the Social Cognitive Theory. Each group participated in physical education for a minimum of ten weeks. Within the following sections the reader is presented with the specific content to which the students were exposed and the process by which course lessons were delivered.

Comparison Group Physical Education Curriculum

Students enrolled in a school assigned to the comparison condition received physical education lessons for ten weeks. Students attended class the equivalent of five days each week. Each lesson was approximately forty-eight minutes in duration. The classroom teachers in consultation with their school requirements were to develop specific class lessons. While classroom teachers within the comparison condition developed their specific class lessons, these lessons were expected to follow a general outline. Each class experience begins with the students changing into exercise clothing. Class attendance is taken after which the teacher lectures for a brief time on some aspect of the sporting event that is engaged by students. Students proceed to participate in the
sporting activity while the teacher assists students in developing necessary skills. Student participation in the sporting activity consumes the majority of class time, approximately thirty-five minutes. Each class concludes with students changing back into their school cloths.

Experimental Group Physical Education Curriculum

Students enrolled in a school assigned to the experimental condition received physical education lessons for the ten weeks of the study. The vast majority of class time was expected to be very similar to the comparison physical education curriculum. Students were expected to attend physical education class the equivalent of five days each week. Each lesson was to last approximately forty-eight minutes. The following is a description of the experimental group physical education curriculum. Teachers were to seek to improve knowledge of and skills pertaining to team sporting activities. During four class days a week students were expected to change into exercise clothing. Teachers began class with a brief lecture on sport fundamentals after which students participated in a specific team sporting activity. Following this, time is allocated for students to change out of their exercise clothing. One day each week the teacher used ten to fifteen minutes of class time to implement the experimental educational treatment. The experimental educational treatment is comprised of two sections, mini-lessons and exercise incentive program. A mini-lesson was delivered one day each week for ten weeks. Each mini-lesson was designed to address specific Social Cognitive Theory constructs. Targeted theoretical constructs included self-control, social situation, outcome expectation, and strength of self-efficacy. Self-control was addressed by developing skills that are useful in directing personal exercise efforts. The self-controlling skills included goal setting,
gaining and maintaining social support, securing intrinsic and extrinsic reinforcements, self-monitoring, and planning to overcome common barriers to physical exercise. Outcome expectation was addressed by encouraging students to challenge their preconceived perceptions pertaining to the outcomes associated with physical exercise. Social situation was addressed by encouraging students to engage family members and friends in their physical exercise effort. Strength of self-efficacy was addressed by having students anticipate potential barriers to physical exercise, and plan ways to overcome these barriers. Each of the ten mini-lessons lasted for approximately fifteen minutes. Experimental students were also encouraged to participate in an exercise incentive program. This exercise incentive program was designed to provide students with an opportunity to gain mastery experiences in the areas addressed during the mini-lessons. In the exercise incentive program students were asked to set a personal exercise goal for a week, and then set about meeting their exercise goal using the knowledge developed within the classroom. Upon successful completion of this personalized exercise program students were reinforced with small gifts provided by this author.
Curriculum Development/Implementation Strategies

As part of this investigation an experimental educational treatment was developed using as foundation the Social Cognitive Theory. At the outset of this section the developmental process by which the experimental educational treatment was developed is presented. In later sections, the strategies used during the implementation phase of this educational treatment are discussed.

Development Strategies

Using the literature reviewed in chapter two this author prepared a brief curricular outline. Having completed the curricular outline four physical education program directors were recruited from public high schools in Franklin county, state of Ohio. Interested physical education program directors formed an Educator Advisory Committee. Members of this Educator Advisory Committee assisted in further development and later refinement of the experimental educational treatment. During early stages this author met individually with each member of the Educator Advisory Committee. These meetings allowed for general discussion of the mission of the curriculum, review of curricular outline, and permitted the committee member to suggest specific recommendations pertaining to potential learning experiences.

Suggestions provided by each member were used to develop a more complete draft of the experimental treatment. Once prepared, this new draft was distributed to each member of the Educator Advisory Committee. After providing one week for review this author met for a second time with each member. This meeting was used in order to discuss the merits of each lesson plan within the experimental educational treatment.
After confirming that each member of the Educator Advisory Committee was satisfied with the educational treatment, the Ohio State University Faculty Dissertation Committee met in order to approve the continuation of this study. Having been granted approval from the dissertation committee, approval from the internal review board of The Ohio State University was requested and received.

Having received approval from each oversight committee, the recruitment of physical education teachers was initiated. Physical education teachers within the schools that were represented on the Educator Advisory Committee were contacted. Interested teachers met privately with this author to discuss the importance and expectations pertaining to their involvement in the implementation of this experimental educational treatment. Each interested teacher was given a copy of the educational treatment teacher’s manual in order to become familiar with the lessons. In order to ensure an adequate number of subjects, sixteen physical education teachers from additional high schools were recruited by mail.

**Implementation**

Each participating classroom teacher provided to this author course enrollment information. Course enrollment information was used to organize the tracking of student participation throughout the implementation of the educational treatment. One week prior to the initiation of the curriculum, each of the educators had a classroom organizational meeting with this author. This organizational meeting was to permit the classroom teacher an opportunity to review the curricular lessons and evaluation procedures one more time. The curriculum was initiated at the discretion of the
classroom teacher and continued for a period of ten weeks. One day each week a lesson from the experimental educational treatment was presented to students. Each lesson targeted one of the foundational Social Cognitive Theory constructs. All educational experiences were to be delivered as expressed in the curricular teacher's manual (Appendix B). Teachers were expected to implement the exercise incentive program over five consecutive weeks. As a part of the exercise incentive program students were expected to set a weekly exercise goal, and monitor their progress toward this expressed goal. Successful students were provided an inexpensive reinforcement by this author (Appendix E). Each week one classroom was chosen randomly for review of implementation fidelity. During this review of implementation fidelity all activities pertaining to the experimental educational treatment were audio-recorded. Audio-recordings were transcribed and evaluated for the attainment of specified teaching objectives (Appendix A).
Implementation Time-Line of the Experimental Educational Treatment

1. Pretest Educational Assessment Day  Week: #1; Monday
   A. Strength of Self-efficacy
   B. Social Situation
   C. Self-regulation
   D. Outcome Expectation

2. Lesson #1: five class days following pretest  Week: #2; Tuesday
   Title: Identification of moderate and vigorous exercise
   In Class:
   A. Calculate moderate & vigorous pulse.
   B. Chart pulse for light, moderate, vigorous exercise.
   Homework:
   A. Calculate moderate & vigorous pulse for parent.
   B. Discuss types of exercise that are moderate, and hard.

3. Lesson #2: Instructions on Reporting Exercise  Week: #2; Thursday
   Title: Instruction on how to report daily exercise activity
   In Class:
   A. Students are introduced to each of the three sheets in exercise self-report instrument.
   B. Students review each of the three activity sheets.
   C. Teacher walks students through activity recall.
   D. Teacher gives example.
   E. Students recall previous days activities.
   F. Students turn in activity recall #1.
   Homework:
   A. Students complete activity recall #2
4. Exercise Log Return  

Week #2; Friday:

In Class:
A. Students turn in activity recall #2.

Homework:
A. Students complete activity recall #3, #4, #5.

5. Exercise Log Return  

Week #3; Monday

In Class:
A. Students turn in activity recall #3, #4, #5.

Homework:
A. Students complete activity recall #6.

6. Exercise Log Return  

Week #3; Tuesday

In Class:
A. Students turn in activity recall #6.

Homework:
A. Students complete activity recall #7.

7. Exercise Log Return  

Week #3; Wednesday

In Class:
A. Students turn in activity recall #7.
8. Lesson #3: Mini-lesson  
Week #4; Tuesday  
Title: Exercise Stage of Change

In Class:
A. Students do exercise stage of change worksheet.
B. Students identify their stage of change.
C. Teacher discuss exercise drop out rates across life.
D. Teacher discuss purpose of these lessons.
E. Students turn in stage of change worksheet.

Homework:
A. Stage of change worksheet with parents
B. Describe parental beliefs about exercise

9. Lesson #4: Mini-lesson  
Week #5; Tuesday  
Title: Incentive Program kick off day

In Class:
A. Organized athletics does not qualify for reinforcement.
B. Adult must sign off that exercise goal is accomplished.
C. Teacher will keep a chart of weeks of student goal achievement.
D. Rewards are given only once each week.

Homework:
A. Students write Incentive Goal #1
10. Incentive Hand In Day  Week #6; Monday

In Class:
A. Students turn in Homework.
B. Students turn in Incentive Goal #1.

Homework:
A. Students create Incentive Goal #2.

11. Incentive distribution day #1  Week #6; Tuesday

In Class:
A. Teacher distributes reward for those accomplishing their weeks exercise goal.

12. Lesson #5 Mini-lesson  Week #6; Wednesday
Title: Self-regulation overview

In Class:
A. Teacher lectures on the role of each component.
   1. Goal Setting
   2. Self-monitoring
   3. Social Support manipulation
   4. Planning to overcome barriers
   5. Reinforcement

Homework:
A. Students identify a method by which they will use each self-regulation component.
13. Incentive Hand In Day  Week #7; Monday

In Class:
   A. Students turn in Homework.
   B. Students turn in Incentive Goal #2.

Homework:
   A. Students create Incentive Goal #3.

14. Incentive distribution day #2  Week #7; Tuesday

In Class:
   A. Teacher distributes reward for those accomplishing their weeks exercise goal.

15. Lesson #7 Mini-lesson  Week #7; Wednesday
Title: Reasons to exercise

In Class:
   A. Student rank orders reasons to exercise.

   B. Student rank orders barriers to exercise.

   C. Teacher lectures on the role of these two components of self-regulation.

16. Incentive hand in day #3  Week #8; Monday

In Class:
   A. Students turn in Incentive Goal #3.

Homework:
   A. Students create Incentive Goal #4.
17. Incentive distribution day #3  

**Week #8; Tuesday**

In Class:
A. Teacher distributes reward for those accomplishing their weeks exercise goal.

18. Lesson #6: Mini-lesson  

**Week #8; Wednesday**  
**Title:** Goal Setting for Exercise

In Class:
A. Students are taught the 3 components of a goal
   1. What exercise
   2. How long / Duration
   3. Which day / Time of day

B. Students are taught the 3 criteria for a good goal
   1. Meaningful fitness benefit
   2. Enjoyable
   3. Within your control

C. Since you must find the exercise enjoyable, remember the seven reasons to exercise in mind.

D. Students write an acceptable goal

**Homework:**
A. Student and parent are to complete explanation of goal component.

19. Incentive Hand In Day  

**Week #9; Monday**

In Class:
A. Students turn in Incentive Goal #4.

**Homework:**
A. Students create Incentive Goal #5.
20. Incentive distribution day #4  Week #9; Tuesday

In Class:
   A. Teacher distributes reward for those accomplishing their weeks exercise goal.

21. Lesson #7: Mini-lesson  Week #9; Wednesday
   Title: Reasons to Exercise

In Class:
   A. Students complete the "Why They Exercise" worksheet.

Homework: None

22. Incentive Hand In Day  Week #10; Monday

In Class:
   A. Students turn in Incentive Goal #5.

23. Incentive distribution day #5  Week #10; Tuesday

In Class:
   A. Teacher distributes reward for those accomplishing their weeks exercise goal.
Lesson #8 Mini-lesson

Week #10; Wednesday

Title: Social Support Manipulation

In Class:
A. Students complete the worksheet, social support.

B. Teacher discusses importance of getting others to help us continue to exercise.

C. Teacher helps to identify specific persons that could help.

Homework:
A. Students provide a list of persons which could help them exercise regularly.

B. Students define the exact way each person could help them exercise regularly.
25. Lesson #9: Mini-lesson
Title: Overcoming Barriers

Week #11; Wednesday

In Class:
A. Teacher lecture on taking you plan for exercise, goal, and expecting problems to come up.

B. Teacher lecture once you expect problems, plan ways to overcome these exercise barriers.

C. Teacher presents most common barriers identified within earlier class.
   1. Time
   2. Weather
   3. Boring

Homework:
A. Exercise is completed in which
   1. Exercise goal is given
   2. Barrier is given
   3. Student must ID overcoming strategy
   4. Student describes specific method

26. Lesson #10 Mini-lesson
Title: Self-monitoring

Week #12; Wednesday

In Class:
A. Teacher lectures on each component of self-monitoring.

Homework:
A. Students complete self-monitoring homework for next seven days. This is all on one piece of paper.
27. Educational Assessment Day: **Week #13; Wednesday**

In Class:

A. Students complete
   1. Exercise Stage of Change
   2. Social Support
   3. Self-regulation
   4. Reasons to Exercise
   5. Self-efficacy to overcome barriers
   6. Day one of posttest daily recall of exercise

28. For the next 6 days students are to complete daily physical activity log
Study Assessment Procedures

The purpose of this study was to test the ability of a Social Cognitive Theory-based educational treatment to increase the frequency of volitional moderate and vigorous physical exercise among adolescent students attending introductory high school physical education classes. Implementation evaluation was conducted in order to determine the degree to which the designed educational treatment was delivered to students and received by students. Treatment construct validity evaluation was conducted in order to determine the degree to which the targeted Social Cognitive Theory constructs changed after the implementation of the educational treatment. Behavioral evaluation was conducted in order to determine the degree to which the frequency of volitional moderate and vigorous physical exercise changed following implementation of the educational treatment.

Implementation Assessment

Type III errors, errors of attribution, were described by Basch et al. (1985) as errors in which specific outcomes are inappropriately attributed to a treatment. In health education a type III error would be committed if an author attributes observed behavioral changes to an educational intervention that was not implemented. Results associated with an educational intervention can not logically be attributed to a standardized version unless evidence is provided that demonstrates how the intervention was implemented.
To account for type III errors and raise the confidence with which increases in physical exercise participation are attributed to the designed educational treatment an assessment of implementation was conducted. During each lesson teachers were expected to accomplish specific tasks, teaching objectives, without which the educational treatment cannot be concluded as being adequately implemented. These teaching objectives are listed on the title page of each lesson within the curriculum (Appendix B). Space was provided within this list for teachers to identify the teaching objectives accomplished. Teachers were expected to accomplish a minimum of eighty percent of the teaching objectives. Teachers not completing eighty percent of the teaching objectives were removed from the study for not adequately implementing the educational treatment. Teachers were also expected to have their students complete the required pretests and posttests.

Although it is important to document the degree to which the teachers accomplished the teaching objectives, it is also important to consider the degree to which students participated in the educational experiences. Each student was graded on the number of learning objectives completed. These learning objectives are listed on the first page of each lesson (Appendix B). Students were expected to complete at least eighty percent of the learning objectives. Students that failed to complete eighty percent of the learning objectives were removed from the study due to inadequate participation in the educational treatment.
Treatment Construct Validity Evaluation

After implementation of the educational treatment it was presumed that measures of the targeted Social Cognitive Theory constructs would increase significantly among experimental subjects. Evaluation of the response in the targeted theoretical constructs enabled the determination of treatment construct validity (Cook & Campbell, 1979).

Within the designed educational treatment the Social Cognitive Theory constructs, strength of self-efficacy, social situation, self-control, and outcome expectations, are targeted by educational experiences. Only if each of the four targeted constructs were altered in the expected direction was it be concluded that the treatment was fully construct valid. If the curriculum is less than fully construct valid, the specific areas in which the curriculum is demonstrated to be construct valid was noted. Possibilities follow.
Behavioral Evaluation

The primary purpose of this study was to determine the effectiveness of a Social Cognitive Theory-based educational treatment to increase the frequency of volitional moderate and vigorous physical exercise among adolescent students attending introductory physical educational classes. In order to achieve the primary purpose of this study it was necessary to conduct a behavioral evaluation. After implementation of the experimental educational treatment frequency of voluntary moderate physical exercise was examined. Subsequent behavioral evaluation focused on the dependent variable frequency of voluntary vigorous physical exercise. The instrument from which these evaluations was based was the self-report instrument, Previous Day Physical Activity
previously developed and validated (Weston et al., 1997). In order for an activity to be considered volitional physical exercise the activity must have occurred during non-school hours, and must be an appropriate selection on the Previous Days Physical Activity Recall. In addition to the type of activity identified, the activity must have been reported as medium to hard intensity and engaged in for at least fifteen continuous minutes. Activities listed within the Previous Days Physical Activity Recall instrument’s Activity Listing page that are considered volitional include selections within the Play/Recreational or Exercise/Workout category. Within these categories activity numbers twenty-six and thirty-four are not considered volitional and therefore are not counted as a bout of volitional physical exercise.

When a student reported an activity that was commensurate with volitional physical exercise and of medium intensity an episode of volitional moderate physical exercise was recorded. Activities number twenty-one, twenty-two, twenty-seven, and thirty-two are presumed to be of moderate intensity even if the subject identifies hard intensity. A maximum of one bout of moderate physical exercise was allowed for a subject each day. The range of integers allowed for the dependent variable moderate physical exercise is zero through seven.

An episode of volitional vigorous physical exercise was recorded when a subject reported an activity that met the criteria for volitional physical exercise and was of hard intensity. Activity numbers thirty-five, thirty-three, and thirty are presumed to be of
vigorous intensity even if the subject identified medium intensity. A maximum of one
episode of vigorous physical exercise was allowed for a subject each day. The range of
integers allowed for the dependent variable vigorous physical exercise was zero through
seven.

Data Entry

Data were entered into the computer software, Statistical Package for the Social
Sciences (SPSS). Frequency of volitional physical exercise was noted for each subject
using the data obtained from the, Previous Days Physical Activity Recall Instrument
(Weston & Petosa, 1997). In order for an activity to have been considered volitional
physical exercise the reported activity must have occurred during non-school hours and
represent an activity defined as physical exercise (see page 167). The activity must also
be reported as being of medium to hard intensity. A recorded episode of volitional
physical exercise must have been engaged in for at least fifteen continuous minutes.
Activities listed within the Previous Days Physical Activity Recall instrument’s Activity
Listing page that are considered volitional physical exercise include activity numbers
twenty-one through twenty-five, twenty-seven through thirty-three, and activity number
thirty-five.

An episode of volitional moderate physical exercise was recorded when a subject
reported an activity that met the criteria for volitional physical exercise and was reported
to be of medium intensity. It was presumed that activity twenty-one, twenty-two, twenty-
seven, and thirty-two were moderate intensity activities even when the subject reported it
to be hard intensity. A maximum of one episode of moderate physical exercise was allowed for a subject each day. The range of integers allowed for the dependent variable frequency of volitional moderate physical exercise was zero through seven.

An episode of vigorous physical exercise was recorded when a subject reported an activity that met the criteria for volitional physical exercise and was reported to be of hard intensity. It was presumed that activity numbers thirty-five, thirty-three, and thirty were vigorous even if the subject identified the intensity to be moderate. A maximum of one bout of vigorous physical exercise was allowed each day. The range of integers allowed for the dependent variable vigorous physical exercise was zero through seven.

Upon the spreadsheet in which data is to be stored the dependent variable frequency of volitional moderate physical exercise was abbreviated using the initials mpe. Moderate physical exercise was further specified as pretest or posttest using the initials pr for pretest, and pt for posttest. Using this system the initials prmpe represented the variable pretest frequency of volitional moderate physical exercise. The initials, ptmpe represented the variable posttest frequency of volitional moderate physical exercise. The dependent variable frequency of volitional vigorous physical exercise was abbreviated using the initials, vpe. Vigorous physical exercise was further specified as pretest or posttest using the initials, pr for pretest, and pt for posttest. Pretest frequency of volitional vigorous physical exercise was abbreviated using the initials, prvpe. Posttest vigorous physical exercise was abbreviated using the initials, ptvpe.
Data representing the dependent variable self-control were entered according to each dimension. Self-control is comprised of five dimensions, a seven item scale for self-monitoring, seven item scale for goal setting, thirteen item scale for social support, five item scale for rewards, and a six item scale for overcoming barriers. Subjects responded to each sub-scale using a six-point Likert-type scale scores items. Potential responses for each item ranged from “never” to “always”. Responses were given a numeric value according to the following rule, never = 0, rarely = 1, unusual = 2, some = 3, often = 4, always = 5. Each item within the instrument was considered a variable that were identified using an abbreviation. Abbreviations for each item was identified as either pretest or posttest data for the self-control sub-scale it represented. Each item was identified further by the specific item number is identified. Using this coding system the abbreviations for the seven items contained in the self-monitoring sub-scale are were of the following form, prscsm1, or ptscsm1. The abbreviations for the seven items in the goal setting sub-scale were of the following form prscgs1 or ptscgs1 depending on the test. Abbreviations for the items comprising the social support sub-scale of the self-control instrument were of the following form prscss1 or ptscss1 depending on the test. Abbreviations for the items comprising the self-control rewards sub-scale were of the following form prscrl1 or ptscrl1 depending on the test. Abbreviation for the items comprising the self-control overcoming barriers sub-scale were of the following form prscob1 or ptscob1 depending on the test. Total score for each pretest sub-scale was coded using the abbreviations prscsmt, prscgst, prscsst, prscrt, prscobt. Total score for each posttest sub-scale were coded using the abbreviations ptscsmt, ptscgst, ptscsst, ptscrt, ptscobt. Total self-control for physical exercise at pretest and posttest were coded.
as variables using the abbreviations prsct and ptsct respectively. A complete list of all item abbreviations for the self-control instrument is provided (Appendix G). Total self-control for physical exercise was calculated by simply summing the sub-scales after each sub-scale was recalculated so that potential ranges were between zero and 100.

The dependent variable outcome expectation for physical exercise was obtained using a six-point Likert-type scale. Subjects were asked to identify a response for each item that ranged from, “never happens”, to “always happens”. Each selection is assigned a numeric value using the following rule, never happens = 0, rarely happens = 1, occasionally happens = 2, often happens = 3, usually happens = 4, always happens = 5.

The outcome expectation instrument is a multi-dimensional instrument with six sub-scales. Each sub-scale contained five items. The six sub-scales are relaxation, fitness, beautiful movement, thrills, competition, social continuation, and social growth. Each item in each sub-scale was abbreviated according to the instrument and sub-scale it represents. Each item abbreviation also included a number that identified the item number it represented. Using this format for item abbreviation the first item within the pretest for outcome expectation relaxation sub-scale was identified as proer1. The first item within the posttest outcome expectation for fitness sub-scale is identified as proef1. The first item within the posttest for outcome expectation beautiful movement sub-scale is identified as proebm1. The first item within the pretest for outcome expectation thrills sub-scale is identified as proet1. The first item within the pretest for outcome expectation competition sub-scale is identified as proec1. The first item within the posttest for outcome expectation for social continuation sub-scale is identified as proescl. The first item within the pretest for outcome expectation for social growth sub-scale is identified
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Social situation for physical exercise is a uni-dimensional instrument that served as one dependent variable. Measures of social situation were obtained using an instrument containing eight items. Subjects are asked to respond to each item using a five-point Likert-type scale. Potential responses ranged from “never” to “always”. Each item response was assigned a numeric value using the following rule, never = 0, rarely = 1, sometimes = 2, often = 3, always = 4. Each item was coded according to the instrument and the item number it represented. Using this system of assigning item abbreviations the first item on the pretest social situation instrument was abbreviated prssl. The first item on the posttest social situation instrument was abbreviated ptssl. Total social situation for physical exercise at pretest was abbreviated
prsst. Total social situation for physical exercise at posttest was abbreviated ptsst. Total social situation for physical exercise will be calculated by summing subject responses to each item. A complete list of the abbreviations used for the social situation instrument is provided (Appendix G).

Strength of self-efficacy for physical exercise is a uni-dimensional instrument that served as a dependent variable. Measures of strength of self-efficacy were obtained using an instrument containing four items. Subjects are asked to respond to each item using a five-point Likert-type scale. Potential responses ranged from “never” to “always”. Each item response was assigned a numeric value using the following rule, never = 0, rarely = 1, sometimes = 2, often = 3, always = 4. Data obtained on each item was recorded as a variable. Each item was abbreviated according to the instrument and item-number it represents. Using this system the first item on the strength of self-efficacy instrument at pretest was abbreviated prssel. The first item on the strength of self-efficacy at posttest was abbreviated ptssel. Total strength of self-efficacy for physical exercise at pretest was abbreviated prsset. Total strength of self-efficacy for physical exercise at posttest was abbreviated ptsset. Total strength of self-efficacy was calculated by summing the values for each item within the instrument. A complete list of the abbreviations used for the strength of self-efficacy instrument is provided (Appendix G).
Evaluation of Validity and Reliability for Construct Assessment Instrumentation

Pretest data obtained by using the instruments that measured the targeted theoretical constructs, self-control, social situation, strength of self-efficacy, and outcome expectations were evaluated for specific validity and reliability properties. Each instrument was evaluated for construct validity and reliability. These properties were calculated using Chronbach's alpha.

Internal reliability is the degree to which an instrument's total variance is captured by item variance. Instruments with strong reliability coefficients provide scores in which large sections of the total test variance is captured by subject's true ability. A common formula for this reliability coefficient is Chronbach alpha. Each of the instruments utilized within this project had reliability coefficients calculated. Each instrument was demonstrated to have a Chronbach alpha value equal to or greater than .70. The construct validity of each item was confirmed after recalculating the instrument's internal reliability after data contributed by the item had been removed from the analysis. In the case of a well-constructed instrument the reliability value will not increase substantially when any one item is removed. If the instrument's reliability value does increase dramatically it can be concluded that the item which has been removed contributed excessive error variance. Contribution of an excessive quantity of error variance indicates that the item does not measure the same object that the remaining items measure.
Examination of Selection Bias

Earlier in this chapter the selection threat due to subject mortality was discussed. In order to examine the potential impact of this threat on this study's conclusions an evaluation was conducted. This evaluation required that subject pretest data be examined for differences between experimental subjects that failed to complete the treatment requirements and experimental subjects that completed the treatment requirements. A second evaluation was conducted on comparison group pretest data for differences between subjects included in the final comparison group and those who were excluded from the final comparison group. These evaluations were only possible for subjects that completed and returned pretest data. Evaluations for this selection bias utilized the independent samples t-test. No evaluation is possible for differences between subjects that failed to return pretest data and those who were included in the final experimental group or final comparison group.

Examination of Athletic Bias

Earlier in this chapter the potential for an athletic bias was discussed. The potential for underreporting physical exercise was possible among athletic subjects. This possibility was caused due to the definition of volitional physical exercise. If athletic subjects chose to exercise only in the context of organized athletics they would appear to be less active than they truly were. If the percentage of athletic subjects was substantially different between groups this underreporting bias could effect the conclusions of this study. In order to determine the magnitude of this athletic bias an evaluation was conducted. Subjects were identified as an athlete if they reported participating in an
organized sporting activity three or more times each week. Subjects were evaluated for athletic participation at the pretest and at posttest. Having identified the athletic subjects the percentage of the experimental group who were judged to be athletes at pretest was reported. The percentage of the comparison group who were judged to be athletes at pretest was also reported. Frequency of volitional moderate physical exercise was reported for both the experimental group athletes and non-athletes. Frequency of volitional vigorous physical exercise was reported for both the experimental group athletes and non-athletes. The magnitudes of differences were descriptively compared for both moderate and vigorous physical exercise. This same data was reported for the final comparison group athletes and non-athletes. Once the athletic bias was explored for pretest data, the athletic bias was explored based on the information provided by the posttest.

**Missing Data**

Subjects were removed from data analysis if there is not a completed pretest and completed posttest. In order for a pretest or posttest to be considered complete a minimum of eighty percent of items must have had a valid response. In order for information on each specific instrument to be utilized in data analysis all items must have had valid responses. This presents the possibility that a subject may not have been included in the evaluation of all instruments but may have been maintained within the study.
TEST OF A SOCIAL COGNITIVE THEORY-BASED EDUCATIONAL TREATMENT TO INCREASE THE FREQUENCY OF VOLUNTARY MODERATE AND VIGOROUS PHYSICAL EXERCISE AMONG ADOLESCENTS SCHOOL STUDENTS
Volume II

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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*****

The Ohio State University
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ABSTRACT

The purpose of this study was to test a Social Cognitive Theory-based educational treatment to increase the frequency of volitional moderate and vigorous physical exercise among adolescent students attending introductory high school physical education classes. Social Cognitive Theory constructs upon which this educational treatment was based include self-control, social situation, outcome expectation, and strength of self-efficacy. Within this study are evaluations of treatment implementation, treatment construct validity, and behavioral impact upon the frequency of both moderate and vigorous physical exercise.

Implementation evaluation is used in order to determine what educational experiences the subjects were exposed to and how closely the implemented educational treatment mirrored the designed educational treatment. Implementation evaluation is also useful in providing a context within which the treatment construct validity evaluation can be interpreted. The treatment construct validity evaluation is used in order to determine the degree to which the targeted Social Cognitive Theory constructs changed following the implementation of the educational treatment. From this type of evaluation it is possible to examine the degree to which the educational experiences that were designed
to impact theoretical constructs were effective. Behavior evaluation is used in order to
determine the degree to which the frequency of volitional moderate and vigorous physical
exercise changed following the implementation of this educational treatment.

Results from this study indicate that the implemented Social Cognitive
Theory-based educational treatment is effective at increasing student self-controlling
actions for physical exercise and the frequency of volitional moderate physical exercise.
This study does not provide evidence that the implemented educational treatment was
effective at increasing student perceptions of outcome expectations, social situation,
strength of self-efficacy, or frequency of volitional vigorous physical exercise. Results
from the implementation evaluation provide a possible explanation for the failure to have
impact upon the perceptions of outcome expectation, social situation, and strength of self-
efficacy. The exercise incentive program component of the educational treatment was
delivered, however not as expected. The exercise incentive program was designed to
provide students with an opportunity to develop, monitor, and control a personalized
exercise program. Rather than mandating student involvement in the exercise incentive
program teachers encouraged students to participate.

Clearly this study demonstrates that it is unwise to assume that the constructs
targeted by an educational treatments will necessarily be altered. It appears that
educational treatments must be refined through repeated implementation trials before
such an impact can be realized.
This study provides information that adds meaningfully to the study of exercise promotion among adolescent school students. This study is one of only a few studies in which the primary purpose was to determine the impact upon exercise behavior following the implementation of an educational treatment. The observed increase in exercise participation was larger than previously published reports. Results of the treatment construct validity evaluation along with the results of the behavior evaluation demonstrate a correlation between the Social Cognitive Theory construct self-control and frequency of volitional moderate physical exercise.
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I would like to express my gratitude to Dr. Rick Petosa. His vision, guidance, and confidence enabled me to accomplish this work. I look forward to using the skills he teaches as I continue to progress. Two dedicated committee members, Dr. William Loadman, and Dr. Janet Buckworth also guided this work. I am grateful to you for your thoughtful comments and assistance as this study was formed, implemented and reported.

Brian Hertz and Emily Krause who in my absence has shouldered an extra burden within our athletic training program have assisted my effort in ways I can not forget. To the students who have allowed me to talk about this study, I thank you.

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VITA

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<td>A comparison between groups on the dependent variable frequency of volitional moderate physical exercise for both the pretest and posttest</td>
<td>255</td>
</tr>
<tr>
<td>4.45</td>
<td>Pretest to posttest correlation coefficients for both groups on the dependent variable frequency of volitional moderate physical exercise</td>
<td>256</td>
</tr>
<tr>
<td>4.46</td>
<td>Pretest categorical distribution of subjects on the dependent variable frequency of volitional moderate physical exercise</td>
<td>258</td>
</tr>
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<td>4.47</td>
<td>Posttest categorical distribution of subjects on the dependent variable frequency of volitional moderate physical exercise</td>
<td>258</td>
</tr>
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<td>4.48</td>
<td>Pretest and posttest descriptive scores for both groups on the dependent variable, frequency of volitional vigorous physical exercise</td>
<td>260</td>
</tr>
<tr>
<td>4.49</td>
<td>Pretest and posttest frequency distribution for both groups as a percentage of students on the dependent variable, frequency of volitional vigorous physical exercise</td>
<td>260</td>
</tr>
<tr>
<td>4.50</td>
<td>A comparison of pretest and posttest mean scores for both groups on the dependent variable, frequency of volitional vigorous physical exercise</td>
<td>262</td>
</tr>
<tr>
<td>4.51</td>
<td>Pretest to posttest correlation coefficients for both groups on the dependent variable frequency of volitional vigorous physical exercise</td>
<td>263</td>
</tr>
<tr>
<td>4.52</td>
<td>Pretest categorical distribution of subjects on the dependent variable frequency of volitional vigorous physical exercise</td>
<td>264</td>
</tr>
<tr>
<td>4.53</td>
<td>Posttest categorical distribution of subjects on the dependent variable frequency of volitional vigorous physical exercise</td>
<td>265</td>
</tr>
</tbody>
</table>
4.54 Results of the analysis of covariance statistic for the dependent variable self-control. The covariant in this analysis was the pretest measure of self-control.

4.55 Results of the analysis of covariance statistic for the dependent variable outcome expectation for physical exercise. The covariant in this analysis was the pretest measure of outcome expectation.

4.56 Results of the analysis of covariance statistic for the dependent variable social situation for physical exercise. The covariant in this analysis was the pretest measure of social situation.

4.57 Results of the analysis of covariance statistic for the dependent variable strength of self-efficacy for physical exercise. The covariant in this analysis was the pretest measure of strength of self-efficacy.

4.58 Results of the paired t-tests conducted for each group on the dependent variable frequency of volitional moderate physical exercise.

4.59 Results of the paired t-tests conducted for each group on the dependent variable frequency of volitional vigorous physical exercise.

4.60 Results of a Chi-square test for independence. Results indicate that the proportion of experimental subjects judged to be sedentary was less than the proportion of comparison subjects judged to be sedentary. Subjects were judged to be sedentary if they reported no volitional physical exercise, moderate or vigorous in intensity, at posttest.

4.61 Post-hoc power analysis in which the actual sample-size, observed differences, potential range, treatment effect, F-ratio, observed significance level are presented. Power indicates the probability that a false null hypothesis will be rejected.
CHAPTER 4
RESULTS

Recent efforts to increase physical exercise participation among adolescent school children have generally documented a behavioral impact that is minimal in magnitude. The studies upon which this conclusion is based infrequently utilize several techniques that could provide a more complete understanding of why there is such a consistency in behavioral impact. Techniques that afford greater understanding include evaluations of implementation, documentation of treatment construct validity, and measurement of both, moderate and vigorous exercise participation. It is not uncommon in the adolescent exercise intervention literature for authors to neglect the importance of documenting the degree to which the designed educational experiences were delivered. Researchers commonly do not provide evidence that indicate the level of treatment construct validity. Researchers often choose to measure participation in all types of physical exercise rather
than subdividing physical exercise by levels of exercise intensity. Finally it is rather unusual for a study to incorporate each of these three desirable techniques. Within this study the three evaluation procedures were integrated. Presentation of results forms the foundation of this chapter.

The primary purpose of this study was to test the ability of a Social Cognitive Theory-based educational intervention to increase the frequency of volitional moderate and vigorous physical exercise among adolescent school students. The term volitional indicates that only physical exercise that took place independent of school organized events was considered. In order to address some of the shortcomings of past research in this area this study incorporated assessments of the treatment delivery, treatment construct validity, and of the impact on the frequency of both moderate and vigorous physical exercise.
Introduction to Chapter Four

This chapter presents the results of an evaluation to document the impact of an educational intervention to increase the frequency of volitional moderate and vigorous physical exercise among high school physical education students. Important results that shape final conclusions include the degree to which the implemented educational treatment matched the prepared curriculum, levels of construct validity of this treatment, and the levels of behavioral adaptation following the treatment.

Evidence provided through the implementation assessment enabled a thorough understanding of how the educational treatment was delivered to the subjects, and with what the subjects were treated. Knowledge of the implemented educational treatment contextualized the results from the treatment construct validity assessment. Information from the treatment construct validity assessment was used to demonstrate the degree to which the Social Cognitive Theory variables were changed during the intervention. When combined with the behavioral assessment, knowledge of the treatment construct validity enabled conclusions that estimate the importance of the Social Cognitive Theory at altering the frequency of volitional moderate and vigorous physical exercise among adolescent school students.
Population and Samples

The two teachers willing to incorporate this educational treatment into their physical education classrooms taught within a large urban school district located within Franklin County. One teacher willing to have her classes serve as the comparison group taught within a large sub-urban school district. A key concern was how well these two groups could be meaningfully compared. Criteria upon which these schools are compared included total enrollment, percent of lower socioeconomic status students, distribution of males and females, and race composition. Lower socioeconomic status is determined by proxy measure, percent of students eligible for the reduced or free school lunch program.

Description of the Schools

Experimental school number one had 616 students enrolled. Fifty-five percent of the enrolled students were female. Twenty-five percent of the students attending this high school were eligible for the reduced or free school lunch program and were therefore classified as having lower socioeconomic status. Of the 616 students enrolled fifty-four percent were classified as black; forty-two were classified as white; two percent were classified as Asian American; one percent was classified as Hispanic.
Experimental school number two had 721 students enrolled. Fifty-three percent of the enrolled students were female. Thirty-four percent of students attending this high school were eligible for the reduced or free school lunch program and were therefore classified as having lower socioeconomic status. Of the 721 students enrolled in this high school, sixty-nine percent were classified as black; twenty-six percent were classified as white; three percent were classified as Asian American; two percent were classified as Hispanic. Four students were listed as other.

Comparison school had 2138 students enrolled. Fifty-one percent of the enrolled students were female. One percent of students attending this high school was eligible for the reduced or free school lunch program and therefore classified as having lower socioeconomic status. Of the 2138 students enrolled in this high school, eighty-six percent were classified as white; ten percent were classified as black, three percent were classified as Asian American; one percent were classified as Hispanic.

Comparisons between Populations

The most notable difference between the two populations was the percentage of students eligible for the reduced or free school lunch program. The first experimental school had twenty-five percent of students classified in the low socioeconomic classification. Second experimental school was comprised of thirty-four percentage of students classified as coming from lower socioeconomic homes. This is compared to only one percent of the comparison school population classified as coming from lower socioeconomic homes. Clearly the comparison population had a much lower percentage of students in the lower socioeconomic classification. Level of socioeconomic status has
been identified as a determinant of physical exercise (Gordon-Larsen, et al, 2000).

Lower socioeconomic status persons tend to exercise less when compared to individuals in higher socioeconomic classifications. As the comparison group had a lower percentage of lower socioeconomic students it can not be assumed that the two groups were similar in respect to physical exercise participation. The direction of group differences however favored a more conservative interpretation of treatment impact. Experimental students in this study presumably were disproportionately less active than the comparison subjects. Given this situation between group analyses at posttest should determine if the educational intervention overcame the preexisting limitation of having lower socioeconomic status subjects.

Racial composition was also very different between experimental and comparison populations. While eighty-six percent of the comparison population was comprised of students classified as white, the experimental population was comprised of thirty-three percent students classified as white. Comparison population had ten percent of students classified as black, while experimental population had sixty-two percent of students classified as black. It was concluded that the two populations differed on the racial composition of students. It has been demonstrated that race is a determinant to participation in physical exercise (Gordon-Larsen, et al., 2000). Black children tend to participate in physical exercise less than their white counterparts. As with population differences on socioeconomic status it is expected that the experimental group subjects will disproportionately exercise less often than the comparison group subjects. Given this situation between group analyses at posttest should determine if the educational intervention overcame the preexisting limitation from racial composition.
Both populations have equivalent percentage of students that are female, slightly greater than fifty percent. Therefore the two populations are comparable in regard to sex of enrolled students.

**Description of Accessible Samples**

Accessible students in the experimental sample consisted of five classrooms within an urban school district. Total number of accessible students in the experimental sample was 122. Of these students, fifty-seven percent were female. Due to the administrations' unwillingness to provide information that indicates individual student's socioeconomic status, no determination was made as to the socioeconomic status of subjects in the accessible experimental samples. Of the 122 students in the accessible experimental samples, forty-five percent were classified as white; forty-three percent were classified as black; the balance of the students was Asian American or Hispanic.

Accessible students for the comparison sample consisted of five classrooms within a large sub-urban school district. Total number of accessible students in the comparison sample was 125. Of these students, fifty percent were female. Due to an unwillingness of school administrators to release information pertaining to the participation of individual students in the reduced or free school lunch program there was no evidence by which the socioeconomic status of the comparison accessible sample could be assessed. Of the 125 students in the accessible comparison group, eighty-five were classified as white; ten percent were classified as black; the balance of the students were classified as Asian American or Hispanic.
Comparison between Accessible Samples

The number of students comprising the accessible experimental sample was 122 while 125 students comprise the accessible comparison sample. This results in a very similar number of students between accessible samples. In regard to sex there were only seven additional females within the experimental group and ten additional males within the comparison group. These results indicate that both accessible samples are fairly similar in regard to sex.

Pertaining to the race distribution between accessible samples it can be concluded that there was a true difference. Accessible experimental sample was comprised of forty-five percent students classified as white. Accessible comparison sample was comprised of eighty-five percent students classified as white. There was a forty percent difference in white students between accessible samples.

Comparison between Accessible Samples and their Respective Populations

Experimental school one was comprised of fifty-five percent female and the second experimental school comprised of fifty-three percent female. The accessible experimental sample was comprised of fifty-seven percent female. This reflects a slightly higher representation of females in the accessible sample when compared to the experimental population however the difference was small. The students classified, as white within the experimental population was thirty-three percent. This was substantially different from the forty-five percent of students classified as white within the accessible experimental sample. There was an overrepresentation of white students in the accessible experimental sample in respect to the experimental population. This was similar to the
figures identified for students classified as black. While sixty-two percent of the
experimental population were classified as black only forty-three percent of the
accessible experimental population were so classified. Students classified as black were
underrepresented in the accessible experimental sample in respect to the experimental
population.

Comparison population was comprised of fifty-one percent females the accessible
collection sample was comprised of fifty-four percent females. The representation by
sex in the accessible comparison sample was consistent with the comparison population.
Of the accessible comparison sample, eighty-five percent were classified as white, while
ten percent were classified as black. The percentages of racial composition were very
similar to the comparison population racial composition of eighty-six percent classified
as white and ten percent classified as black. Racial composition of the comparison
population was reflected in the accessible comparison sample.

Racial differences between the two accessible samples were minimized by the
overrepresentation of white students in the accessible experimental sample. Differences
between the two populations on percentage of white students were fifty-two percent
while differences between the two accessible samples was forty percent. While the
differences in regard to racial composition between accessible samples remain substantial
the difference decreased.
Comparison between Final Samples

A result of differential mortality of student participation there was a differential in final group size. The final experimental group consisted of fifty-one students. The final comparison group consisted of ninety-two students. Differential mortality indicates that a greater number of students were removed from the experimental group than comparison group. This high rate of subject mortality within the experimental group resulted from experimental student failure to meet study standards. This indicates that the remaining fifty-one students within the final experimental group may have been more motivated to participate in this study than the ninety-two students within the final comparison group.

Female participation was equivalent between final experimental and final comparison groups, fifty-seven and fifty-four percent respectively. The final experimental group was substantially similar to the final comparison group in regard to the percentage of female participation.

Difference between the final experimental and final comparison groups in regard to racial composition was once again diminished. While the difference between the accessible samples in regard to the participation of white students was forty percent, the differences between the final groups on this characteristic was only twenty-nine percent. While racial composition remains substantially different between the final groups differences were minimized.

While it was impossible to quantify the differences between the two final groups in regard to socioeconomic level, it was likely that the percentage of students in the final experimental group classified as economically disadvantaged were higher than the final comparison group.
Conclusion as to the Comparability of Study Participants

Upon the outset of this educational treatment three schools were recruited as participants. Two schools from a large urban school district served as the experimental schools. One school from a large suburban school district served as the comparison school. Two teachers from the experimental schools agreed to take part in this study. These two teachers taught five classes of physical education, teacher one taught three classes, teacher two taught two classes. One teacher from the comparison school agreed to take part in this study. This teacher taught five classes of physical education. All classes included within this study were introductory physical education classes taught predominantly to ninth and tenth grade students.

Consideration as to the similarities between the two study populations and subsequent final study groups indicated that there were differences. Among these differences were, school student enrollments, percentage of student qualifying for the reduced or free school lunch program, and racial composition. Study populations and final study groups were substantially similar in regard to the percentage of females enrolled.

The experimental population included students attending schools with a moderate number of students, while comparison population included students attending a school with a much higher number of students enrolled. This difference should have little impact upon study results because the teacher to student ratio was substantially similar between the participating classrooms.
The difference between the two populations on percentage of students qualifying for the reduced or free school lunch program was substantial. Thirty-four percent of the experimental population qualified for this program while one percent of the comparison population qualified. Unwillingness from school administrators to release information pertaining to individual student qualification for the reduced or free school lunch program prohibited examination of final group differences. While it was impossible to determine the percentages of student in the final groups that qualified for this program, it was likely that there remained substantial differences. The likely difference between the final groups on the determinant, socioeconomic status, should present the educational treatment with the obstacle of having to increase the exercise participation of students more likely to be classified as from lower socioeconomic homes. The presumed higher percentage of students classified as coming from economically disadvantaged homes should make it less likely for the experimental group to increase the frequency of volitional moderate and vigorous physical exercise. Conclusions as to the effectiveness of the educational treatment were therefore expected to be conservative.
There was a difference in the racial composition between the two study populations. The experimental population had thirty-three percent of students classified as white while the comparison population had eighty-six percent of students classified as white. A difference between the final experimental group and the final comparison group on racial composition was diminished although differences remained substantial, twenty-nine percent. Race has been documented to be a determinant of exercise participation. White persons tend to participate in exercise more than black persons, therefore the racial distribution between these populations indicate that the educational treatment must overcome this obstacle in order to be demonstrated effective. Differences in racial composition between the final groups indicate that conclusions pertaining to the effectiveness of the educational treatment will be conservative.

Differences between study populations on the percentage of female students were minimal. The recognized association between the sex of subjects and exercise participation should not play a significant role in the interpretation of the effectiveness of this educational treatment.

Results of pretest group differences using the one way analysis of variance indicated that the two groups differed only on the measure, frequency of volitional moderate physical exercise. No pretest differences were noted for the variables: self-control, outcome expectation, social situation, strength of self-efficacy, or frequency of volitional vigorous physical exercise.
Comparison of Subject Mortality

Figure 4.1 represents student participation by period of treatment implementation. Student participation by program implementation period was important to consider when assessing the threat of a differential mortality. Differences in subject mortality were indicated at two periods during program implementation. In each case experimental students withdraw from the project at much higher rates than their comparison counterparts.

The first point in differential mortality comes at the collection of the pretest. At pretest students were expected to maintain a record of daily activities over seven consecutive days. Teachers within the experimental group had students' place their pretest material in a folder labeled, physical education. Students were expected to maintain possession and record information as requested. The teacher within the comparison group opted to maintain possession of the pretest and to have the students record information at the beginning of class. It was not expected that these differing techniques would create substantially different results as students were expected to complete the instruments at the conclusion of each day. In practice however, these two techniques translated into very different return rates. Within the experimental group forty-six students failed to return the pretest leaving seventy-six. Within the comparison group only eighteen students failed to return a completed pretest, this left 107 participants. Differential mortality between groups was twenty-eight.
Differential in the return of the exercise report instruments were attributable to students in the experimental group that did not maintain their exercise report during the seven days. These students may have either lost the report during the week or realized that completion of the report prior to the deadline at the beginning of class was impossible and choose to throw them out. These students may have been less motivated to participate in this study.

A second area of differential mortality occurred at the fourth step in the progression of this study. At this fourth step experimental students were expected to return their curriculum workbook with at least eighty percent of assignments completed. In order for the comparison students to be maintained as a participant, they were required to receive at least an eighty-percent grade in the class. These two requirements maintained different proportions of study participants. Of the seventy-one experimental participants maintained through pretest and attendance, fifty-seven returned their workbook with adequate amount of assignments completed. Of the 102 comparison participants maintained through pretest and attendance, all 102 received a grade of eighty percent or higher. The observed differential was fourteen percent. While the comparison group was under the direction of a single teacher, the failure to provide any of the 102 students having satisfactory attendance, a grade less than eighty percent indicates grading leniency. In other words, attendance seems to be the only requirement for an above average grade in high school physical education. This inclusion leniency was not the case for the experimental group; the removal of students with inadequate evidence of learning was designed so that only the most able students were retained. This provided the most optimal test of the efficacy of the incorporated curriculum.
While student mortality effected the experimental group to a greater extent than comparison group, experimental females and males were included in the final sample at equivalent rates. Of the seventy experimental females in the accessible sample twenty-nine were included in the final experimental sample, forty-one percent inclusion. Of the fifty-two males included in the original accessible sample twenty-two were included in the final experimental group, forty-two percent inclusion.

The race of students included in the final experimental or comparison groups indicated that there was a differential participation. Of the fifty-two black students within the accessible experimental sample, twenty were included in the final experimental group, thirty-eight percent inclusion. This was compared to fifty-three percent inclusion of white students into the final experimental group. This race differential holds but was less pronounced between white and black students in the comparison group. Among the black students within the accessible comparison sample, sixty-nine percent were included in the final comparison group. This was compared with seventy-five percent inclusion of white students in the final comparison group. Reason for the disparity between the inclusion of white and black students into the final experimental sample is not known, however it may indicate that the implemented educational treatment was less acceptable among black students when compared with white students.
Figure 4.1
The number of students contained within each group by the phase of implementation of the educational treatment.
Exploration of Selection Bias

During this study it was determined that there is a differential in subject mortality. Differential mortality has the potential to create a bias in the selection of subjects. It must be considered that the subjects selected for participation in the final experimental group differed from the subjects that did not participate in the final experimental group. It could also be that students selected for participation in the final comparison group differed from the subjects that did not participate in the final comparison group. In recognition of this potential selection threat to the internal validity of this study an exploration of this threat was conducted. Differences between completers and non-completers were calculated for each group on all of the pretest dependent variables used in this study. Differences were examined using the Independent samples t-test using pretest data. Only subjects who completed and returned pretest data were examined in this exploration of the selection threat to internal validity.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-control</td>
<td>Compliers</td>
<td>51</td>
<td>161.51 (94.40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control</td>
<td>Non-compliers</td>
<td>24</td>
<td>193.30 (77.64)</td>
<td>-1.44</td>
<td>73</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=0.76, p=0.39
Equal variances are assumed

Figure: 4.2
Comparison of pretest self-control mean scores using the independent t-test statistics. Completers were those subjects in the accessible experimental sample that completed all requirements of the educational treatment. Non-completers were those subjects in the accessible experimental sample that did not complete the educational treatment.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Exp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Expectations</td>
<td>Completers</td>
<td>46</td>
<td>121.70 (41.49)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome Expectations</td>
<td>Non-completers</td>
<td>21</td>
<td>122.38 (29.28)</td>
<td>-0.68</td>
<td>53</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=5.63, p=0.02
Equal variances are not assumed

Figure: 4.3
Comparison of pretest outcome expectation mean scores using the independent t-test statistic. Completers were those subjects in the accessible experimental sample that completed all requirements of the educational treatment. Non-completers were those subjects in the accessible experimental sample that did not complete the educational treatment.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Situation</td>
<td>Completers</td>
<td>51</td>
<td>7.92 (7.49)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Situation</td>
<td>Non-completers</td>
<td>23</td>
<td>9.78 (6.89)</td>
<td>-1.01</td>
<td>72</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=0.30, p=0.59
Equal variances are assumed

Figure: 4.4
Comparison of pretest social situation mean scores using the independent t-test statistic. Completers were those subjects in the accessible experimental sample that completed all requirements of the educational treatment. Non-completers were those subjects in the accessible experimental sample that did not complete the educational treatment.
### Table 1: Pretest Strength and Self-efficacy Scores

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>Completers</td>
<td>51</td>
<td>6.98 (4.38)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Non-completers</td>
<td>23</td>
<td>6.52 (3.57)</td>
<td>0.44</td>
<td>72</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=1.81, p=0.18
Equal variances are assumed

Figure: 4.5
Comparison of pretest strength of self-efficacy mean scores using the independent t-test statistic. Completers were those subjects in the accessible experimental sample that completed all requirements of the educational treatment. Non-completers were those subjects in the accessible experimental sample that did not complete the educational treatment.

### Table 2: Pretest Frequency of Moderate Ex

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of</td>
<td>Completers</td>
<td>51</td>
<td>1.29 (1.85)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Ex</td>
<td>Non-completers</td>
<td>24</td>
<td>1.71 (2.14)</td>
<td>-0.86</td>
<td>73</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=0.48, p=0.49
Equal variances are assumed

Figure: 4.6
Comparison of pretest frequency of volitional moderate physical exercise mean scores using the independent t-test statistic. Completers were those subjects in the accessible experimental sample that completed all requirements of the educational treatment. Non-completers were those subjects in the accessible experimental sample that did not complete the educational treatment.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Exp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of Vigorous Ex</td>
<td>Completers</td>
<td>51</td>
<td>0.71 (1.46)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of Vigorous Ex</td>
<td>Non-completers</td>
<td>24</td>
<td>1.17 (1.79)</td>
<td>-1.19</td>
<td>73</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=2.16, p=0.15
Equal variances are assumed

Figure: 4.7
Comparison of pretest frequency of volitional vigorous physical exercise mean scores using the independent t-test statistic. Completers were those subjects in the accessible experimental sample that completed all requirements of the educational treatment. Non-completers were those subjects in the accessible experimental sample that did not complete the educational treatment.

Examination of pretest data reveals that it is unlikely that there are differences between those subjects who completed and those failing to complete the experimental educational treatment. This result indicates that in selecting subjects for the final experimental group a selection bias most likely was not present for the variables that were measured within this study. It can not be determined if the selection threat to internal validity was present among the accessible experimental subjects that did not return pretest data.

Results of the examination of pretest data for differences between subjects that completed and those who failed to complete the requirements for admission into the final study population revealed no significant differences. These results may be misleading due to the small number of students available for this analysis. Having a sample size with so few subjects may lead to inadequate statistical power, which may make it impossible to reject a false null hypothesis. In recognition of this it is important to
consider descriptive differences between the sample groups in order to determine any practical differences that may exist. While differences between completers and non-completers within the comparison group are minimal and most likely inconsequential, differences within the experimental group are more interesting. Subjects failing to complete the experimental educational treatment reported noticeably higher scores on the variables self-control, social situation, frequency of volitional moderate physical exercise, and frequency of volitional vigorous physical exercise. This pattern of response is interesting to note because it was expected that these scores would all be lower among those that failed to complete the experimental educational treatment. This examination indicates that at pretest subjects failing to complete the treatment tended to be more frequent exercisers, perceived greater social situation, and utilized self-controlling mechanisms more often than the subjects that subsequently completed the treatment. This pattern of responses may indicate that the experimental treatment was attractive to students that were disadvantaged in their exercise potential and was less attractive to students that were less disadvantaged in their exercise potential. This is a relevant finding when considering an educational treatment that can be used to encourage the initiation of a personalized exercise program.

The following figures report the differences between subjects that completed and those that failed to complete the requirements for inclusion into the final comparison group. Differences were analyzed for each of the dependent variables used within this study. Analysis of difference was conducted using the Independent samples t-test. Subjects included in this analysis are those that completed and returned pretest data.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Comp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-control</td>
<td>Completers</td>
<td>92</td>
<td>174.24 (97.56)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control</td>
<td>Non-completers</td>
<td>13</td>
<td>177.14 (86.59)</td>
<td>-.10</td>
<td>103</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Levene’s test for equality of variance $F=0.55$, $p=0.46$

Equal variances are assumed

Figure: 4.8
Comparison of pretest self-control mean scores using the independent t-test statistic. Completers were those subjects in the accessible comparison sample that completed all requirements to be included in the final comparison group. Non-completers were those subjects in the accessible comparison sample who returned the pretest but who were excluded from the final comparison group.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Expectation</td>
<td>Completers</td>
<td>86</td>
<td>128.60 (36.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome Expectation</td>
<td>Non-completers</td>
<td>13</td>
<td>138.68 (36.00)</td>
<td>-0.87</td>
<td>95</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Levene’s test for equality of variance $F=0.03$, $p=0.87$

Equal variances are assumed

Figure: 4.9
Comparison of pretest outcome expectation mean scores using the independent t-test statistic. Completers were those subjects in the accessible comparison sample that completed all requirements to be included in the final comparison group. Non-completers were those subjects in the accessible comparison sample who returned a pretest but who were excluded from the final comparison group.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Comp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Situation</td>
<td>Completers</td>
<td>86</td>
<td>10.00 (7.59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Situation</td>
<td>Non-completers</td>
<td>12</td>
<td>11.17 (7.80)</td>
<td>-0.49</td>
<td>96</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=0.42, p=0.52
Equal variances are assumed

Figure: 4.10
Comparison of pretest social situation mean scores using the independent t-test statistic. Completers were those subjects in the accessible comparison sample that completed all requirements to be included in the final comparison group. Non-completers were those subjects in the accessible comparison sample who returned the pretest but who were excluded from the final comparison group.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comp. Subgroup</th>
<th>N</th>
<th>Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength Self-efficacy</td>
<td>Completers</td>
<td>91</td>
<td>7.81 (4.46)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength Self-efficacy</td>
<td>Non-completers</td>
<td>12</td>
<td>9.00 (4.75)</td>
<td>-0.86</td>
<td>101</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Levene's test for equality of variance F=0.001, p=0.97
Equal variances are assumed

Figure: 4.11
Comparison of pretest strength of self-efficacy mean scores using the independent t-test statistic. Completers were those subjects in the accessible comparison sample that completed all requirements to be included in the final comparison group. Non-completers were those subjects in the accessible comparison sample who returned the pretest but who were excluded from the final comparison group.
Variable | Comp. Subgroup | N  | Mean (SD) | t   | df | p  
--- | --- | --- | --- | --- | --- | --- 
Frequency Moderate Ex | Completers | 92 | 2.89 (2.45) |  |  |  
Frequency | Non-completers | 13 | 2.54 (2.79) | 0.48 | 103 | 0.63 
Levene’s test for equality of variance F=0.38, p=0.54  
Equal variances are assumed 

Figure: 4.12  
Comparison of pretest frequency of volitional moderate physical exercise mean scores using the independent t-test statistic. Completers were those subjects in the accessible comparison sample that completed all requirements to be included in the final comparison group. Non-completers were those subjects in the accessible comparison sample who returned the pretest but who were excluded from the final comparison group.

Variable | Comp. Subgroup | N  | Mean (SD) | t   | df | p  
--- | --- | --- | --- | --- | --- | --- 
Frequency Vigorous Ex | Completers | 92 | 0.79 (1.56) |  |  |  
Frequency Vigorous Ex | Non-completers | 13 | 1.31 (1.84) | -1.09 | 103 | 0.28 
Levene’s test for equality of variance F=2.78, p=0.10  
Equal variances are assumed 

Figure: 4.13  
Comparison of pretest frequency of volitional vigorous physical exercise mean scores using the independent t-test statistic. Completers were those subjects in the accessible comparison sample that completed all requirements to be included in the final comparison group. Non-completers were those subjects in the accessible comparison sample who returned the pretest but who were excluded from the final comparison group.
Examination of pretest data reveals that it is unlikely that there are differences of practical importance between those subjects who completed and those failing to complete the requirements for inclusion into the final comparison group. These results indicate that in selecting subjects for the final comparison group a selection bias most likely was not present for the variables that were measured within this study. This analysis can not determine the magnitude of the selection threat between accessible comparison subjects who failed to complete pretest data and subjects included in the final comparison group.

Analysis between final experimental subjects and the experimental subjects that returned pretest data but failed to complete the requirements for inclusion into the final experimental group indicates that no significant differences were noted for the measured variables within this study. Descriptive differences observed indicates that the subjects failing to complete the requirements of the study engaged in greater frequency of both volitional moderate and volitional vigorous physical exercise, utilized more frequently the skills of self-control, and perceived greater social situation than their peers who completed the study requirements. These descriptive differences may therefore indicate that the experimental educational treatment was more attractive and engaging to subjects with lesser dispositions for volitional physical exercise. If this possibility is true than the interpretation of this study is more applicable to students with greater disadvantages for exercise.

Analysis between final comparison subjects and the comparison subjects that returned pretest data but failed to complete the requirements for inclusion into the final comparison group indicates that there were no significant differences on any of the dependent variables measured within this study. Descriptive differences were minimal.
between sub-groups within the comparison group. These minimal differences are not practically important and therefore indicates that the comparison completers and non-completers were substantially similar at pretest.

No analysis is possible to determine the magnitude of difference on dependent variable pretest scores between the experimental subjects that failed to return pretest data and those included in the final experimental group. Similarly there is no analysis possible to determine the magnitude of difference on dependent variable pretest scores between the comparison subjects that failed to return pretest data and those included in the final comparison group. Therefore it can not be determined if exclusion from the final experimental or comparison group subjects who failed to return pretest data resulted in a selection threat to internal validity.

**Exploration of an Athletic Bias**

Primary dependent variables within this study were the frequency of volitional moderate physical exercise and frequency of volitional vigorous physical exercise. These dependent variables were measured using the Previous Day Physical Activity Recall instrument (Weston, et al., 1997). While subjects were expected to report all physical activities engaged in during seven consecutive days, only physical exercise that was judged to be volitional was entered as a recorded bout. Volitional physical exercise was defined to be any planned physical exercise that was engaged in during non-school hours and not associated with organized sporting events such as games or practice. This definition of volitional physical exercise raised the possibility of an underreporting of the frequency of physical exercise due to athletic participation. Subjects engaging in athletic
participation may be less likely to participate in physical exercise that is external to their athletic activities. Therefore it is important to examine the number and percentage of final experimental and comparison subjects judged to be athletes. Once this has been done the difference in frequency of volitional moderate and vigorous physical exercise can be explored in order to further understand any potential threat to the conclusions of this study based upon this athletic threat. Figure 4.14 reports the data upon which this examination is conducted. A subject was judged to be an athlete if at pretest they reported three or more days of organized athletic participation.

<table>
<thead>
<tr>
<th></th>
<th>Number(%)</th>
<th>Pretest Moderate(SD)</th>
<th>P value</th>
<th>Pretest Vigorous(SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Athletes</td>
<td>44 (86)</td>
<td>1.20 (1.89)</td>
<td>0.39</td>
<td>0.75 (1.54)</td>
<td>0.59</td>
</tr>
<tr>
<td>Athletes</td>
<td>07 (14)</td>
<td>1.86 (1.57)</td>
<td>0.43</td>
<td>0.43 (0.77)</td>
<td></td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Athletes</td>
<td>69 (75)</td>
<td>3.22 (2.49)</td>
<td>0.03</td>
<td>0.78 (1.59)</td>
<td>0.91</td>
</tr>
<tr>
<td>Athletes</td>
<td>23 (25)</td>
<td>1.91 (2.07)</td>
<td></td>
<td>0.83 (1.50)</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.14
Distribution of students judged to be athletes and non-athletes among both the experimental and comparison groups. Also reported is the average number of days in which volitional moderate and vigorous physical exercise are reported. The probability that athletes differed from non-athletes was calculated using independent t-test, the p-value is reported. Data are based on pretest.
From figure 4.14 it appears that the final comparison group may have had a greater percentage of athletic subjects, 14% vs. 25%. The concern therefore is that the final comparison group frequency of volitional moderate and vigorous physical exercise was disproportionately diminished by athletic participation. In considering the frequency of volitional moderate and vigorous physical exercise it should be expected that the frequency of exercise should be equal for athletes and those judged as non-athletes. Deviation away from this expectation will serve to support the assumption that athletic participation did impact the report of volitional physical exercise. Such a disparity may be present among the final comparison group. Subjects judged to be athletes within the final comparison group reported significantly fewer days of moderate physical exercise than did their non-athletic peers. This raises the potential that had these athletes not participated in athletics during the pretest the final comparison group may have had a higher frequency of volitional moderate physical exercise score at pretest. No other differences were calculated between athletes and their non-athletic peers. Athletes and non-athletes in both the experimental and comparison group reported an equivalent number of days engaged in vigorous physical exercise. Athletes and non-athletes in the experimental group reported an equivalent number of days engaged in volitional moderate physical exercise.

Taking into consideration the possibility that athletic participation may have diminished the pretest frequency of volitional moderate physical exercise among the final comparison group, it is possible that the pretest disparity between the final comparison and final experimental groups may have been greater than that observed.
<table>
<thead>
<tr>
<th></th>
<th>Number(%)</th>
<th>Pretest Moderate(SD)</th>
<th>P value</th>
<th>Pretest Vigorous(SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Athletes</td>
<td>49 (96)</td>
<td>2.35 (1.90)</td>
<td>0.91</td>
<td>0.81 (1.51)</td>
<td>0.45</td>
</tr>
<tr>
<td>Athletes</td>
<td>02 (04)</td>
<td>2.50 (0.71)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Athletes</td>
<td>83 (90)</td>
<td>1.76 (1.95)</td>
<td>0.11</td>
<td>1.04 (1.82)</td>
<td>0.81</td>
</tr>
<tr>
<td>Athletes</td>
<td>09 (10)</td>
<td>0.67 (1.32)</td>
<td>0.89</td>
<td>(1.27)</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.14
Distribution of students judged to be athletes and non-athletes among both the experimental and comparison groups. Also reported is the average number of days in which volitional moderate and vigorous physical exercise are reported. The probability that athletes differed from non-athletes was calculated using independent t-test, the p-value is reported. Data are based on posttest.

A similar analysis based upon posttest data yielded what appears to be a greatly reduced number of subjects judged to be athletes. Within the final comparison group only nine subjects were classified as an athlete. Within the final experimental group only two subjects were classified as athletes. Having so few subjects classified as athletic in both the experimental and comparison group makes conclusions pertaining to any potential underreport of volitional exercise tenuous. Descriptively it appears that frequency of volitional moderate physical exercise may have been equivalent between experimental group athletes and non-athletes. Athletes and non-athletes within the comparison group appear to report volitional moderate physical exercise at approximately the same rate. Neither of the athletic experimental subjects reported any bouts of volitional vigorous physical exercise, while non-athletes in the experimental group reported less than one day of volitional vigorous physical exercise. Athletes within the
comparison group also appear to report slightly less volitional vigorous physical exercise when compared with their non-athletic peers. There may have been some underreport of volitional vigorous physical exercise at posttest for both the experimental athletes and non-athletes, however the low number of athletes available at posttest renders this conclusion tenuous. The potential bias in which athletic subjects are falsely reported to have low frequency of volitional exercise involves less than ten percent of the final experimental and comparison groups at posttest. The differential between recorded volitional physical exercise for athletes and non-athletes does not appear to be substantial at posttest among either the experimental group or comparison group. Taking into consideration both the number athletes and the minimal athlete to non-athlete difference in recorded physical exercise, it does not seem likely that an athletic bias substantially effected the posttest group average scores.

While it is impossible to quantify exactly the impact athletic participation may have had within this study on the dependent variables frequency of volitional moderate and vigorous physical exercise this subgroup analysis indicates that the impact most likely was greatest within the final comparison group at pretest. The final comparison group had what appears to be a disproportionately high number of pretest athletic subjects. These comparison group athletes appear to have reported fewer days in which they engaged in volitional moderate physical exercise at pretest when they are compared with their non-athletic peers. Therefore it may be expected that the pretest difference between the final comparison group and final experimental group may have been larger than was observed. At posttest it was observed that less than ten percent of the final experimental group and final comparison group were judged to be athletes. It is unlikely
that even if there was an underreport bias of volitional exercise due to athletic participation that the bias would be of sufficient magnitude to alter the group averages on the dependent variables frequency of moderate physical exercise and frequency of volitional vigorous physical exercise.

Teaching Objectives

Within this section results of the teaching and learning objectives are reported. This assessment determines the degree to which the curricular component was delivered as anticipated. This information provides insight that can prevent a type III error from being committed. A type III error is one in which educational and behavioral results are attributed to an intervention that was not implemented (Basch, et al., 1985).

A list of teaching objectives was developed for each of the classroom lessons. These teaching objectives can be found on the first page of each lesson plan (Appendix B). For each lesson, one classroom was randomly selected for observation. Classroom observation was accomplished using an audio recording of classroom interaction. This author selected the classroom that was to be observed. Each classroom observation included an entire audio recording of the classroom interaction that was subsequently transcribed by this author (Appendix A). Content analysis of the transcription provided the method by which the teaching objectives were evaluated. Each teaching objective was scored as either achieved, X, or not achieved, O.
Figure 4.16 provides the outcome of the implementation assessment. Due to the unwillingness of the classroom teachers to implement this educational treatment it was necessary for this author to deliver all classroom experiences. Forty-two of the forty-five teaching objectives were delivered resulting in ninety-three percent of the educational treatment being delivered. Although this percentage was very high, it is important to note that one of the teaching objectives not achieved resulted in a substantial deviation in the educational treatment.

Within lesson number four it was expected that students would be made aware that participation in the exercise incentive program was mandatory. This teaching objective was important because participation in the exercise incentive program was necessary for students to be considered completely treated. As implemented, students were encouraged to participate in the exercise incentive program on a voluntary basis. Students retained within the final experimental group that participated in the exercise incentive program may be considered more fully treated than students retained in the final experimental group that did not participate in the exercise incentive program. The potential impact of this differential dosing among final experimental group students may have lead to a differential in treatment effect. Figure 4.15 provides mean scores for each outcome measure among final experimental subjects dependent on participation in the exercise incentive program at any acceptable level. Although the number of subjects in the final experimental group was inadequate to allow decisive subgroup analysis, a descriptive comparison of mean scores was warranted in order to determine the potential impact of the exercise incentive program as it was implemented within this study.
Figure 4.15
Mean scores on outcome measures: outcome expectation, social situation, strength of self-efficacy, self-control, frequency of volitional moderate physical exercise, and frequency of volitional vigorous physical exercise. Group membership is for final experimental subjects with any adequate level of participation in the exercise incentive program or no adequate level of participation in the exercise incentive program.

The observed alteration in the implementation of the exercise incentive program has ramifications for subsequent conclusions pertaining to the educational treatment. Although the exercise incentive program may have been altered substantially from what was designed, some form of the exercise incentive program was delivered. Twenty subjects within the final experimental group participated in this voluntary exercise incentive program and descriptive comparison of mean scores indicates that there may have been some treatment effect of this adapted exercise incentive program. From these observations, conclusions from this study will presume that the educational treatment was substantially similar to the designed treatment in regard to the classroom experiences and substantially dissimilar to the designed treatment in regard to the exercise incentive program. Subsequent treatment effects that were observed within the remainder of this paper will presume that any significant difference between experimental and comparison groups at posttest were caused by the combination of the designed classroom experiences, and the adapted voluntary exercise incentive program. This decision will prevent a type III error from occurring. A type III error is committed when results of a
In the case of this study the exercise incentive program was not implemented as expected. Therefore results from this study should not be attributed to the designed exercise incentive program. Future studies should be designed so as to enable an adequate subgroup analysis between students taking part in both the classroom experiences and voluntary exercise incentive program, and those taking part in only the classroom experiences.
Lesson 1

_X_ Discuss the purpose and structure of this curricular component.

_X_ Define aerobic exercise. Physical movement that increases heart rate, breathing and lasts for at least 15 continuous minutes.

_X_ Present target heart ranges for common student ages.

_X_ Have students take resting pulse, light exercise pulse, moderate exercise pulse, hard exercise pulse.

_X_ Have students complete exercise pulse worksheet.

_X_ Explain homework

Lesson 2

_X_ Discuss that today's class is to help you recall your own exercise activities

_O_ Discuss with students the importance of the educational questionnaires to understanding their personal perceptions of regular exercise.

_X_ Review with students the content of the workbook.

_X_ Provide example to students on how to complete daily activity recall.

_X_ Have students complete one exercise self-report.

_X_ Have students complete the educational questionnaires.

_O_ Collect each student's workbook.

Lesson 3

_X_ Present the frequency of physical exercise throughout the lifetime.

_X_ Present the purpose of this curricular component as an effort to increase frequency of physical exercise outside the classroom.

_X_ Have students complete the exercise stage of change worksheet.

_X_ Discuss the meaning of each stage within the exercise stage of change worksheet.

_X_ Assign and explain homework

Lesson 4

_X_ Instruct students that each week they will write an exercise contract.

_X_ Instruct students that qualifying goals must be signed by an adult in order to receive an award.

_X_ Explain to students the necessary levels for exercise intensity, duration, and frequency for an exercise contract.

_O_ Explain to students that completion of each exercise contract will effect their grade for this segment of the class.

_X_ Instruct students that school sponsored exercise activities will not qualify for rewards.

Figure 4.16
Assessment of teaching objective accomplishment within each lesson.

continued
Lesson 5
_**X**_ Present the five components of the self-regulation process.
  - Goal-setting
  - Getting Social Support
  - Reinforcement
  - Planning to Overcome Barriers
  - Self-monitoring
_**X**_ Explain the importance of each of the five components of self-regulation.
_**X**_ Distribute awards to those students completing their exercise contracts.
_**X**_ Assign and explain homework.

Lesson 6
_**X**_ Present the three necessary components of an exercise goal.
  - What exercise
  - How long will you exercise
  - On which days will you exercise.
_**X**_ Present the three criteria by which an exercise goal is judged appropriate.
  - What fitness benefit? 
  - Enjoyment of exercise?
  - Is the exercise possible for you?
_**X**_ Provide opportunity for students to complete the Exercise Goal Worksheet.
_**X**_ Explain to students the Exercise Goal Statement Homework.
_**X**_ Distribute awards to those students completing their exercise contracts.

Lesson 7
_**X**_ Present the seven reasons why people enjoy exercise.
  - Social Growth
  - Social Continuation
  - Thrills
  - Competition
  - Relaxation
  - Beautiful Movement
  - Fitness
_**X**_ Allow time for students to complete the Why Exercise worksheet.
_**X**_ Distribute awards to those students completing their exercise contracts.

Lesson 8
_**X**_ Present the two general classifications of exercise social supporters.
  - Instrumental
  - Authoritative
_**X**_ Explain, Social Supporters homework.
_**X**_ Distribute awards to those students completing their exercise contracts.
Lesson 9

_X_ Present the four general classifications of exercise barriers.
   Too little time        Poor weather        Fatigue
   Boring exercise

_X_ Present the four general classifications of overcoming actions.
   Time management
   Change exercise location
   Alter exercise time, duration, intensity
   Find a new exercise

_X_ Assign and explain homework.

Lesson 10

_X_ Remind the students what the first three steps in the self-regulation process are
   Goal-setting      Getting Social Support      Overcome Barriers

_X_ Present the importance of the self-monitoring process.

_X_ Present the five targets of the self-monitoring process.
   Achievement        Location of Exercise     Social Support
   Change Exercise Goal      Feelings After Exercise

_X_ Assign and explain homework.

Description of the Implemented Exercise Incentive Program

As discussed in the previous section, the designed exercise incentive program was altered substantially during implementation. Within this section a complete description of the adapted exercise incentive program is provided. The primary adaptation of the exercise incentive program resulted from classroom teachers' unwillingness to make student participation mandatory. As a result student participation in the exercise incentive was voluntary.
A second adaptation of this incentive program was the duration of the program. At the outset of this educational treatment it was expected that students would participate in the exercise incentive program for five consecutive weeks. Due to time constraints resulting from the length of the semester the duration of the exercise incentive program was shortened to four consecutive weeks.

Final alteration in the exercise incentive program was in the delivery of the program. At the outset of this educational treatment it was expected that students would receive reinforcements for their successful participation in the incentive program on separate class days than the educational treatment classroom lessons. Due to the normal physical education classroom teachers' unwillingness to deliver any of the educational treatment it became necessary for this author to deliver all educational lessons. Time constraints due to travel and scheduling of classes made it necessary for the adapted exercise incentive program to be delivered at the conclusion of the class session in which the classroom experiences were implemented.

The mechanics of this adapted exercise incentive program followed the following format. At the conclusion of lesson number four, students were encouraged to write an exercise goal statement within their workbook on the page identified as "Exercise Contract #1". Students were told that if during the week they accomplished their personalized exercise goal, which was confirmed by the student completing fully the self-monitoring exercise, and having an adult sign this contract page, they would receive an undisclosed reinforcement. The following week students were presented with classroom experience number five. At the conclusion of this lesson students were encouraged to write a new exercise goal statement on the page identified as "Exercise Contract #2".
Once students had completed this task, students were encouraged to return their workbook to this author if they felt that they had accomplished all the necessary expectations for exercise contract number one. At this point all students were informed that successful completion of exercise contract number one would be awarded a five-dollar gift certificate to McDonald's fast food restaurant. Students were not told what would be awarded for exercise contract number two. During the remainder of class, this author reviewed all submitted student workbooks for completion of exercise contract number one. At the conclusion of class students had their workbooks returned, and students meeting exercise contract number one expectations were awarded the gift certificate. This process continued in subsequent weeks. Reinforcement for exercise contract number two was a ten-dollar gift certificate to Target department store. Reinforcement for exercise contract number three was a five-dollar tee-shirt with program logo. Reinforcement for exercise contract number four was a five-dollar gift certificate to Blockbuster Video.

**Learning Objectives**

Learning objectives were listed on the first page of each lesson (Appendix B). Student achievements on these learning objectives were determined after all workbooks were returned to the teacher following the final educational session within this project. Only students with acceptable attendance and completed pretest were initially evaluated for completion of the workbook. Students with at least eighty percent of workbook assignments completed were maintained as valid participants. Any student that submitted their workbook with at least eighty percent of assignments completed received a ten-
dollar gift certificate to a local movie theater. Students with a completed pretest, acceptable attendance, workbook with eighty percent completion and who later completed and returned the posttest were included in the final experimental sample. Learning objectives reported in the following tables were calculated using only final experimental subjects. Figure 4.17 depicts the percentage of students in the final sample completing each learning objective.
Lesson 1
92% Students will calculate target heart range and calculate heart rate during moderate and vigorous aerobic exercise.
72% Students will name a specific exercise that represents moderate and hard aerobic exercise.
88% Students will engage in exercise for the day.

Lesson 2
100% Students will complete the seven days of daily activities.
100% Students will complete the educational questionnaires.
92% Students will participate in the exercise for the day.

Lesson 3
100% Students will complete the exercise stage of change worksheet.
100% Students will identify their current stage of exercise change.
90% Students will complete the exercise stage of change homework.
96% Students will engage in class activity for the day.

Lesson 4
58% Students will complete the exercise contract for the week with appropriate exercise intensity, duration, and frequency.
98% Students will engage in class activity for the day.

Lesson 5
80% Students will complete the exercise self-regulation homework.
52% Students will complete the exercise contract for the week with appropriate exercise intensity, duration, and frequency.
90% Students will engage in class activity for the day.

Lesson 6
96% Students will identify the three components of a goal that are necessary.
94% Students will identify the three criteria by which we determine the appropriateness of an exercise goal.
96% Students will complete the exercise goal worksheet during class.
72% Students will complete exercise goal statement homework.
50% Students will complete the exercise contract for the week with appropriate exercise intensity, duration and frequency.
84% Students will engage in class activity for the day.

Figure 4.17
Assessment of student participation in learning objectives set for each lesson. Students included in this assessment were only those experimental subjects that were included in the final experimental sample. continued
Lesson 7
98% Students will complete the why exercise worksheet.
56% Students will complete the exercise contract for the week with appropriate exercise intensity, duration and frequency.
92% Students will engage in class activity for the day.

Lesson 8
88% Students will complete social supporters homework.
94% Students will engage in class activity for the day.

Lesson 9
84% Students will complete the barriers to exercise homework.
80% Students will engage in class activity for the day.

Lesson 10
58% Students will self-monitor for their exercise behavior over a continuous seven days using each of the self-monitoring components.
84% Students will engage in class activity for the day.

Summary of Student Attainment of Learning Objectives

Student participation was expected to be greater than eighty percent for each learning objective identified. This criterion was expected to indicate that substantial learning had taken place across the great majority of students retained in the final experimental sample. It is interesting to note that this criterion failed to be achieved for seven learning objectives.
Within lesson number one only seventy-two percent of students named a specific exercise that represented moderate and hard aerobic exercise. The purpose of this learning objective was to have students identify some exercise to be inherently moderate in intensity or hard in intensity. Failure to achieve eighty-percent student completion was not expected to diminish the impact of this educational treatment.

Within lesson number six only seventy-two percent of students completed the exercise goal statement homework. Upon further consideration this learning objective was sufficiently redundant with an activity accomplished in the classroom. It was likely that the redundancy of this assignment would add little to student learning and therefore failure to achieve adequate student participation was less important.

Within lesson number ten only fifty-eight percent of students completed the seven days of exercise self-monitoring homework. As this learning objective represented a presumed meaningful aspect of exercise self-control, failure to achieve adequate student participation was problematic. Student refusal to participate in this learning experience indicates that student understanding of self-monitoring can be expected to be minimally changed at posttest. High rate of student refusal on this activity may be attributed to the difficulty and time consuming nature of this experience. Prior to any further implementation of this educational treatment it would be desirable for this learning experience to be modified.

The balance of learning objectives failing to achieve the criterion eighty percent student participation were associated with the exercise incentive program. As noted in an earlier section of this chapter, student participation in this incentive program was made voluntary by the demand of the normal classroom teachers. When student participation
in this incentive program was made voluntary it became unlikely that eighty percent of students would choose to participate. It is important to note however that consistently over fifty percent of students did participate in the writing of an exercise goal statement. This indicates that students made some effort to comply with the exercise incentive program even though their participation was not mandatory. It is also important to note that of the students attempting to comply with the exercise incentive program substantially fewer students completed the process at the specified level to receive reinforcement. Of the fifty-eight percent of students attempting exercise contract number one, twenty-four percent of the final experimental sample received such reinforcement. Of the fifty-two percent of students in the final experimental sample that attempted exercise contract number two, twenty-four percent of students received the reinforcement. Of the fifty percent of students in the final experimental sample that attempted exercise contract number three, twenty percent of students received the reinforcement. Of the fifty-eight percent of students in the final experimental sample that attempted exercise contract number four, twenty-nine percent of students received the reinforcement. These figures indicate that students were interested in the voluntary exercise incentive program, however the expectations were rigorous enough that only the most motivated or diligent of final experimental subjects completed the projects.
Reliability and Validity Measures of Social Cognitive Theory constructs

The primary purpose of this study was to discover the degree to which a Social Cognitive Theory-based educational treatment was capable of increasing the frequency of volitional moderate and vigorous physical exercise among adolescent school children. In order to draw any conclusion as to this theory's power to increase frequency of volitional exercise, the degree to which the Social Cognitive Theory was manipulated by the educational treatment must be determined. This determination was accomplished using an evaluation designed to document the construct validity of the treatment. The precision and consistency of the instruments used to assess this theory's constructs can confuse the results of this type of evaluation. For this reason it is important that a section of this chapter present findings as to the validity and reliability for each assessment instrument used to measure the theory's constructs.

Educational targets that reflected specific Social Cognitive Theory constructs included, outcome expectation, social situation, strength of self-efficacy, and exercise self-control. Assessment instruments were incorporated into this study in order to measure each of these Social Cognitive Theory constructs. Pretest data obtained from approximately 140 subjects included within the final experimental and comparison samples were used in order to document each instrument's level of reliability and validity. Each subject must have completed all items on the specified instrument in order to be included within this analysis of each specified instrument.
Data obtained from each assessment instrument were subjected to a reliability analysis using Chronbach alpha. Sequentially each item was removed and Chronbach alpha was sequentially calculated with each item removed. This analysis is used to document the construct validity for each item. If it is noted that the value of Chronbach's alpha coefficient increases substantially when an item is removed it will signify that the item is not construct valid. In order for an instrument to be judged adequately reliable reliability values must be equal to or greater than 0.70.

Within the remainder of this section is a presentation of the construct validity for items and reliability measures for each utilized instrument. Only one item was found to have inadequate construct validity. This item was within the outcome expectation for social continuation sub-scale. Due to inadequate construct validity this item was removed from the sub-scale. The sub-scale was then recalibrated so that a simple summation of the sub-scales could yield a total instrument score for student outcome expectation. Only one sub-scale was found to have inadequate reliability. This sub-scale was within the exercise self-control instrument and was used to measure the subjects' quantity of self-monitoring activities. Reliability for this sub-scale was, 0.69. While this fell below the preset criterion, 0.70, the magnitude of unreliability was within acceptable range. This sub-scale was subsequently maintained within the exercise self-control instrument. It was concluded that the measures obtained on each of the dependent variables: outcome expectation, social situation, strength of self-efficacy, and exercise self-control were both valid and reliable. These instruments yield measures upon which an evaluation of this treatment's construct validity can be based.
Outcome Expectation

This author developed the incorporated outcome expectation instrument prior to the implementation of this study. Gerald Kenyon (1968) first introduced the assessment model upon which this instrument was based. This outcome expectation instrument was pilot tested on a sample of high school students similar in age, context, and geographical location to the sample presented in this work. Using this pilot test it was determined that the instrument achieved acceptable levels of validity and reliability. Items not functioning as expected in the pilot test were rewritten and included in the current outcome expectation instrument that was used in this study.

Outcome expectation score is a linear combination of seven sub-scales: beauty, competition, fitness, relaxation, social continuation, social growth, and thrills. Each of the seven sub-scales had five items. The sub-scale outcome expectation for social continuation was found to have only four valid items. The fifth item in this sub-scale was found to have a substantial improvement in reliability when it was removed. This fifth item was therefore removed from the total outcome expectation score. In order to maintain a simple sum total for outcome expectation, the values obtained for each subject on the social continuation sub-scale was multiplied by 1.25. This placed the sub-scale on the same potential range as the other six sub-scales and allowed for a summated value to serve as the construct outcome expectation. Figure 4.18 reports the reliability value for each sub-scale and the sub-scale reliability with sequential removal of each item.
Sample size for outcome expectation reliability and validity was between 137 and 142 subjects dependent upon the sub-scale. Sample size varied according to the total number of subjects completing each of the items contained on the sub-scale. Seven sub-scales of outcome expectation had acceptable levels of reliability. Six of the outcome expectation sub-scales had five items with acceptable levels of validity. The seventh sub-scale, social continuation, had one item that did not have acceptable levels of validity. This item was removed subject scores were recalculated so that this sub-scale had a potential range equal to the other six sub-scales. This analysis provided the evidence necessary to conclude that the Social Cognitive Theory construct outcome expectation was adequately measured. Data collected using this instrument were then entered in the final inferential statistics.
<table>
<thead>
<tr>
<th>Sub-scale</th>
<th>N</th>
<th>Item</th>
<th>Alpha Sub-scale</th>
<th>Alpha Item Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation</td>
<td>142</td>
<td>Help me unwind</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make me more relaxed</td>
<td>0.81</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Get rid of frustration</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cheer me up when I am sad</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gets me to calm down</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>Fitness</td>
<td>141</td>
<td>Make me feel more physical</td>
<td>0.91</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keep me in good condition</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make me look better</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improve my stamina</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make me more lean</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Beauty</td>
<td>142</td>
<td>Demonstrate my feelings</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perform precise movement</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Demonstrate my creativity</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Express through movement</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communicate my emotions</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Thrills</td>
<td>141</td>
<td>Make bold decisions</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Be extreme</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experience daring moves</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test my physical limits</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struggle to remain in control</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>Competition</td>
<td>142</td>
<td>Challenge another to contest</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compare my skills with other</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Find out who is best athlete</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beat another person</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work to become a winner</td>
<td>0.93</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.18
Evaluation of construct validity of the outcome expectation instrument. The figure reports a Chronbach alpha coefficient for the sub-scale as each item is sequentially removed. Substantial improvement in sub-scale reliability as an item is removed indicates that the removed item is not construct validity.
Figure 4.18 (continued)

<table>
<thead>
<tr>
<th>Social Continuation</th>
<th>141</th>
<th>0.93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be with my friends</td>
<td>0.91</td>
<td></td>
</tr>
<tr>
<td>Stay in touch with friends</td>
<td>0.91</td>
<td></td>
</tr>
<tr>
<td>Become closer with friends</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Experience with friends</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Work through social problem</td>
<td>0.95</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Growth</th>
<th>137</th>
<th>0.91</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet people my age in school</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Meet people my age in town</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Talk to interesting people</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>Join new groups</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Find new friends</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>

**Self-control**

This self-control instrument was originally developed and validated by Petosa and Kirby (1993). This self-control instrument is comprised of five sub-scales, goal setting, overcoming barriers, reinforcements, self-monitoring and social situation. Values obtained from this instrument indicate the degree to which students utilize specific skills that enable the initiation, improvement, and perpetuation of physical exercise. It was assumed that higher score values indicate a greater amount of self-generated activity to control participation in physical exercise. In this study it was expected that students with greater scores of self-control would be more involved in self-directing their physical exercise activities.
Potential low score for each item is zero. Potential high score for each item is five. Table 4.19 reports the reliability for each sub-scale and the sub-scale reliability with sequential removal of each item. Sample size for this assessment was 143 subjects. Four of the five sub-scales demonstrated acceptable levels of reliability. The sub-scale, self-monitoring exhibited an inadequate reliability measure, 0.69. Acceptability for reliability was set a priori at 0.70. It was determined that while the reliability for this sub-scale was inadequate it fell close enough to the cut point to be retained as a measure. Values of content validity were acceptable for each item contained within the instrument that indicated that items in each sub-scale measured aspects of a common construct. Using this evaluation it was determined that this instrument measured adequately the construct self-control. Data obtained using this instrument were entered into subsequent inferential statistical analysis.
<table>
<thead>
<tr>
<th>Sub-scale</th>
<th>N</th>
<th>Item</th>
<th>Alpha Sub-scale</th>
<th>Alpha Item Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal Setting</td>
<td>143</td>
<td>Mentally set</td>
<td>0.89</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wrote</td>
<td></td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short term frequency</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long term outcome</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Goals time or distance</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meaningful outcome</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time frame for</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Self-monitoring</td>
<td>141</td>
<td>Mental tracking</td>
<td>0.81</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specific things</td>
<td></td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How others helped</td>
<td></td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How environment helped</td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recorded exercise in writing</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recorded duration and intensity</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specific methods written</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Social Support</td>
<td>143</td>
<td>Talked with others about goal</td>
<td>0.93</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral commitment to exercise</td>
<td></td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Another signed goal</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Written commitment with other</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asked another to remind me</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Another assume my task</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asked a friend for advice</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asked a friend to demonstrate</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exercise with another</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Talked with another while ex</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asked parent for advice</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asked a teacher for advice</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asked a coach for advice</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.19

Evaluation of construct validity of the self-control instrument. The figure reports a Chronbach alpha coefficient for the sub-scale as each item is sequentially removed. Substantial improvement in sub-scale reliability as an item is removed indicates that the removed item is not construct validity.

Figure continued
Figure 4.19 (continued)

<table>
<thead>
<tr>
<th>Reinforcements</th>
<th>143</th>
<th>0.78</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received verbal praise</td>
<td></td>
<td>0.76</td>
</tr>
<tr>
<td>Reward from another for</td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td>Rewarded myself for exercise</td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td>Rewarded myself for goals</td>
<td></td>
<td>0.68</td>
</tr>
<tr>
<td>Remind myself of reasons for</td>
<td></td>
<td>0.73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barriers</th>
<th>143</th>
<th>0.85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others Identify barriers</td>
<td></td>
<td>0.83</td>
</tr>
<tr>
<td>Mentally schedule time periods</td>
<td></td>
<td>0.81</td>
</tr>
<tr>
<td>Mentally note problems</td>
<td></td>
<td>0.82</td>
</tr>
<tr>
<td>I write specific time periods</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>I planned ways to overcome</td>
<td></td>
<td>0.80</td>
</tr>
<tr>
<td>I rearranged schedule to ensure</td>
<td></td>
<td>0.80</td>
</tr>
</tbody>
</table>

Social Situation

This social situation instrument was previously developed and validated in 1997 by Ruth Saunders (Saunders, et al., 1997). Using this instrument, social situation is a measure containing eight items. This measure of social situation indicates the degree to which students feel their social environment is conducive with physical exercise. Higher scores on this instrument reflect more positive beliefs of students that their social environment is conducive with physical exercise. Within this study it was anticipated that students with higher social situation measures would be more frequent exercisers.
Each of the eight items within this scale has a potential low score of zero. Each of the eight items within this scale has a potential high score of four. Table 4.20 reports this instrument's reliability and the instrument's reliability with sequential removal of each item. Sample size for this analysis included data obtained from 137 subjects. This instrument provided data that was demonstrated to have a reliability value of 0.87. Reliability of this magnitude was determined to be acceptable for use within this study. Each item contained within this instrument demonstrated acceptable levels of construct validity. This instrument was accepted as an adequate measure of social situation. Data obtained using this instrument was entered into subsequent inferential statistics.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>N</th>
<th>Item</th>
<th>Alpha Sub-scale</th>
<th>Alpha Item Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Situation</td>
<td>137</td>
<td>Past two weeks friends offer</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Past two weeks friend ex with</td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Past two weeks family offered</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Past two weeks family ex</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Friend encouraged me to Ex</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family encouraged me to ex</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Friends think I should ex</td>
<td></td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family thinks I should ex</td>
<td></td>
<td>0.86</td>
</tr>
</tbody>
</table>

Figure: 4.20
Evaluation of construct validity of the social situation instrument. The figure reports a Chronbach alpha coefficient for the sub-scale as each item is sequentially removed. Substantial improvement in sub-scale reliability as an item is removed indicates that the removed item is not construct validity.
**Strength of Self-efficacy**

This strength of self-efficacy instrument was developed and validated prior to this study (Saunders, et al., 1997). Self-efficacy is a measure that indicates the perception students have in their ability to overcome common obstacles associated with regular physical exercise. This instrument presumes that higher measures indicate increasing perception in ability to overcome common obstacles. It was anticipated in this study that students who have greater strength of self-efficacy would report greater frequency of physical exercise.

Each item within this scale has a potential low score of zero. Each item within this scale has a potential high score of four. Table 4.21 reports the instrument’s reliability and the instrument’s reliability with sequential removal of items. Sample size for this assessment was 142 subjects. This instrument is comprised of four items and data obtained using it demonstrated a reliability value of .89. Each item contained within this instrument was demonstrated to have adequate content validity indicating that each item was measuring components of a shared construct. Information providing evidence of instrument reliability and construct validity support the claim that this instrument adequately measures strength of self-efficacy. Data obtained using this instrument was entered into subsequent inferential statistics.
<table>
<thead>
<tr>
<th>Instrument</th>
<th>N</th>
<th>Item</th>
<th>Alpha Sub-scale</th>
<th>Alpha Item Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength Self-efficacy</td>
<td>142</td>
<td>I can exercise on busy day</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I can exercise when I'm tired</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I can exercise when it's hot</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can exercise with homework</td>
<td>0.83</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.21
Evaluation of construct validity of the strength of self-efficacy instrument. The figure reports a Chronbach alpha coefficient for the sub-scale as each item is sequentially removed. Substantial improvement in sub-scale reliability as an item is removed indicates that the removed item is not construct validity.

Descriptive Statistics for Educational Targets

Within this section the descriptive statistics for the educational targets are presented. Information includes mean scores, standard deviation and observed range statistics by group for pretest and posttest. The observed ranges were divided into four categories, very low scores, low scores, high scores, and very high scores. Dividing scores into these categories provided a mechanism by which it was possible to detect segments of the sample most influenced by the educational intervention. This crude sub-sample analysis may enable future targeting of subjects most likely to be influenced by the educational intervention.
Overview

Self-control was the only Social Cognitive Theory construct that was targeted and effected by the educational treatment. The greatest impact of the educational treatment in exercise self-control appears to have been among the experimental subjects scoring within the lowest score category. The percentage of experimental subjects scoring in this very low category at posttest was eleven percent less than at pretest. Categorical distribution of comparison subjects scoring in the very low category remained substantially stable from pretest to posttest.

Examination of group mean scores on each sub-scale of exercise self-control indicates that experimental students increased from pretest to posttest on all but one sub-scale, self-monitoring. Comparison group mean scores for pretest and posttest were substantially stable for each sub-scale. This demonstrates that the educational treatment was effective at addressing four of the five targets within self-control. Failure to substantially shift the experimental group mean score on self-monitoring was most likely due to a failure to meet the learning objectives for the self-monitoring lesson.

The Social Cognitive Theory constructs targeted but unaffected by the educational treatment included: social situation, strength of self-efficacy and outcome expectation. These Social Cognitive Theory constructs were not observed to have a noticeable shift in the categorical distribution for either the experimental group or the comparison group. This observation provides further indication that while the implemented educational treatment was effective at increasing experimental subjects' exercise self-controlling actions the educational treatment was ineffective at improving student perceptions. It is important to remain aware that self-controlling actions may, over time, influence the
perceptions of social situation, strength of self-efficacy, and outcome expectation. Self-controlling actions may provide students with experiences that will enable them to reevaluate their perceptions on these constructs. If this explanation were true, it would be expected that additional time must pass prior to any alteration of subject perceptions.

**Self-control Scores**

Self-control is a summated score of five sub-scales, goal setting, self-monitoring, overcoming barriers, reinforcements and social situation. Each of the five sub-scales is responded to using a six point "Likert" type scale. Potential minimum score is zero on each sub-scale. Potential maximum on each sub-scale is five. Number of items contained within sub-scales differed in that goal setting had seven, self-monitoring had seven, overcoming barriers had six items, reinforcements had five items, and social support had thirteen items. The differences in item number created a variety of potential range scores for each scale thereby prohibiting a simple summation of scores across sub-scales. In order to overcome this difficulty, each sub-scale was summed; this summed sub-scale score was then multiplied by a figure that placed each sub-scale score on an equal metric.

Figure 4.22 reports the experimental and comparison group mean scores and standard deviation for both pretest and posttest. Mean summated self-control pretest measure for the experimental group was 161.51 with a standard deviation of 94.40. Mean summated self-control pretest measure for the comparison group was 174.24 with a standard deviation of 97.56. Pretest differences between groups was 12.73 on the self-control construct. Mean summated self-control posttest measure for the experimental
group was 197.57 standard deviation of 87.02. Mean summated self-control posttest measure for the comparison group was 175.07 standard deviation of 100.84. A posttest difference between groups was 22.5 on the self-control construct. It was clear that as a group the experimental students improved their score quite well whereas the comparison group's score remained stable. Figure 4.23 depicts group mean scores by test.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group (n=51)</th>
<th>Comparison Group (n=92)</th>
<th>Experimental Group (n=51)</th>
<th>Comparison Group (n=89)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Scale</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>35.29</td>
<td>22.90</td>
<td>40.84</td>
<td>25.65</td>
</tr>
<tr>
<td>Barriers</td>
<td>26.90</td>
<td>22.33</td>
<td>29.53</td>
<td>23.36</td>
</tr>
<tr>
<td>Goal Setting</td>
<td>41.39</td>
<td>24.92</td>
<td>49.43</td>
<td>25.59</td>
</tr>
<tr>
<td>Social Support</td>
<td>22.38</td>
<td>21.75</td>
<td>23.56</td>
<td>18.68</td>
</tr>
<tr>
<td>Self-monitor</td>
<td>35.55</td>
<td>19.69</td>
<td>30.81</td>
<td>20.41</td>
</tr>
<tr>
<td>Summated</td>
<td>161.5</td>
<td>94.40</td>
<td>174.2</td>
<td>97.56</td>
</tr>
</tbody>
</table>

Figure 4.22
Self-control mean scores and standard deviation scores for both groups on pretest as well as posttest test.
Figure 4.23
Experimental and comparison group mean scores for self-control by test.
Figure 4.24 reports the pretest to posttest correlation coefficients for both groups on the dependent variable self-control. Comparison of these correlation values indicates the degree to which the group slopes are equivalent to one another. The greater the magnitude of pretest to posttest correlation the more steep the slope. When using the analysis of covariance statistic the slopes are expected to be similar between groups. From the data provided in figure 4.24 regression analysis yields the probable \( \beta \) coefficient range for each group. Given the probable distributions of the \( \beta \) coefficient for each group it can be concluded that the slopes are statistical equivalent.

Figure 4.25 reports the distribution of pretest scores for each group by score categories. Experimental students included in the final analysis were fifty-one, while ninety-two comparison students were included. The most frequent category into which scores fell was the low category (107.1 - 215). Within this category were forty-five percent of experimental students and thirty-five percent of comparison students. The

<table>
<thead>
<tr>
<th>Experimental Group Posttest Self-control</th>
<th>Comparison Group Posttest Self-control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group Pretest Self-control</td>
<td>0.63 (n=51)</td>
</tr>
<tr>
<td></td>
<td>( \beta = .6 \pm .1 )</td>
</tr>
<tr>
<td>Comparison Group Pretest Self-control</td>
<td>0.67 (n=89)</td>
</tr>
<tr>
<td></td>
<td>( \beta = .7 \pm .1 )</td>
</tr>
</tbody>
</table>
very low category (0 - 107) had twenty-seven percent of experimental and twenty-six percent of comparison group subjects. Five percent of experimental and eight percent of comparison students scored within the very high category (323.1 - 427).

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group % (n=51)</th>
<th>Comparison Group % (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Very Low</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Pretest Low</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Pretest High</td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td>Pretest Very High</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure: 4.25
Pretest categorical distribution of subjects on the dependent variable self-control.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group % (n=51)</th>
<th>Comparison Group % (n=89)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest Very Low</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Posttest Low</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Posttest High</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>Posttest Very High</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

Figure: 4.26
Posttest categorical distribution of subjects on the dependent variable self-control

Figure 4.26 depicts the score distribution of posttest self-control scores for each group. A decline of eleven percent was found for the experimental very low category. By contrast the comparison group very low category increased by two percent. The high category also fluctuated from pretest. Experimental students scoring within this category increased pretest to posttest by eleven percent while students scoring in this category
from the comparison group increased by two percent. Experimental students scored as very high increased pretest to posttest by five percent while comparison students scoring in the very high category dropped by two percent.

**Outcome Expectation Scores**

Outcome expectation is a summated score across seven dimensions, beautiful movement, competition, fitness, relaxation, social continuation, social growth and thrills. Each sub-scale is comprised of five questions. Each question is responded to using a six point "Likert" type scale. Potential minimum response on each item is one. Potential maximum on each item is six.

Figure 4.27 reports the group mean scores and standard deviations for both the experimental and comparison group. Mean outcome expectation score for the experimental group at pretest was 121.70 with a standard deviation of 41.49. Comparison group's mean outcome expectation score at pretest was 128.60 with a standard deviation of 36.05. There appears to be a minimal difference of about seven points between the two groups at pretest. At posttest the experimental group has a mean outcome expectation score of 118.78 standard deviation of 39.17. Comparison group's mean outcome expectation score was 124.77 standard deviation of 37.76. Posttest measures for both groups indicate a decrease in score from pretest that was three points and four points for the experimental and comparison group respectively. Figure 4.28 is a line graph representing the experimental and comparison groups mean scores by test.
<table>
<thead>
<tr>
<th>Scale</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
<th>Pretest Mean</th>
<th>Pretest SD</th>
<th>Posttest Mean</th>
<th>Posttest SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrill</td>
<td>16.46</td>
<td>7.14</td>
<td>17.01</td>
<td>6.63</td>
<td>16.78</td>
<td>7.33</td>
<td>16.22</td>
<td>6.59</td>
</tr>
<tr>
<td>S. Growth</td>
<td>15.70</td>
<td>8.00</td>
<td>17.15</td>
<td>7.22</td>
<td>14.02</td>
<td>7.92</td>
<td>16.99</td>
<td>7.64</td>
</tr>
<tr>
<td>S. Cont.</td>
<td>15.33</td>
<td>8.31</td>
<td>18.68</td>
<td>7.76</td>
<td>14.02</td>
<td>7.99</td>
<td>18.05</td>
<td>8.11</td>
</tr>
<tr>
<td>Relaxation</td>
<td>16.18</td>
<td>6.73</td>
<td>17.42</td>
<td>5.93</td>
<td>18.31</td>
<td>7.23</td>
<td>17.14</td>
<td>6.40</td>
</tr>
<tr>
<td>Fitness</td>
<td>22.02</td>
<td>7.06</td>
<td>23.42</td>
<td>5.68</td>
<td>22.18</td>
<td>6.28</td>
<td>22.89</td>
<td>6.54</td>
</tr>
<tr>
<td>Competitio</td>
<td>16.94</td>
<td>7.86</td>
<td>20.56</td>
<td>7.75</td>
<td>16.96</td>
<td>8.13</td>
<td>19.65</td>
<td>7.74</td>
</tr>
<tr>
<td>Summation</td>
<td>121.7</td>
<td>41.5</td>
<td>128.6</td>
<td>36.1</td>
<td>118.8</td>
<td>39.2</td>
<td>124.8</td>
<td>37.8</td>
</tr>
</tbody>
</table>

Figure 4.27
Mean score and standard deviation for both groups by test on the outcome expectation instrument.
Figure 4.28
A comparison of pretest and posttest group mean scores on the measure outcome expectation.
<table>
<thead>
<tr>
<th></th>
<th>Experimental Group Posttest Outcome Expectation</th>
<th>Comparison Group Posttest Outcome Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest Outcome Expectation</td>
<td>0.57 (n=46)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\beta = .5 \pm .1$</td>
<td></td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest Outcome Expectation</td>
<td>0.63 (n=82)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\beta = .6 \pm .1$</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.29
Pretest to posttest correlation coefficients for both groups on the dependent variable outcome expectation.

Figure 4.29 reports the pretest to posttest correlation coefficients for both groups on the dependent variable outcome expectation. Comparison of these correlation values indicates the degree to which the group slopes are equivalent to one another. The greater the magnitude of pretest to posttest correlation the more steep the slope. When using the analysis of covariance statistic the slopes are expected to be similar between groups. From the data provided in figure 4.29 regression analysis yields the probable $\beta$ coefficient range for each group. Given the probable distributions of the $\beta$ coefficient for each group it can be concluded that the slopes are statistically equivalent.
Figure 4.30 depicts the pretest score distribution for the score categories, very low, low, high, very high for individual outcome expectation measure. Forty-six experimental and eighty-six comparison students were included in this analysis. Pretest distribution of the experimental group shows that the greatest score category for the experimental group was low classification, (78 - 120) with forty-one percent of students. This was not so for the comparison group, at pretest the greatest frequency of subject score was the high category, (121 - 163) with forty-six percent of students. Approximately two percentage points separated the two groups in the very low category with the experimental group having the greater percentage.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group % (n=46)</th>
<th>Comparison Group % (n=86)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Very Low</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Pretest Low</td>
<td>41</td>
<td>29</td>
</tr>
<tr>
<td>Pretest High</td>
<td>26</td>
<td>46</td>
</tr>
<tr>
<td>Pretest Very High</td>
<td>22</td>
<td>15</td>
</tr>
</tbody>
</table>

Figure: 4.30
Pretest categorical distribution of subjects on the dependent variable outcome expectation.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group % (n=51)</th>
<th>Comparison Group % (n=88)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest Very Low</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Posttest Low</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>Posttest High</td>
<td>27</td>
<td>40</td>
</tr>
<tr>
<td>Posttest Very High</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

Figure: 4.31
Posttest categorical distribution of subjects on the dependent variable outcome expectation.
Social Situation

Social situation instrument consists of eight items. Each item is responded to using a five point "Likert" type scale. Each item has a potential minimum score of zero. Each item has a potential maximum score of four. Figure 4.32 reports the group mean scores, standard deviation, observed minimum and maximum scores, and range, by test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td>51</td>
<td>7.92</td>
</tr>
<tr>
<td>Comparison</td>
<td>86</td>
<td>10.00</td>
</tr>
</tbody>
</table>

Figure 4.32
Group mean scores and standard deviations for the dependent variable social situation by test.

Pretest social situation mean score for the fifty-one experimental students was 7.92 with a standard deviation of 7.49. This is compared with the mean score of 10.00 standard deviation of 7.59 for eighty-six comparison group students at pretest. While the experimental group scored lower than the comparison group, differences were small, 2.08. The amount of variance in both groups appears to be fairly high, experimental group 7.49 standard deviation and comparison group 10.00 standard deviation. At posttest the experimental students mean score increased to 8.94, standard deviation 8.24, while comparison group mean score increased to 10.56, standard deviation 8.47. Both groups increased their perception of social situation at posttest, experimental by 1.02 points, comparison by .56 points. Figure 4.33 depicts group mean scores by test.
Figure 4.33
Mean scores on the dependent variable social situation for each group by test
Figure: 4.34
Pretest to posttest correlation coefficients for both groups on the dependent variable social situation.

Figure 4.34 reports the pretest to posttest correlation coefficients for both groups on the dependent variable social situation. Comparison of these correlation values indicates the degree to which the group slopes are equivalent to one another. The greater the magnitude of pretest to posttest correlation the more steep the slope. When using the analysis of covariance statistic the slopes are expected to be similar between groups.

From the data provided in figure 4.34 regression analysis yields the probable β coefficient range for each group. Given the probable distributions of the β coefficient for each group it can be concluded that the slopes are statistically equivalent.

Figure 4.35 reports the score distribution for individuals at pretest by categories, very low, low, high, very high. Experimental students included in these analyses were fifty-one, comparison students included were eighty-six. A most striking observation of this frequency distribution was the very high percentage of students in both the experimental and comparison group that scored within the very low (0 - 7) and low (8 -
15) category. Eighty-six percent of experimental students scored sufficiently low to be included in one of these two categories. Seventy-six comparison group students scored sufficiently low on pretest social situation to be classified as very low, or low. This frequency distribution would indicate a very low group score that would represent very low perception of all students of a conducive social environment in which to physically exercise.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group % (n=51)</th>
<th>Comparison Group % (n=86)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Very Low</td>
<td>55</td>
<td>43</td>
</tr>
<tr>
<td>Pretest Low</td>
<td>31</td>
<td>33</td>
</tr>
<tr>
<td>Pretest High</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Pretest Very High</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Figure: 4.35
Pretest categorical distribution of subjects on the dependent variable social situation.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group % (n=51)</th>
<th>Comparison Group % (n=85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest Very Low</td>
<td>55</td>
<td>46</td>
</tr>
<tr>
<td>Posttest Low</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Posttest High</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Posttest Very High</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure: 4.36
Posttest categorical distribution of subjects on the dependent variable social situation.
Figure 4.36 depicts the distribution of posttest social situation scores for each group. Both experimental and comparison students tended to be classified as having very low, or low perceptions of social support. Fifty-five percent of experimental subjects were classified in the very low category at pretest, and fifty-five percent of experimental subjects were classified in the very low category at posttest. Percentage of comparison group reporting scores on social situation that fell within the very low category increased three percent pretest to posttest. A shift was shown between the low and high group for both the experimental and comparison groups. Experimental students classified as low at posttest dropped by eleven percent while the number of experimental students classified as high at posttest increased by twelve percent. Comparison students classified as low at posttest dropped by thirteen percent while the number of comparison students classified as high at posttest increased by eight percent.

**Strength of Self-efficacy by Test**

Strength of self-efficacy was measured using an instrument that is comprised of four items. Each item is responded to using a five point "Likert" type scale. Potential minimum score is zero. Potential maximum score is four. Instrument potential range is between the score zero and sixteen. Figure 4.37 reports the group mean scores, standard deviation, observed minimum and maximum scores, and range, by test.
<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td>51</td>
<td>6.98</td>
</tr>
<tr>
<td>Comparison</td>
<td>91</td>
<td>7.81</td>
</tr>
</tbody>
</table>

Figure 4.37
Strength of self-efficacy mean scores and standard deviation for both groups by test.

Experimental students included in this analysis were fifty-one students. There were ninety-one comparison students included in this analysis. Experimental students had pretest strength of self-efficacy mean score of 6.98 standard deviation 4.38. Comparison students had a pretest mean score for strength of self-efficacy of 7.84 standard deviation 4.47. These groups' mean scores were very similar, difference of .86. At posttest experimental group mean score was 7.29 standard deviation 4.63, the comparison group mean score was 7.52 standard deviation 4.54. Between group differences at posttest on the construct strength of self-efficacy was .23.

At both the pretest and posttest subjects in each group demonstrated scores that were fairly low. These low scores are incompatible with what is known about physical exercise. A high perception in the ability to overcome common barriers to physical exercise was consistent with adolescent children reporting greater frequency of physical exercise. The values obtained in this study for strength of self-efficacy clearly have room to improve. Figure 4.38 depicts the strength of self-efficacy group mean scores by test.
Figure 4.38
A comparison of mean scores between groups on the measure strength of self-efficacy, by test.
<table>
<thead>
<tr>
<th></th>
<th>Experimental Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posttest</td>
<td></td>
</tr>
<tr>
<td>Strength of Self-efficacy</td>
<td>0.61 (n=51)</td>
<td>0.54 (n=90)</td>
</tr>
<tr>
<td></td>
<td>$\beta = .6 \pm .1$</td>
<td>$\beta = .6 \pm .1$</td>
</tr>
</tbody>
</table>

Figure 4.39 reports the pretest to posttest correlation coefficients for both groups on the dependent variable strength of self-efficacy. Comparison of these correlation values indicates the degree to which the group slopes are equivalent to one another. The greater the magnitude of pretest to posttest correlation the more steep the slope. When using the analysis of covariance statistic the slopes are expected to be similar between groups. From the data provided in figure 4.39 regression analysis yields the probable $\beta$ coefficient range for each group. Given the probable distributions of the $\beta$ coefficient for each group it can be concluded that the slopes are statistically equivalent.

Figure 4.40 depicts the frequency distribution for both groups on pretest scores of strength of self-efficacy. These scores were categorized as very low (0 - 3), low (4 - 7), high (8 - 11) and very high (12 - 16). Both the experimental and comparison group appear to have a similar trend for scores categorized as very low and low. This trend was to have few students categorized as very low but a substantial percentage categorized as low. At pretest, thirteen percent of comparison students and twenty-two percent of
experimental students were categorized as having very low perceptions of their ability to overcome common barriers to exercise. Thirty-six percent of comparison students and forty-three percent of experimental students were categorized as having low perceptions of their ability to overcome common barriers to physical exercise. In each of these categories the experimental group had a higher percentages of students. This pattern changed in the high category. Comparison group had a much higher percentage of students reported in the high category, twenty-nine, compared to the experimental group's sixteen percent. Similar percentages of students were observed in the very high category, experimental group had twenty percent, and the comparison group had twenty-two percent.

![Table]

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group %</th>
<th>Comparison Group %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=51)</td>
<td>(n=91)</td>
</tr>
<tr>
<td>Pretest Very Low</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Pretest Low</td>
<td>43</td>
<td>36</td>
</tr>
<tr>
<td>Pretest High</td>
<td>16</td>
<td>29</td>
</tr>
<tr>
<td>Pretest Very High</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

Figure: 4.40
Pretest categorical distribution of subjects on the dependent variable strength of self-efficacy.
Figure: 4.41
Posttest categorical distribution of subjects on the dependent variable strength of self-efficacy.

Figure 4.41 depicts the posttest score distribution using four categories, very low, low, high, or very high for the measure strength of self-efficacy. Similar percentage of experimental and comparison students were classified as very low in perception of strength of self-efficacy, eighteen percent of experimental students and nineteen percent of comparison students. This differs from pretest distribution in which the experimental group had a higher percentage of very low students. This difference was caused by a drop of four percent of experimental students at posttest classified as very low, and an increase of six percent among comparison students. Forty-one percent of experimental students classified as low at posttest was consistent with the forty-three percent of experimental student classified as having low perceptions of strength of self-efficacy at pretest. A pretest to posttest drop of ten percent occurred among comparison students classified as having low perceptions of strength of self-efficacy. Consistent with pretests differences between groups on those classified as having high perceptions of strength of self-efficacy, there was a fourteen percent difference between the groups at posttest. Both the comparison and experimental groups had twenty-one percent of students classified as having very high perceptions of strength of self-efficacy at posttest.
Descriptive Statistics for Behavioral Targets

Within this section the descriptive statistics for the behavioral targets are presented. Behavioral targets, frequency of volitional moderate physical exercise and frequency of volitional vigorous physical exercise were the primary dependent variables in this study. Frequency of volitional moderate and vigorous physical exercise were the measures upon which conclusions will be based. Students recorded exercise behavior using the previous day physical activity recall (Weston, et al., 1997). Exercise was recorded over seven consecutive days. Potential range for moderate physical exercise was zero to seven. Potential range for vigorous physical exercise was zero to seven. Coding of data allowed for a maximum of one bout of moderate exercise each day, this was true also for coding of vigorous physical exercise.

Information presented in this section includes group mean score, standard deviation and observed range. As in the previous section, The observed ranges were divided into four categories, very low scores, low scores, high scores and very high scores. Dividing scores into these categories provide a mechanism by which it was possible to detect segments of the sample most influenced by the educational intervention. This crude sub-sample analysis may enable future selective targeting of subjects most likely to be influenced by the educational treatment.
Overview

Measures of frequency of volitional moderate physical exercise and frequency of volitional vigorous physical exercise served as the primary dependent variable for this study. The primary purpose to which these behavioral variables were to be put was to determine the ability of the Social Cognitive Theory-based educational treatment to influence frequency of volitional moderate and vigorous physical exercise. Only group changes were observed for the dependent variable frequency of volitional moderate physical exercise. This indicated that the implemented educational treatment was effective at increasing frequency of volitional moderate physical exercise. Using the sub-group analysis of score distributions across four descriptive categories it was clear that the greatest impact was among the experimental students classified as very low frequency moderate physical exercisers. Within this category there was noted a very steep decline in the percentage of experimental students from pretest to posttest. In contrast to the experimental group decline, there was noted a steep incline from pretest to posttest in the percentage of comparison students classified as very low frequency moderate physical exercisers. This steep incline reflected among comparison students was expected as the treatment spanned the seasonal transition from autumn to winter. Colder weather in central Ohio during this time should be associated with a decrease in physical exercise as persons remain indoors for greater quantities of the day. In addition to the cold weather impact on physical exercise, there is a decreased number of hours with daylight. It was expected within this study that physical exercise should become more infrequent as daylight hours dropped. It was concluded that the frequency of volitional moderate physical exercise among comparison group subjects was consistent with this expected
secular trend. The observation that the experimental students did not follow this trend makes the conclusions pertaining to the ability of the implemented educational treatment to manipulate the frequency of volitional moderate physical exercise more important. It appears that the implemented educational treatment was effective at increasing the frequency of volitional moderate physical exercise not only among the most sedentary of subjects but can assert its effect even with diminishing environmental conditions.

**Moderate Physical Exercise**

Moderate physical exercise within this study was defined as planned bouts of physical exercise, lasting at least fifteen minutes, slightly increasing the heart rate and breathing rate and were done in order to maintain physical fitness. Moderate physical exercise was measured using the self-report instrument, previous day physical activity recall (Weston, et al., 1997). Potential physical activities were provided to student on the activities listing page of the instrument. Only those activities numbered between twenty-one and twenty-five and twenty-seven and thirty-three, and thirty-five were considered potential volitional physical exercises. Only those potential volitional physical exercise numbers that were identified by students as occurring during non-school hours were included as volitional physical exercise. Exercises in which the subject identified with medium intensity were included as being moderate physical exercise bouts. Activities such as weight lifting, walking, or moderately intense sporting events not sponsored by any organization, had a defined moderate intensity. For these activities to be included as a moderate exercise bout students must self-report the intensity to be at least moderate. Potential minimum score was zero. Potential maximum score was seven. Figure 4.42
provides mean frequency of volitional moderate physical exercise, standard deviation, observed minimum and maximum score and observed range for each group by test.

Figure 4.43 presents the frequency distribution for moderate exercise by group and test.

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th></th>
<th>Posttest</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Experimental</td>
<td>51</td>
<td>1.29</td>
<td>1.85</td>
<td>51</td>
</tr>
<tr>
<td>Comparison</td>
<td>92</td>
<td>2.89</td>
<td>2.45</td>
<td>92</td>
</tr>
</tbody>
</table>

Figure: 4.42
Group scores by test on the dependent variable frequency of volitional moderate
moderate exercise.

<table>
<thead>
<tr>
<th>Days of Moderate Exercise</th>
<th>Experimental Group (n=51)</th>
<th>Comparator Group (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>0-day</td>
<td>55</td>
<td>18</td>
</tr>
<tr>
<td>1-day</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>2-day</td>
<td>08</td>
<td>18</td>
</tr>
<tr>
<td>3-day</td>
<td>08</td>
<td>18</td>
</tr>
<tr>
<td>4-day</td>
<td>06</td>
<td>12</td>
</tr>
<tr>
<td>5-day</td>
<td>08</td>
<td>06</td>
</tr>
<tr>
<td>6-day</td>
<td>00</td>
<td>06</td>
</tr>
<tr>
<td>7-day</td>
<td>02</td>
<td>02</td>
</tr>
</tbody>
</table>

Figure: 4.43
Frequency distribution for each group on the dependent variable frequency of volitional moderate physical exercise by test.

253
Fifty-one students in the experimental group were included in the calculation of pretest frequency mean score. Ninety-two comparison students were included in the calculation of frequency mean score. At pretest experimental students reported engaging in moderate physical exercise less often than comparison students, experimental group 1.29 days each week, comparison group 2.89.

Experimental students increased the frequency of moderate physical exercise at posttest while comparison students decreased moderate physical exercise. At posttest experimental students reported more frequent moderate physical exercise than their comparison counterparts, experimental group 2.35 days each week, comparison group 1.65 days each week. Figure 4.29 is a comparison between groups on the dependent variable frequency of volitional moderate physical exercise for both the pretest and posttest.
Figure 4.44
A comparison between groups on the dependent variable frequency of moderate physical exercise for both the pretest and posttest.
### Table 4.45

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posttest</td>
<td>Frequency Moderate Ex</td>
<td>Posttest</td>
<td>Frequency Moderate Ex</td>
</tr>
<tr>
<td><strong>Experimental Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency Moderate Ex</strong></td>
<td>-0.05 (n=51)</td>
<td>( \beta = -0.1 \pm 0.1 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency Moderate Ex</strong></td>
<td>0.31 (n=92)</td>
<td>( \beta = 0.2 \pm 0.1 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.45 reports the pretest to posttest correlation coefficients for both groups on the dependent variable frequency of volitional moderate physical exercise.

Comparison of these correlation values indicates the degree to which the group slopes are equivalent to one another. The greater the magnitude of pretest to posttest correlation the more steep the slope. When using the analysis of covariance statistic the slopes are expected to be similar between groups. From the data provided in figure 4.45 regression analysis yields the probable \( \beta \) coefficient range for each group. Given the probable distributions of the \( \beta \) coefficient for each group it can be concluded that the slopes are statistically different.
Figure 4.46 depicts the pretest score distribution for both groups across four descriptive categories of frequency of volitional moderate physical exercise. The four descriptive categories are, very low, low, high, very high frequency. Students reporting no moderate physical exercise were included in the very low category. Students reporting one or two days of moderate physical exercise were included into the low category. Students reporting three, four, or five days of moderate physical exercise were included in the high category. Students reporting six or seven days of moderate physical exercise were included in the very high category.

At pretest fifty-five percent of the experimental group reported no days of moderate physical exercise this was compared with twenty-seven percent of the comparison group that reported no days of moderate physical exercise. The pretest difference between these groups in this category was striking, clearly there were many more experimental students than comparison students engaging in zero bouts of volitional moderate physical exercise. Both groups had similar percentages of students categorized in the low section, twenty-two percent of experimental group, nineteen percent of comparison group. Within the high category there were twenty-two percent of experimental students. and thirty-seven percent of comparison students. Two percent of experimental group was categorized as being very high in regard to frequency of moderate exercise. This was compared to the eighteen percent of comparison students included in the very high category. These results indicate that at pretest the experimental and comparison students differ on the frequency of volitional moderate exercise. Most of the experimental students being classified as very low or low exercisers, while comparison students were classified as being high or very high exercisers.
Experimental Group %  
(n=51)  
Comparison Group %  
(n=92)  
Pretest Very Low 55  27  
Pretest Low 22  18  
Pretest High 22  37  
Pretest Very High 2  17  

Figure: 4.46  
Pretest categorical distribution of subjects on the dependent variable frequency of volitional moderate physical exercise.

Experimental Group %  
(n=51)  
Comparison Group %  
(n=92)  
Posttest Very Low 18  44  
Posttest Low 39  23  
Posttest High 35  28  
Posttest Very High 8  4  

Figure: 4.47  
Posttest categorical distribution of subjects on the dependent variable frequency of volitional moderate physical exercise.

Figure 4.47 depicts the posttest score distribution for both groups across the four descriptive categories of frequency of volitional moderate physical exercise. At posttest eighteen percent of experimental students were included within the very low category. At posttest forty-four percent of comparison students were included within the very low category. This was a strong reversal from the pretest in which a much greater percentage of students included within the very low category were from the experimental group. Within the low category this trend was continuing, where almost equal percentages of students between groups were included here at pretest, the percentage of experimental
students increased by seventeen percent at posttest while the percentage of comparison
students in the low category increased by eight percent. At posttest thirty-five percent of
experimental students were included in the high category up from twenty-two percent at
pretest, this was compared with twenty-eight percent of comparison students included in
the high category, down from thirty-seven percent at pretest. Within the very high
category at posttest were eight percent of experimental students and four percent of
comparison students. This constituted a six percent rise in very high frequency of
moderate exercisers in the experimental group and a thirteen percent drop in the
comparison group.

Vigorous Physical Exercise

Vigorous physical exercise within this study was defined as physical activity that
was planned, lasting for at least fifteen minutes, result in greatly increased heart rate and
breathing rate and done in order to maintain or improve physical fitness. Frequency of
volitional vigorous physical exercise was measured using the self-report instrument,
previous day physical activity recall (Weston, et al., 1997). A list of potential physical
activities was provided to students within the activities listing page of the instrument.
Only the physical activities numbered between twenty-one and twenty-five, twenty-seven
and thirty-three, and thirty-five were considered to be potential volitional physical
exercise. In order for potential volitional physical exercise to be included as a bout of
volitional physical exercise it must have been identified by the student to have occurred
during non-school hours. Activities such as running, aerobic dance, and intense sporting
events not sponsored by any organization, had a defined intensity of vigorous. For these
activities to be included as vigorous exercise bouts students must have self-reported the
intensity to be at least moderate. Potential minimum score was zero. Potential maximum
score was seven. Figure 4.48 is a presentation of the mean scores for frequency of
volitional vigorous physical exercise, standard deviation, observed minimum and
maximum score and observed range were also included, information is presented by test.
Figure 4.49 is a presentation of the frequency distribution for vigorous exercise by group
and test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td>51</td>
<td>0.71</td>
</tr>
<tr>
<td>Comparison</td>
<td>92</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Figure 4.48
Pretest and posttest descriptive scores for both groups on the dependent variable,
frequency of volitional vigorous physical exercise.

<table>
<thead>
<tr>
<th>Days of Vigorous Exercise</th>
<th>Experimental Group (n=51)</th>
<th>Comparison Group (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>0-day</td>
<td>73</td>
<td>67</td>
</tr>
<tr>
<td>1-day</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>2-day</td>
<td>06</td>
<td>12</td>
</tr>
<tr>
<td>3-day</td>
<td>06</td>
<td>06</td>
</tr>
<tr>
<td>4-day</td>
<td>02</td>
<td>00</td>
</tr>
<tr>
<td>5-day</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>6-day</td>
<td>03</td>
<td>02</td>
</tr>
<tr>
<td>7-day</td>
<td>00</td>
<td>02</td>
</tr>
</tbody>
</table>

Figure 4.49
Pretest and posttest frequency distribution for both groups as percentage of students on
the dependent variable, frequency of volitional vigorous physical exercise.

260
Fifty-one students in the experimental group were included in the calculation of frequency mean score. Ninety-two students in the comparison group were included in the calculation of frequency mean score. Both groups reported infrequent bouts of vigorous physical exercise at pretest, experimental .71; comparison .79. While both groups increase the frequency of volitional vigorous physical exercise at posttest the increase was small and nearly symmetrical between groups. At posttest scores were, experimental .78; comparison 1.02. Figure 4.50 is a pretest and posttest comparison of group mean scores on the dependent variable, frequency of volitional vigorous physical exercise.
Figure 4.50
A comparison of pretest and posttest mean scores for both groups on the dependent variable, frequency of volitional vigorous physical exercise.
<table>
<thead>
<tr>
<th></th>
<th>Experimental Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posttest Frequency Vigorous Ex</td>
<td>Posttest Frequency Vigorous Ex</td>
</tr>
<tr>
<td><strong>Experimental Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency Vigorous Ex</td>
<td>0.54 (n=51)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\beta = .6 \pm .1$</td>
<td></td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency Vigorous Ex</td>
<td>0.34 (n=92)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\beta = .4 \pm .1$</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.51
Pretest to posttest correlation coefficients for both groups on the dependent variable frequency of volitional vigorous physical exercise.

Figure 4.51 reports the pretest to posttest correlation coefficients for both groups on the dependent variable frequency of volitional vigorous physical exercise. Comparison of these correlation values indicates the degree to which the group slopes are equivalent to one another. The greater the magnitude of pretest to posttest correlation the more steep the slope. When using the analysis of covariance statistic the slopes are expected to be similar between groups. From the data provided in figure 4.51 regression analysis yields the probable $\beta$ coefficient range for each group. Given the probable distributions of the $\beta$ coefficient for each group it can be concluded that the slopes are statistically different.

Figure 4.52 depicts the pretest score distribution for both groups within four descriptive categories on the dependent variable frequency of volitional vigorous physical exercise. The descriptive categories include, very low, low, high and very high. The category very low was for students that report zero days of volitional vigorous physical exercise. Low category was for students that report one or two days of volitional
vigorous physical exercise. High category was for students that report three, four, or five
days of volitional vigorous physical exercise. Very high category was for students that
report six or seven days of volitional vigorous physical exercise. Both the experimental
and comparison group had similar distributions at pretest. At pretest seventy-two percent
of students in the experimental group were categorized in the very low category while
sixty-eight percent of students in the comparison group were similarly categorized.
There was a steep decline from the percent of students in the very low category and the
low category, twenty-one percent of experimental students, fifteen percent of comparison
students. Eight percent of students in the experimental group were identified as being in
the high category while ten percent of comparison students were similarly identified.
Four percent of experimental students were identified as being in the very high category
while three percent of comparison students were similarly identified. These data suggest
that the two groups had a similar distribution of students in each category.

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group %</th>
<th>Comparison Group %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=51)</td>
<td>(n=92)</td>
</tr>
<tr>
<td>Pretest Very Low</td>
<td>73</td>
<td>67</td>
</tr>
<tr>
<td>Pretest Low</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>Pretest High</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Pretest Very High</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure: 4.52
Pretest categorical distribution of subjects on the dependent variable frequency of
volitional vigorous physical exercise.
<table>
<thead>
<tr>
<th>Posttest</th>
<th>Experimental Group % (n=51)</th>
<th>Comparison Group % (n=92)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>67</td>
<td>63</td>
</tr>
<tr>
<td>Low</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Very High</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Figure: 4.53
Posttest categorical distribution of subjects on the dependent variable frequency of volitional vigorous physical exercise.

Figure 4.53 is a presentation of the posttest score distribution for both groups across four descriptive categories on the dependent variable frequency of vigorous physical exercise. Descriptive categories were very low, low, high, and very high. Students in both groups reported similar frequency of volitional vigorous physical exercise. The category with the largest percent of students remains the very low, sixty-seven percent of experimental students, sixty-three percent of comparison students. This represents a drop of five percent for the experimental group and a five percent drop among comparison group. At posttest the percentage of experimental students classified in the low category was twenty-three while twenty percent of comparison students were similarly classified. This represents an increase from pretest among experimental students equal to eight percent while it represents a decrease among comparison student equal to one percent. At posttest five percent of experimental student were classified within the high category, while twelve percent of comparison students were similarly classified. This represents a decrease of four percent among experimental students and a decrease of two percent among comparison students. At posttest both the experimental and comparison groups had four percent of students classified within the very high
category. This represents no change among experimental student and a one percent increase among comparison students. These data demonstrate that it was unlikely that the implemented educational treatment had any effect upon the frequency of volitional vigorous physical exercise.

Hypotheses Testing

Analysis of covariance, with an alpha level of .05 was conducted on each of the dependent variables that appeared to have a similar pretest to posttest slope between groups. These variables include self-control, outcome expectation, social situation, and strength of self-efficacy. The dependent variables frequency of volitional moderate physical exercise and frequency of volitional vigorous physical exercise have dissimilar group slopes. In recognition of the differing group slopes it was determined that use of the analysis of covariance statistic would be unwise. In preference to the analysis of covariance, the paired t-test was conducted in order to determine the significance of within group pretest to posttest change. This t-test analysis was conducted for both the experimental and comparison groups.

For the dependent variables self-control, outcome expectation, social situation, and strength of self-efficacy, pretest measures served as the covariant. Using the pretest measure for each dependent variable ensured that any differences between groups at pretest would be statistically controlled for prior to analysis of posttest differences. Further, the use of pretest measures increased the statistical power in the analysis of posttest differences. Following inclusion of the covariant, a one-way analysis of variance was conducted. The factor built into the design was group. The group factor was
composed of two levels, experimental or comparison. This group factor was a between subjects factor in that each subject can only have membership in one of the levels. The one-way analysis of variance statistic indicates differences in the main effect. This main effect answers the question, does an adequate dose of the educational treatment increase student scores on the targeted Social Cognitive Theory constructs?

Inferential Statistics on Social Cognitive Theory Educational Targets

Using an analysis of covariance statistic it was determined that only the exercise self-control construct was influenced by the educational treatment. Self-control is a cognitive construct that describes the frequency of action in the areas of goal-setting, self-monitoring, securing and maintaining a supportive social environment, securing and maintaining reinforcements for physical exercise, and planning to overcome barriers to physical exercise.

The educational intervention was not effective at improving student perceptions of social situation, strength of self-efficacy or outcome expectations. One explanation of the failure to influence these perceptions was that the educational treatment as implemented did not provide adequate opportunities for students to evaluate their perceptions. Results from the implementation evaluation demonstrated that the classroom experiences were delivered as expected, while the exercise incentive program was implemented in an unexpected fashion. Material discussed within the classroom sessions was predominantly directed toward the development of the exercise self-control construct. Relatively little effort was expended within the classroom at challenging directly student perceptions of social situation, strength of self-efficacy or outcome
expectations. These perceptions were to be evaluated by students through the exercise incentive program. As implemented, the exercise incentive program was a voluntary activity rather than mandatory component of the class. As a result of the voluntary nature of the implemented exercise incentive program only twenty of the fifty-one experimental subjects participated. These twenty subjects did not necessarily participate in each of the four weeks in which the exercise incentive program was delivered, therefore some students within the experimental group remained relatively untreated in regard to social situation, strength of self-efficacy, outcome expectation.
Self-control

Figure 4.54 summarizes the outcome of the analysis of covariance statistic for the dependent variable, posttest measure of self-control for physical exercise. In this analysis the pretest measures of self-control served as covariant. Statistical significance was found for the group factor ($F_{1,137} = 6.08, p = 0.015$). Upon examination of descriptive scores it was determined that self-control scores were higher among experimental subjects. The following null hypothesis was rejected:

$H_0$: Group membership will not account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

The following alternative hypothesis was accepted:

$H_A$: Group membership will account for significant variance in posttest measures of self-control after variance that is shared with the pretest is controlled.

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Pr=F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model, $R^2=0.438$</td>
<td>2</td>
<td>564805.31</td>
<td>282402.65</td>
<td>53.36</td>
<td>.000</td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>548388.14</td>
<td>548388.14</td>
<td>103.62</td>
<td>.000</td>
</tr>
<tr>
<td>Group, $R^2=0.025$</td>
<td>1</td>
<td>32169.31</td>
<td>32169.31</td>
<td>06.08</td>
<td>.015</td>
</tr>
<tr>
<td>Residual</td>
<td>137</td>
<td>725047.64</td>
<td>5292.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.54

Results of the analysis of covariance for the dependent variable self-control. The covariant in this analysis was the pretest measure of self-control.
Outcome Expectations

Figure 4.55 summarizes the result of the analysis of covariance statistic for the dependent variable, posttest measure of outcome expectation for physical exercise. In this analysis the pretest measures of outcome expectation for physical exercise served as covariant. No statistical significance was found for the group factor after statistically controlling for pretest scores ($F_{1:125} = 0.06, p = 0.804$). The null hypothesis failed to be rejected:

$$H_0: \text{ Group membership will not account for significant variance in the posttest measure outcome expectation for physical exercise after variance that is shared with the pretest is controlled.}$$

The following alternative hypothesis was rejected:

$$H_A: \text{ Group membership will account for significant variance in the posttest measure outcome expectation for physical exercise after variance that is shared with the pretest is controlled.}$$

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Pr=F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model, $R^2=0.371$</td>
<td>2</td>
<td>69098.68</td>
<td>34549.34</td>
<td>36.94</td>
<td>.000</td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>68151.01</td>
<td>68151.01</td>
<td>72.87</td>
<td>.000</td>
</tr>
<tr>
<td>Group, $R^2=0.0003$</td>
<td>1</td>
<td>57.70</td>
<td>57.70</td>
<td>00.06</td>
<td>.804</td>
</tr>
<tr>
<td>Residual</td>
<td>125</td>
<td>116905.29</td>
<td>935.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.55

Results of the analysis of covariance for the dependent variable outcome expectation for physical exercise. The covariant in this analysis was the pretest measure of outcome expectation.
Social Situation

Figure 4.56 summarizes the result of the analysis of covariance statistic for the dependent variable, posttest measure of social situation for physical exercise. In this analysis pretest measures of social situation for physical exercise served as covariant. No statistical significance was found for the group factor after statistically controlling for the covariate (F_{1,133} = 0.26, p = 0.610). The null hypothesis failed to be rejected:

H₀: Group membership will not account for significant variance in the posttest measure social situation after variance that is shared with the pretest is controlled.

The following alternative hypothesis was rejected:

Hₐ: Group membership will account for significant variance in the posttest measure social situation after variance that is shared with the pretest is controlled.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Pr=F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model, R²=0.379</td>
<td>2</td>
<td>3577.18</td>
<td>1788.59</td>
<td>40.56</td>
<td>.000</td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>3459.97</td>
<td>3459.97</td>
<td>78.46</td>
<td>.000</td>
</tr>
<tr>
<td>Group, R²=0.0012</td>
<td>1</td>
<td>11.55</td>
<td>11.55</td>
<td>0.26</td>
<td>.610</td>
</tr>
<tr>
<td>Residual</td>
<td>133</td>
<td>5865.16</td>
<td>44.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.56
Results of the analysis of covariance for the dependent variable social situation for physical exercise. The covariant in this analysis was the pretest measure of social situation.
Strength of Self-efficacy

Figure 4.57 summarizes the result of the analysis of covariance statistic for the dependent variable, posttest measure of strength of self-efficacy. In this analysis the pretest measure of strength of self-efficacy for physical exercise served as covariant. No statistical significance was found for the group factor after statistically controlling for pretest measures of strength of self-efficacy ($F_{1,138} = 0.11$, $p = 0.744$). The null hypothesis failed to be rejected:

$H_0$: Group membership will not account for significant variance in the posttest measure strength of self-efficacy after variance that is shared with the pretest is controlled.

The following alternative hypothesis was rejected:

$H_A$: Group membership will account for significant variance in the posttest measure strength of self-efficacy after variance that is shared with the pretest is controlled.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Pr=F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model, $R^2=0.319$</td>
<td>2</td>
<td>925.46</td>
<td>462.73</td>
<td>32.32</td>
<td>.000</td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>922.84</td>
<td>922.84</td>
<td>64.46</td>
<td>.000</td>
</tr>
<tr>
<td>Group, $R^2=0.0005$</td>
<td>1</td>
<td>1.53</td>
<td>1.53</td>
<td>00.11</td>
<td>.744</td>
</tr>
<tr>
<td>Residual</td>
<td>138</td>
<td>1975.71</td>
<td>14.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.57
Results of the analysis of covariance for the dependent variable strength of self-efficacy for physical exercise. The covariant in this analysis was the pretest measure of strength of self-efficacy.
Summary of Results of Inferential Statistics Indicating Construct Validity of this Treatment

Results from the inferential statistics on the educational targets indicated that the only Social Cognitive Theory construct manipulated by the educational intervention was self-control. Other targeted constructs outcome expectation, social situation, and strength of self-efficacy were not preferentially improved among experimental students. The treatment was therefore concluded to be only construct valid for self-control. Inability to attain satisfactory levels of construct validity for this treatment on the constructs outcome expectation, social situation, and strength of self-efficacy is likely to be tied to the failure to implement all parts of the treatment as intended. As noted in the implementation evaluation, the failure to deliver the exercise incentive program as expected decreased the opportunities for students to interact with experiences that could improve their perceptions of social situation, outcome expectations, and strength of self-efficacy. The failure to implement the exercise incentive program as designed was the result of teachers who were unwilling to require student participation in the out of school personal exercise program.
Preferential improvement among experimental students on the construct self-control demonstrated that actions associated with self-control were developed using the learning experiences within the classroom component of this curriculum. These self-control actions were increased to a greater degree when compared to the comparison group that was treated using an exclusively skill-based physical education curriculum.

Inferential Statistics on Behavioral Targets

The primary purpose of this study was to determine the effectiveness of a Social Cognitive Theory-based educational treatment at increasing the frequency of volitional moderate and vigorous physical exercise among adolescent students. Within this section results of the inferential statistics pertaining to the frequency of volitional moderate and vigorous physical exercise are reported. There was a significant increase in the frequency of volitional moderate physical exercise documented among experimental subjects. There was a significant decrease in the frequency of volitional moderate physical exercise documented among comparison subjects. On the dependent variable frequency of volitional vigorous physical exercise neither the experimental nor comparison group demonstrated any significant deviation away from their pretest measure. These findings indicate that the educational treatment was effective at increasing the frequency of volitional moderate physical exercise.
Moderate Physical Exercise

Figure 4.58 summarizes the results of the paired t-test on the variables pretest and posttest frequency of volitional moderate physical exercise. Two separate paired t-tests were conducted one within the experimental group, the other within the comparison group. Statistical significance was found for the experimental group \((t_{50} = -2.81, p = 0.007)\). Upon examination of descriptive scores it was determined that for experimental subjects frequency of volitional moderate physical exercise was higher at posttest. At posttest experimental subjects increased the number of days in which moderate exercise was reported by slightly greater than one day a week. The percentage of experimental subjects reporting no days of moderate physical exercise dropped from fifty-five percent at pretest to eighteen percent at posttest. A statistical difference was demonstrated within the comparison group \((t_{91} = 4.56, p = 0.000)\). Upon examination of descriptive scores it was determined that for comparison subjects frequency of volitional moderate physical exercise was lower at posttest. Frequency of moderate physical exercise among comparison group subjects dropped by 1.24 days a week by posttest. The percentage of comparison subjects at posttest was forty-four percent, this is an increase of seventeen percent from pretest. The following null hypotheses was rejected:

\[ H_0: \text{Experimental group posttest frequency of volitional moderate physical exercise will be equal to pretest values.} \]

\[ H_0: \text{Comparison group posttest frequency of volitional moderate physical exercise will be equal to pretest values.} \]

The following alternative hypotheses were accepted:
\( H_A: \) Experimental group posttest frequency of volitional moderate physical exercise will be different than the pretest value.

\( H_A: \) Comparison group posttest frequency of volitional moderate physical exercise will be different than the pretest value.

<table>
<thead>
<tr>
<th>Group</th>
<th>Paired Difference</th>
<th>Paired SD</th>
<th>Degrees of Freedom</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>-1.06</td>
<td>2.69</td>
<td>50</td>
<td>-2.81</td>
<td>0.007</td>
</tr>
<tr>
<td>Comparison</td>
<td>1.24</td>
<td>2.61</td>
<td>91</td>
<td>4.56</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Figure 4.58
Results of the paired t-tests conducted for each group on the dependent variable frequency of moderate physical exercise.
Vigorous Physical Exercise

Figure 4.59 summarizes the results of the paired sample t-tests on the variables pretest and posttest frequency of volitional vigorous physical exercise. Two separate paired sample t-tests were conducted, one within the experimental group, the other within the comparison group. No statistical significance was found for the experimental group ($t_{90} = -0.40$, $p = 0.69$). No statistical difference was demonstrated within the comparison group ($t_{91} = -1.14$, $p = 0.26$). The following null hypothesis failed to be rejected:

$H_0$: Experimental group posttest frequency of volitional vigorous physical exercise will be equal to pretest values.

$H_0$: Comparison group posttest frequency of volitional vigorous physical exercise will be equal to pretest values.

The following alternative hypothesis was rejected:

$H_A$: Experimental group posttest frequency of volitional vigorous physical exercise will be different than the pretest value.

$H_A$: Comparison group posttest frequency of volitional vigorous physical exercise will be different than the pretest value.

<table>
<thead>
<tr>
<th>Group</th>
<th>Paired Difference</th>
<th>Paired SD</th>
<th>Degrees of Freedom</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>-0.078</td>
<td>1.14</td>
<td>50</td>
<td>-0.40</td>
<td>0.69</td>
</tr>
<tr>
<td>Comparison</td>
<td>-0.23</td>
<td>1.93</td>
<td>91</td>
<td>-1.14</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Figure 4.59
Results of the paired t-tests conducted for each group on the dependent variable frequency of vigorous physical exercise.
Summary of Results of Inferential Statistics Indicating Behavioral Impact of this Treatment

Results of the inferential statistics on the behavioral targets indicated that the implemented educational treatment was effective at increasing student frequency of volitional moderate physical exercise. During the same time frame in which experimental group participation in moderate physical exercise was increasing it was demonstrated that participation in moderate physical exercise among comparison subjects was decreasing. This study did not provide evidence that indicated that the implemented educational treatment was effective at increasing the frequency of volitional vigorous physical exercise.

Sedentary Rate Among Subjects

In order to determine if there was a difference in the distribution of sedentary subjects between groups at posttest a Chi-square for Independence statistic was calculated. Figure 4.60 summarizes this Chi-square for Independence statistic. Subjects were identified as sedentary if in the behavioral assessment they reported no bouts of volitional physical exercise, moderate or vigorous, at posttest. Seven subjects in the experimental group were identified as sedentary, while thirty comparison subjects were identified as sedentary. Results demonstrate a group difference, $X^2_{(1)} = 5.75$, $p < 0.05$. As a result, the following null hypothesis was rejected:

$H_0$: The proportion of students identified as sedentary at posttest will be equal between groups.

The following alternative hypothesis was accepted:

$H_A$: The proportion of students identified as sedentary at posttest will be lower among experimental group subjects than comparison group subjects.

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### Table 1

<table>
<thead>
<tr>
<th>Cell</th>
<th>( f_o )</th>
<th>( f_e )</th>
<th>((f_o-f_e))</th>
<th>((f_o-f_e)^2)</th>
<th>((f_o-f_e)^2/f_e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercisers-Experimental</td>
<td>44</td>
<td>38</td>
<td>06</td>
<td>36</td>
<td>0.95</td>
</tr>
<tr>
<td>Sedentary-Experimental</td>
<td>07</td>
<td>13</td>
<td>06</td>
<td>36</td>
<td>2.77</td>
</tr>
<tr>
<td>Exercisers-Comparison</td>
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<td>68</td>
<td>06</td>
<td>36</td>
<td>1.50</td>
</tr>
<tr>
<td>Sedentary-Comparison</td>
<td>30</td>
<td>24</td>
<td>06</td>
<td>36</td>
<td>0.53</td>
</tr>
</tbody>
</table>

**Figure: 4.60**

Result of a Chi-square test for independence. Results indicate that the proportion of experimental subjects judged to be sedentary was less than the proportion of comparison subjects judged to be sedentary. Subjects were judged to be sedentary if they reported no volitional physical exercise, moderate or vigorous in intensity, at posttest.

---

**Summary of Analysis of Sedentary Rate Among Subjects**

The result of the Chi-square test of independence statistic indicated that the experimental subjects were less likely than their comparison counterparts to be truly sedentary at posttest. The importance of this analysis was that the implemented educational treatment was effective at decreasing the sedentary rate among experimental subjects. The value of this finding was in the realization that through physical education in which self-controlling actions were taught along side the development of exercise skill the most sedentary of students were more likely to initiate some physical exercise. These students who had been resistant in the past to volitional physical exercise were reached by this educational treatment. To the degree that physical education is designed to encourage all students to exercise, teachers of the subject should incorporate the techniques presented within this study in order to decrease the sedentary rate among students. Through the use of these techniques this study has provided evidence that students will activate these self-controlling actions and even the most sedentary of students will be enabled to engage in some form of volitional physical exercise.

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Post hoc Power Analysis

Difficulty in recruiting physical education teachers, and the high rate of students being removed from this study resulted in 143 students being retained within the study. This was a subject population that was slightly less than the 154 student population predicted to be necessary in order to achieve statistical power of eighty percent at an alpha level 0.05, for an expected minimal treatment effect, PV = 0.05. Although the subject population was slightly less than that expected in order to achieve eighty percent statistical power, the obtained 143 subject population was expected to yield statistical power greater than fifty percent if the treatment effect was minimal, PV = 0.05. While this degree of statistical power was less desirable, it should permit reasonable confidence that if one of the null hypotheses were false it would be rejected. In order to determine the probability that each null hypothesis would be rejected if false, it was necessary to perform a post hoc power analysis on each of the dependent variables. This analysis requires several pieces of information, which includes the obtained F ratio for the obtained degrees of freedom. This information enables the calculation of the magnitude of treatment effect, PV (Murphy, 1998).

\[ f^2 = (v1 * F) / v2 \]

\[ pv = f^2 / (1 + f^2) \]

- \( f^2 \) is the squared value of the effect size estimator \( f \).
- \( v1 \) is the degree freedom used in F ratio numerator.
- \( v2 \) is the degree freedom used in F ratio denominator.
- \( pv \) is the proportion of total variance explained by the treatment.
After calculation of the magnitude of the treatment effect it was necessary to estimate the statistical power obtained for each dependent variable subjected to the analysis of covariance. The statistical power estimate is calculated most efficiently using the technique presented in chapter three of this paper and repeated in the following formula (Murphy, 1998). Critical F ratios to obtain fifty percent and eighty percent statistical power for the pertinent degrees of freedom are provided in the "one stop F table" (Murphy, 1998). Results from this post hoc power analysis are presented for each dependent variable within figure 4.61.

\[
\text{Power} = .50 + \left[ \frac{F_{\text{result}} - F_{50} / F_{80} - F_{50}}{F_{50}} \right] \times .30
\]

- \(F_{\text{result}}\) = Observed F ratio for the ANCOVA.
- \(F_{50}\) = Critical F ratio needed for 50% power given pertinent degrees of freedom.
- \(F_{80}\) = Critical F ratio needed for 80% power given pertinent degrees of freedom.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample</th>
<th>Difference</th>
<th>Potential Range</th>
<th>(p_v)</th>
<th>F ratio</th>
<th>Significance</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-control</td>
<td>140</td>
<td>22.50</td>
<td>500</td>
<td>0.042</td>
<td>6.08</td>
<td>.015</td>
<td>67%</td>
</tr>
<tr>
<td>Outcome Exp.</td>
<td>128</td>
<td>-5.99</td>
<td>175</td>
<td>0.0005</td>
<td>0.06</td>
<td>.804</td>
<td>22%</td>
</tr>
<tr>
<td>Social Sit.</td>
<td>136</td>
<td>-1.62</td>
<td>32</td>
<td>0.002</td>
<td>0.26</td>
<td>.610</td>
<td>24%</td>
</tr>
<tr>
<td>Strength S-E.</td>
<td>141</td>
<td>-0.23</td>
<td>16</td>
<td>0.0008</td>
<td>0.11</td>
<td>.744</td>
<td>23%</td>
</tr>
<tr>
<td>Moderate Ex.</td>
<td>143</td>
<td>0.70</td>
<td>07</td>
<td>0.054</td>
<td>7.96</td>
<td>.005</td>
<td>80%</td>
</tr>
<tr>
<td>Vigorous Ex.</td>
<td>141</td>
<td>-0.24</td>
<td>07</td>
<td>0.0039</td>
<td>0.55</td>
<td>.462</td>
<td>26%</td>
</tr>
</tbody>
</table>

Figure 4.61
Post hoc power analysis in which the actual sample-size, observed differences, potential range, treatment effect, F ratio, observed significance level are presented. Power indicates the probability that a false null hypothesis will be rejected.
Summary of the Post-hoc Power Analysis

It was clear that only the dependent variable in this study to achieve the desired a-priori level of power was the dependent variable frequency of volitional moderate physical exercise. A second analysis of covariance that achieved statistical power greater than fifty percent was for the dependent variable self-control. The statistical analysis to which both these dependent variables were subjected resulted in a rejection of the null hypothesis. The remaining dependent variables were subjected to statistical analysis that had substantially less statistical power than desired: outcome expectation twenty-two percent, social situation twenty-four percent, strength of self-efficacy twenty-three percent, and frequency of vigorous physical exercise twenty-six percent. Inadequate statistical power attained on these analyses was likely due to inadequate treatment effects rather than insufficient sample size. At pretest it was determined that 154 subjects would be needed in order to reject a null hypothesis if the treatment effect, \( \text{pv} = 0.05 \). While the number of subjects fell below this expected sample size, differences were minimal. Treatment effects however for the dependent variables: outcome expectation, social situation, strength of self-efficacy, and frequency of volitional vigorous physical exercise fell well below the expected magnitude of 0.05. Observing the magnitude of treatment effects it was concluded that the null hypotheses were rejected when appropriate, and accepted when appropriate.
As indicated in the implementation evaluation of this treatment, the exercise incentive program failed to be delivered consistently across all subjects within the final experimental group. This exercise incentive program primarily targeted the dependent variables: outcome expectation, social situation, and strength of self-efficacy, all of which failed to demonstrate an adequate treatment effect. It was possible that the failure to deliver the exercise incentive program consistently to all final experimental subjects resulted in the observed diminished treatment effect.

In the cases of self-control, and frequency of volitional moderate physical exercise, sample sizes were acceptable and the treatment effects were within the expected range, resulting in adequate statistical power, sixty-eight percent for self-control and eighty percent for frequency of volitional moderate physical exercise. In each case statistical significance was achieved, 0.015 for self-control and 0.005 for frequency of moderate physical exercise.
CHAPTER 5

CONCLUSIONS AND DISCUSSION

Recent efforts to increase physical exercise participation among adolescent school children have generally documented a behavioral impact that was minimal in magnitude. The studies upon which this conclusion was based infrequently utilize several evaluation techniques that provide a more complete understanding of the observed behavioral impact. Evaluation techniques that afford greater understanding include evaluations of implementation, documentation of treatment construct validity, and measurement of both moderate, and vigorous exercise participation. It is not uncommon within this literature for authors to neglect the importance of documenting the degree to which the designed educational experiences were delivered. Researchers commonly do not provide evidence that indicate the level of treatment construct validity. Researchers often choose to measure participation in all types of physical exercise rather than subdividing physical exercise by levels of exercise intensity. Finally it is unusual for a study to incorporate each of these evaluation techniques. Within this study the three evaluation techniques were integrated. Presented in this chapter are conclusions from this study and discussion that integrates these conclusions into the existing literature.
The primary purpose of this study was to test the ability of a Social Cognitive Theory-based educational intervention to increase the frequency of volitional moderate and vigorous exercise among adolescent students. In order to address some of the shortcomings of past research in this area this study incorporated evaluations of treatment implementation, treatment construct validity, and behavioral impact upon moderate and vigorous physical exercise.

The initial section of this chapter focuses upon the construct validity of this educational treatment. Evaluation of the treatment construct validity was valuable in determining the degree to which the Social Cognitive Theory constructs were changed during the course of the educational treatment. The next section examines the impact of the educational treatment on the frequency of volitional moderate and vigorous physical exercise participation. Combining these evaluations it was possible to determine the degree to which the educational treatment had impact upon the exercise participation and to identify potential mechanisms by which this impact was realized. Accomplishment of this represents the completion of the primary purpose of this study. Additional evaluations are secondary to the conclusions from the treatment construct validity and behavioral impact evaluations and therefore are presented in subsequent sections of this chapter.

Treatment implementation evaluation described the educational experiences to which experimental subjects were subjected. This implementation evaluation was used in order to provide a context in which results from the treatment construct validity evaluation were interpreted. Conclusions from the evaluation into the adequacy of the Social Cognitive Theory measures are presented in order to examine the potential effect
of measurement error within the treatment construct validity evaluation. An evaluation regarding the similarities between the two final samples was presented to determine the degree of comparability between the two study groups. The consequences to interpretation of study results are also discussed in light of the differences in subject characteristics.

In the remaining sections of this chapter the reader will find a discussion of descriptive and inferential results, a comparative analysis between this study and other similar studies, limitations of this study, and the importance of this study. This chapter concludes with recommendations for future exercise promotion efforts among adolescent school students.
Construct Validity of the Treatment Conclusions

In order to determine the level of construct validity for this treatment it was necessary to determine if the implemented treatment differentially increased experimental student scores on each of the four targeted Social Cognitive Theory constructs. Targeted Social Cognitive Theory constructs included self-control, outcome expectations for physical exercise, social situation for physical exercise, and strength of self-efficacy.

Construct scores for self-control at pretest for both the experimental and comparison groups are, 161.51 and 174.24 respectively, group difference was 12.73. It was determined using a one-way analysis of variance that at pretest group membership did not account for significant variance in self-control scores, $F_{1,141} = 0.57; p = 0.45$. Therefore both groups were similar in respect to self-controlling actions for physical exercise. At posttest the experimental group increased their average self-control score to 197.57. This was an improvement of 22.5. The comparison students remained essentially stable at 175.1. Once this difference between groups was divided by the standard deviation of the comparison group a minimal standard effect size of 0.22 was determined. Controlling for subject pretest score on self-control it was determined that group membership accounted for significant variance on posttest self-control score. This indicated that the implemented experimental treatment was influential at improving subject self-control for physical exercise to a greater degree than was the comparison physical education treatment. Conclusion for this result was that the experimental treatment was construct valid for self-control.
Construct scores for outcome expectation for both groups were similar at pretest, experimental group 121.70 and comparison group 128.60 a difference of 6.9. It was determined using a one-way analysis of variance that at pretest, group membership did not account for significant variance in outcome expectation, F_{1,130} = 0.99; p = 0.32. Therefore at pretest both groups were similar in respect to perceptions of outcome expectations for physical exercise. At posttest the group mean score for both the experimental and comparison groups dropped to 118.78 and 124.77 respectively. Difference between groups at posttest was 5.99. Standard effect size was negative in direction and minimal in magnitude, -0.16. After controlling for subject pretest score, it was determined that group membership did not account for significant variance in outcome expectation at posttest. This indicated that the implemented experimental treatment was not more effective at increasing outcome expectation perceptions than the comparison physical education treatment. Conclusion for this finding was that the experimental treatment was not construct valid for the construct outcome expectation for physical exercise.
Construct scores of social situation for both groups at pretest were similar. Pretest mean score for the experimental group was 7.92 while pretest mean score for the comparison group was 10 difference was 2.08. Using a one-way analysis of variance it was determined that at pretest group membership did not account for significant variance, $F_{1,135} = 2.42; p = 0.12$. Therefore at pretest the two groups were similar in respect to their perceptions of social situation for physical exercise. In comparison with their pretest group mean scores both groups improved at posttest, experimental group increased by 1.02 points to group mean score 8.94, comparison group improved by 0.56 to group mean score 10.56. Difference between the two groups at posttest was 1.92. Posttest standardized effect size was negative in direction and minimal in magnitude, -0.19. After controlling for subject pretest score on social situation for physical exercise it was determined that group membership did not account for significant variance in posttest scores of social situation for physical exercise. This indicated that the implemented experimental treatment was not more effective at increasing social situation perceptions than the comparison physical education treatment. Conclusion for this finding was that the experimental treatment was not construct valid for social situation for physical exercise.
For the variable strength of self-efficacy the experimental group reported a pretest mean score of 6.98 and comparison group reported a pretest mean score of 7.81. Difference between the two groups at pretest was 0.83. It was determined using a one-way analysis of variance that at pretest, group membership did not account for significant variance in strength of self-efficacy. Pretest mean score for experimental and comparison groups were similar, $F_{1,40} = 1.15; p = 0.28$. Therefore at pretest both groups were similar in respect to perceptions of strength of self-efficacy for physical exercise. Difference between group mean scores at posttest was 0.23 indicating that the experimental group posttest mean score was 7.29 and comparison group mean score was 7.52. Effect size was negative in direction and inconsequential in magnitude, -0.064. After controlling for subject pretest score on strength of self-efficacy for physical exercise it was determined that group membership did not account for significant variance in this dependent variable at posttest. This indicated that the implemented experimental treatment was not more effective at increasing strength of self-efficacy perceptions than the comparison physical education treatment. Conclusion for this finding was that the experimental treatment was not construct valid for strength of self-efficacy for physical exercise.
Discussion Regarding the Documented Construct Validity of This Treatment

The primary purpose of this study was to determine the degree to which a Social Cognitive Theory-based educational intervention influenced the frequency of volitional moderate and vigorous physical exercise among adolescent students. The educational intervention developed for this study was based upon four constructs within the Social Cognitive Theory. These constructs were self-control, outcome expectation for physical exercise, social situation for physical exercise, and strength of self-efficacy for physical exercise. In this study the only Social Cognitive Theory construct that was successfully manipulated was self-control. It therefore was concluded that the physical education treatment implemented within this study was construct valid only for self-control.

Failure to achieve treatment construct validity on the variables, social situation, outcome expectations, and strength of self-efficacy may in part be due to an implementation error in which the exercise incentive program was implemented, although not as expected. The exercise incentive program was designed to be a mandatory component of the educational treatment in which students designed and followed through on an exercise program. By doing so students were expected to experience situations that would alter perceptions pertaining to social situation, outcome expectation, strength of self-efficacy, and self-control. This exercise incentive program was implemented, however student participation was voluntary. Reliance upon voluntary student participation resulted in an inadequate rate of student involvement, twenty of the fifty-one students included in the final experimental sample participated successfully in at least one week of the incentive program. A subgroup analysis was conducted within the final experimental sample in order to estimate if there was a differential impact upon
those students that chose to participate in the exercise incentive program above that observed in student choosing not to participate. Result of this subgroup analysis indicated that there was a descriptive difference between subgroup mean scores for the variables, outcome expectation, social situation, strength of self-efficacy, self-control, and frequency of volitional vigorous physical exercise. None of the descriptive differences between subgroup mean scores was observed to be statistically significant. This subgroup analysis was however inadequate in that each subgroup was comprised of few participants. The exercise incentive program therefore remains potentially valuable to future efforts in this area. Given this potential, the failure to achieve treatment construct validity on the variables, social situation, outcome expectation, and strength of self-efficacy was discussed in light of the largely untapped potential of the exercise incentive program.
Self-control is a construct with five dimensions, goal setting, self-monitoring, gaining of reinforcements, gaining social support, and planning to overcome barriers. Substantial improvement from pretest was observed in four of the five dimensions at posttest. The self-control dimension not having marked improvement was self-monitoring. In addition to the direct potential that improved self-control will cause an increase in physical exercise, there is a possibility that student perceptions may be determined through skilled application of the self-control process. That is while the educational treatment implemented within this study failed to effect student perceptions, increased self-control efforts in the areas of social support, and overcoming common barriers may lead students to reflect on, and at a later time alter these perceptions.

Methods incorporated in this educational treatment were insufficient at differentially improving experimental student perceptions on social situation above the perceptions held by comparison students. Results of this assessment were not consistent with findings derived from the CATCH curriculum. At three times the construct positive social support was observed to increase after students were presented with the CATCH curriculum (Luepker, et al., 1996; Edmundson, et al., 1996; Nader, et al., 1996). Methods used in the CATCH curriculum are very similar to methods used in this project, teacher support and parental involvement in lessons. Differences between this study and previous studies may be due in part to one distinction the curricular component that was designed to engage the students in a more complete exploration of social situation was not delivered as expected. Failure to implement the exercise incentive program as expected resulted in an inadequate percentage of students who chose to participate in the exercise incentive program at any level, sixty-five percent. Of the students that did
participate in the exercise incentive program only fifteen percent participated in all four weeks. This low participation rate reflects inadequate levels of student participation in experiences that in part were developed in order to improve student perceptions of social situation. Therefore had student participation in these activities been more substantial results from this study may have mirrored those observed in the CATCH curriculum. This study clearly illustrated that it would be unwise to assume that targeted Social Cognitive Theory constructs will increase in response to interventions. It is likely that interventions need to be refined in several implementation trials in order to produce sufficient impact on targeted constructs.

The failure to document construct validity of this treatment for the construct outcome expectations for physical exercise indicated that the methods implemented were inadequate. The importance of the perceptions pertaining to exercise outcome expectation remains debatable. Approximately half of the reviewed studies that evaluated the association between this construct and physical exercise activity find no relationship (Butcher, 1985; Saunders, et al., 1997; Zakarian, et al., 1994; Garcia, et al., 1995; Stucky-Ropp & DiLorenzo, 1993). Within this study this discrepancy in the literature was believed to be due to poor measurement. Correction for previous errors in measurement required new instrumentation. Instrumentation within this study utilized an encompassing model of physical exercise outcome expectations (Kenyon, 1968). Within the educational treatment were experiences designed to increase student expectations that physical exercise leads to desirable outcomes. These experiences included classroom assignment, homework, lecture, and the exercise incentive program. Failure to implement the exercise incentive program as designed may have limited the impact of the
curriculum on the construct outcome expectation. Inadequate student participation in the exercise incentive program minimized student exploration of the positive outcomes that can be associated with physical exercise. It is possible that in order to have an impact upon this construct students must be exposed to all the educational methods and experiences that were prepared within this designed educational treatment. To the author's knowledge, no other educational intervention to increase frequency of physical exercise among adolescent school students has systematically measured or specifically attempted to manipulate the construct of outcome expectation. Future educational intervention efforts should examine the potential impact of outcome expectations on physical exercise.

Results observed for the construct, strength of self-efficacy, in this study were similar to those found in an investigation of the Know Your Body curriculum (Resnicow, et al., 1992). Results found in this study differ from those found for the CATCH curriculum (Luepker, et al., 1996; Edmundson, et al., 1996; Parcel, et al., 1989). In the evaluation of the CATCH curriculum each investigator found that exercise self-efficacy increased among experimental subjects. There is one primary distinction between the investigations of both the Know Your Body curriculum, the CATCH curriculum, and this investigation. Within this study the targeted construct was strength of self-efficacy while the other curricula targeted exercise self-efficacy. Strength of self-efficacy in this study refers to a subject's perception of their ability to overcome common barriers to exercise. Exercise self-efficacy is a measure of a subject's perception of their ability to exercise. Strength of self-efficacy and exercise self-efficacy are two distinct dimensions of self-efficacy, therefore, results from this study should not be compared with results obtained
from previous investigations. Within this study strength of self-efficacy was targeted by the educational treatment because of the empirical evidence indicating that strength of self-efficacy is associated with physical exercise (Biddle & Goudas, 1996; Craig, et al., 1996; Reynolds, et al., 1990; Saunders, et al., 1997). Methods and experiences that were designed to be implemented within this educational intervention included a lecture format, classroom assignment, and exercise incentive program. It is possible that the failure to increase student perception of strength of self-efficacy was due to a failure to implement each of the prepared experiences as designed. Failure to implement the exercise incentive program as expected limited the participation of students in the development of a personalized exercise program. Within this study it was believed that if students participated in an exercise program that was personally controlled each student would encounter some of the potential barriers that would have to be overcome. By using the skills learned within the classroom experience students would overcome these barriers and therefore achieve an increased perception of strength of self-efficacy. Therefore, the failure to implement all of the designed educational experiences as designed may have limited the potential impact upon this construct. There is one interesting possibility that is worthy of discussion experimental subjects in this study did experience a differential increase in frequency of moderate physical exercise when compared to the comparison subjects. So while student participation in the exercise incentive program was low, these students did report engaging in moderate physical exercise at the posttest. The increased exercise participation should provide the students with the opportunities to overcome these exercise barriers. If this were to occur it could
be presumed that by doing so students will gain mastery experiences that then should lead to improved perceptions of strength of self-efficacy (Bandura, 1986). This possibility however would require the incorporation of a post-posttest, which is beyond the scope of this study.

In summary, this educational treatment was determined to be construct valid only for self-control. The implemented educational treatment appears to be inadequate at increasing student perceptions of outcome expectation, social situation, and strength of self-efficacy. There is a strong possibility that the failure to implement the exercise incentive program limited the potential impact upon these constructs. In order to determine the level of construct validity of the designed educational treatment it is necessary to implement all of the experiences as designed. This study clearly illustrates that it would be unwise to assume targeted Social Cognitive Theory constructs will increase in response to an intervention. It is likely that interventions need to be refined in several implementation trials in order to produce sufficient impact on all targeted constructs.

This implemented educational treatment was found to be construct valid only for one of the underlying Social Cognitive Theory constructs. Any determination that this educational treatment was effective at increasing the frequency of volitional physical exercise must lead to an investigation as to the probable mechanism of impact. These potential mechanisms of impact include both theoretical and non-theoretical possibilities. In light of the treatment construct validity evaluation it is concluded that the only potential theoretical mechanism of impact was the successful manipulation of the self-control construct.
Behavioral Assessment: Impact of the Educational Treatment on Physical Exercise

In order to determine the magnitude of impact the implemented educational treatment had upon the frequency of volitional moderate and vigorous it was necessary to obtain pretest and posttest measures of exercise frequency. Measures of moderate and vigorous physical exercise frequency were obtained using the self-report instrument, Previous Day Physical Activity Recall (Weston et al., 1997). During both measurement periods exercise activity was collected over seven consecutive days. Exercise bouts were categorized as either moderate or vigorous primarily based upon student self-rating of exercise intensity although selected exceptions were discussed in an earlier section of this paper. A maximum of one bout of moderate physical exercise was counted for each day, this was also true of vigorous exercise bouts. Using this method a maximum range for moderate physical exercise frequency was seven, and a maximum range for vigorous physical exercise frequency was seven. Only exercise bouts that occurred during non-school hours, and which were disassociated from organized activities were included in the dependent measure, therefore, all identified exercise bouts were labeled as volitional.

Due to dissimilarities between experimental and comparison groups pretest to posttest correlation values the analysis of covariance statistic was dropped in favor of within groups analysis using the paired t-test statistic. It was hypothesized that at posttest the frequency of moderate and vigorous physical exercise would be greater than the pretest values among experimental subjects. It was also presumed that at posttest the frequency of moderate and vigorous physical exercise would be equal to the pretest values among comparison subjects.
An additional evaluation was conducted in order to determine the impact of the educational treatment upon the distribution of truly sedentary students. It was postulated that the distribution of truly sedentary students would be different between the experimental and comparison groups at posttest. Analysis of this hypothesis utilized the Chi-square Test for Independence.

**Frequency of Volitional Moderate Physical Exercise**

Measures of frequency of volitional moderate physical exercise were derived from seven consecutive, one-day self-report instruments (Weston, et al., 1997). Using this instrument, students coded their daily activities and provided a measure of the intensity for each activity. Students reported activities for seven consecutive days. Responses were recorded as moderate exercise bouts only if the activity was during non-school hours, were non-school related and identified by students as moderate. Only activity numbers twenty-one through thirty-five from the activity list page of the exercise report were accepted as exercise bouts. Exercises reflecting the codes for walking, lifting weights and slow paced exercise/sport were counted as moderate if students reported the intensity of these activities as vigorous.

Pretest measures indicated that the experimental and comparison group differed significantly in regard to frequency of volitional moderate physical exercise, \( F_{1,141} = 16.49; p=0.000 \). Upon comparison of group means it was determined that the experimental group reported the lower mean value. At pretest the experimental group indicated a group mean score equal to 1.29 days involving volitional moderate physical exercise. Comparison students indicated a group mean score at pretest of 2.89. Posttest
measures indicated that subjects within the experimental group significantly ($t_{sg} = -2.81$, $p = 0.007$) increased the frequency of participation in volitional moderate physical exercise to 2.35 days, an increase in days of moderate exercise of just over one day. Comparison students experienced a significant ($t_{c} = 4.56$, $p = 0.000$) decrease in the frequency of volitional moderate physical exercise. By the posttest the frequency of volitional moderate physical exercise had decreased by 1.24 days. The frequency of volitional moderate physical exercise at the posttest was 1.65. Posttest between group difference was calculated to be 0.7, which reflects a standard effect size of 0.36, both positive in direction and moderate in magnitude.

**Frequency of Volitional Vigorous Physical Exercise**

Measures of frequency of volitional vigorous physical exercise were derived from seven, one-day self-report instruments (Weston, et al., 1997). Using this instrument, students coded their daily activities and the intensity of each activity for seven consecutive days. Responses were recorded as vigorous exercise bouts only if the activity was during before or after school hours, non-school related and identified by students as hard in intensity. Only activity numbers twenty-one through thirty-five from the activity list page of the exercise report were accepted as exercise bouts. Exercises reflecting the codes for jog/run, aerobic dance and fast paced exercise/sport were counted as vigorous if students reported the intensity of these activities as medium.

Pretest measures of volitional vigorous physical exercise indicated that students in the experimental and comparison groups scored similarly, $F_{1,44} = 0.11; p = 0.743$. At pretest, group frequency of volitional vigorous exercise among experimental students was
0.71 while pretest frequency of volitional vigorous exercise among comparison students was 0.79. The change in frequency of volitional vigorous exercise among the experimental group was found to be non-significant ($t_{30} = -0.40, p = 0.69$) posttest frequency was 0.78, which represents a decrease in volitional vigorous exercise participation of 0.07 days. The change in frequency of volitional vigorous exercise among the comparison group was also found to be non-significant ($t_{31} = -1.14, p = 0.26$), posttest frequency was 1.02, which represents an increase in volitional vigorous exercise participation of 0.23 days. Posttest between group difference was calculated to be 0.24, which represents a standard effect of -0.14. This standard effect was negative in direction and minimal in magnitude.

**Analysis of the Distribution of Sedentary Subjects**

A hypothesis of this study was that at posttest the experimental group would have a lesser distribution of sedentary subjects than the comparison group. Operationalization of sedentary for this study was any student reporting zero days involving volitional moderate or vigorous physical exercise. This analysis required use of the Chi-square test for independence. Analysis revealed a Chi-square of 5.75, $p<0.05$. The null hypothesis was rejected and its rival accepted. This demonstrated that the implemented educational treatment is effective at decreasing sedentary lifestyles.

Descriptive statistics for sedentary rate demonstrated that at pretest fifty-five percent of experimental students were classified as sedentary in regard to volitional moderate physical exercise while twenty-seven percent of comparison students were classified accordingly. At posttest eighteen percent of experimental students were
classified as sedentary in regard to volitional moderate physical exercise while forty-four percent of comparison students were so classified. This indicates that sedentary students within the experimental group initiated some form of exercise into their life at a faster rate than did comparison students.

Discussion Pertaining to Behavioral Assessment

Important distinctions between this behavioral assessment and the behavioral assessments of the Stanford Heart Health, CATCH, and Fargo/Moorehead-250 curricula must be presented. No behavioral assessment that involved the previous curricula separated the dependent variable, physical exercise, into moderate and vigorous categories. The choice to study physical exercise without regard to the level of exercise intensity is less desirable than stipulating that moderate exercise is tangibly different than vigorous exercise. Although there are at present no articles that demonstrate differing determinants for moderate physical exercise and vigorous physical exercise it is likely that differing levels of exercise intensity will be explained by a divergent group of determinants. In response to this potential the current study did categorize physical exercise according to levels of intensity. This assessment design is unique and proves to be a valuable expansion upon previous investigations. An additional difference between this behavioral assessment and previous efforts is the use of exercise frequency and number of truly sedentary subjects as dependent variables. Using the literature review provided within chapter two of this study only one intervention investigation is known to have used exercise frequency as the dependent variable (Parcel, et al., 1989). Other behavioral assessments utilized exercise duration (Kelder, et al., 1993; Webber, et al.,
1996; Luepker, et al., 1996). In the assessment of the CATCH curriculum conducted by Luepker there is no descriptive data upon which effect sizes can be determined (Luepker, et al., 1996). A final method of assessing behavioral impact of an educational treatment uses rate of exercise initiation (Killen, et al., 1989). The presence of differing dependent variables will make comparisons between studies difficult. A final difference between this behavioral assessment and previous efforts is the requirement of this study that all exercise bouts be volitional in nature. Only in the assessment of Fargo/Moorehead-250 was there any assurance that behavioral measures did not include physical exercise that was associated with classroom physical education class (Kelder, et al., 1993). Even with this one assessment there was no assurance that physical exercise measures did not include physical exercise that was associated with some school organization. Given the acknowledgement that the exercise dependent variable in this study did not include such organized physical exercise activities it is justified to claim that this study measured a type of physical exercise that has not to this author's knowledge been utilized in a prior behavioral assessment investigations.

Behavioral assessment pertaining to frequency of volitional moderate physical exercise indicates an impact greater than those observed by previous authors. Intra-group difference on the measure of moderate exercise frequency from pretest to posttest in this project was 1.06. Information from the CATCH curriculum indicates an increase in exercise frequency of 0.51 (Parcel, et al., 1989). Magnitude of pretest - posttest difference between these two studies is likely to have been mediated to some degree by the separation of exercise intensities in this study and the lack thereof in the previous study. Examination of between group difference at posttest yields a standardized effect
size of .36 for this study, Fargo/Moorehead-250 program reports a standard effect size of .19 for experimental females (Kelder, et al., 1993). Magnitude of difference in between group standardized effect size is likely mediated by difference in dependent variables, moderate physical exercise in this study and vigorous exercise in the previous study. Further the separation by gender by Kelder makes it more difficult to determine the difference of impact between these two studies. However even while Kelder utilized exercise duration, among females and this study utilized moderate exercise frequency among males and females as dependent variable the use of the standardized effect may permit some discussion of program impact between studies.

The observed drop in mean frequency of volitional moderate physical exercise among the comparison group may be attributable to the onset of winter at posttest. Winter weather is associated with decreased exercise activity and increased levels of sedentary behaviors (USDHHS, 1996). It is interesting to note that this trend away from exercise during winter months did not impact the experimental students. Mean frequency of exercise increased, prevalence of sedentary behavior decreased.

Conclusions from the Behavioral Evaluation

The educational treatment implemented within this study was effective at increasing the frequency of volitional moderate physical exercise among experimental subjects. Without a similar treatment members of the comparison group experienced a significant decrease in frequency of volitional moderate physical exercise. At pretest the members of the experimental group reported significantly fewer days of volitional moderate physical exercise than did their comparison group peers. Although no statistic
was conducted that would enable compare posttest scores between groups, it appears that the experimental group reported more days of volitional moderate physical exercise than did their comparison group peers. Standardized effect at posttest was 0.36 between groups. This standardized effect was positive in direction and moderate in magnitude. The educational treatment implemented within this study was effective at altering the distribution of sedentary subjects. The implemented educational treatment was not effective at increasing the frequency of volitional vigorous physical exercise. These conclusions indicate that the implemented educational treatment was effective at increasing the frequency of moderate physical exercise, and decreasing sedentary behavior.

Comparison of behavioral impact between this study and others similar to it is complicated due to the differing characteristics of the dependent variables. The behavioral impact of this educational treatment appears to be larger than documented in other published investigations. Difference in magnitude is likely due to the separation in this study of physical exercise into both moderate and vigorous intensities. If this study were to have included vigorous physical exercise in with moderate physical exercise it would be likely that the magnitude of treatment effect would be similar with other previous studies.
Discussion of Descriptive Findings Pertaining to Social Cognitive Theory Constructs

Descriptive results provide specific information that enhances our understanding of the adolescent student and their determinants of physical exercise. Within chapter two of this study an extensive literature review was conducted in order to find likely Social Cognitive Theory determinants of physical exercise among young persons. This review revealed two such determinants social situation and strength of self-efficacy. Review of the construct outcome expectation provided inconclusive evidence of consistent association with physical exercise. A major contributor to the Social Cognitive Theory postulated that self-control is a determinant of human behavior (Bandura, 1986). This study has provided evidence of an observed correlation between self-control actions and frequency of volitional moderate physical exercise. Descriptive findings of these potential determinants of physical exercise are discussed in this section in order to examine the preexisting perceptions held by these adolescent subjects. Knowledge pertaining to the mean scores obtained and the distribution of these scores may provide valuable information that can help us understand the relatively low levels of exercise frequency observed within similar populations of adolescents.
Self-control

Pretest mean scores for the experimental and comparison groups were very low, 161.51 and 174.24 respectively. The five sub-scales within self-control include, goal setting, gaining social support, gaining reinforcements, planning to overcome barriers, and self-monitoring. Each of these sub-scales had an average score that was less than fifty percent of its potential maximum. Observation of the distribution of pretest self-control scores within nominal categories indicates that the majority of students in both groups were classified within the lowest two levels. About twenty-six percent of students were classified within the lowest category while only about six percent of students were classified within the highest category. When group mean scores and the distribution of these scores were considered it indicates that the average young high school student within this study utilized exercise self-controlling activities on an unusual basis. In recognition of this fact there is a great opportunity to assist these students assert greater control over their personal exercise activity thereby enabling students to exercise more often. Results of inferential statistics within this study demonstrate the potential importance of increased self-controlling actions in increasing the frequency of volitional moderate physical exercise.
Outcome Expectations

Observation of pretest measures for exercise outcome expectation for both the experimental and comparison group indicates moderately high scores, experimental group 121.70 and comparison group 128.60. Both groups had a mean score just about sixty percent of the potential maximum. Observation of the pretest distribution of outcome expectation scores within the nominal categories: very low, low, high, very high demonstrated that just over sixty-five percent of students in both groups were within the categories, low and high. For both groups the sub-scales with the highest mean scores were fitness and competition. This indicates that students were relatively convinced that regular exercise can generate increases in fitness and opportunities for competition. This observation is consistent with what appears to be a consistent societal message, exercise is good for fitness improvement and the competitive arena. Fewer in number and less consistent are the messages that exercise is effective at increasing one's social opportunities, relaxation, thrilling experiences, and beautiful movement. Recent success of the "Extreme Games" indicates that there is greater interest in exercises that generate thrills. Exercises commonly associated physical thrills are street biking, in-line skating, and skateboarding. Exercise as a way of deriving physical thrills appears to be almost, if not completely lacking in the physical education curricula and as such students are not receiving reaffirmation. Exercise as a method for attaining beautiful movement is almost completely marginalized to those involved in activities such as dance, diving and gymnastics. Each of these activities were absent from the physical education curricula found in this study.
Social Situation

Potential range on the eight item social situation instrument was thirty-two. At pretest both groups reported mean scores that were exceptionally low. Pretest mean score for the experimental group was 7.92 while pretest mean score for the comparison group was 10. This represents mean scores for social situation that were between twenty-five and thirty percent of the potential maximum. Observation of the pretest distribution within the nominal categories: very low, low, high, and very high demonstrates that forty-two percent of comparison scores and fifty-five percent of experimental scores were classified within the very lowest category. Magnitude of group mean scores and the pretest distribution of scores indicate that students participating in this study feel that their social environment is not conducive to regular physical exercise. This finding is most meaningful in light of the importance it has demonstrated across many studies (Biddle & Goudas, 1996; Craig, et al., 1996; Moore, et al., 1991; Nader, et al., 1996; Reynolds, et al., 1990; Saunders, et al., 1997; Stucky-Ropp & DiLorenzo, 1993). It is clear from the preponderance of studies that child exercise is greatest among children with high perceptions of the supportive nature of their social environment.
Strength of Self-efficacy

Potential range for the strength of self-efficacy instrument was sixteen. As with other Social Cognitive Theory variables targeted by this curriculum, the strength of self-efficacy among students appears to be very low. Experimental group reported a pretest mean score of 6.98 and comparison group reported a pretest mean score of 7.81. Both groups had an average score on this variable that was at or just below fifty percent of the potential maximum score. Observation of the pretest distribution of strength of self-efficacy scores within the nominal categories: very low, low, high, and very high indicate that in both groups the category with the greatest percentage of scores is the low category. Forty-three percent of experimental scores and thirty-five percent of comparison scores fall within this low category. The remainder of scores were fairly distributed between the remaining three categories. The generally low scores on strength of self-efficacy is once again troubling. As with social situation the literature on strength of self-efficacy indicate that this construct is important to child exercise (Biddle & Goudas, 1996; Craig, et al., 1996; Reynolds, et al., 1990; Saunders, et al., 1997).

Students participating in this study appear to have little perceived ability to overcome common exercise barriers encountered among young persons.
Discussion of Descriptive Findings Pertaining to Frequency of Physical Exercise

The primary purpose of this study was to increase the frequency of volitional moderate and vigorous physical exercise among adolescent school students. In an earlier section of this paper the importance of this purpose was developed. It was determined that cardiorespiratory physical fitness is independently associated with deceased risk of all cause mortality (Blair, et al., 1989; Blair, et al., 1996). The causal link was strengthened when it was determined that improved physical fitness is associated with declining risk of death due to all causes (Blair, et al., 1995). It is also known that individuals that refrain from regular physical exercise are at greater risk of death due to all causes (Araiz, et al., 1992; Hein, et al., 1992; Kampert, et al., 1996; Leon, et al., 1997). With the preponderance of evidence that supports the promotion of physical exercise it is concerning to find that only about twenty-three percent of American adults exercise five times a week for at least thirty minutes (USDHHS, 1999). Only about sixteen percent of Americans exercise at intensities that are likely to generate cardiorespiratory fitness improvement (USDHHS, 1999). The trend toward sedentary lifestyles seems to be most dramatic during the high school years (CDC, 1998). Descriptive results derived from this study may provide specific information that will enhance our understanding of the frequency of adolescent student physical exercise.
Moderate Physical Exercise Descriptive Analysis

At pretest the experimental group mean frequency of volitional moderate physical exercise was 1.29 days a week, comparison group on this measure was 2.89. These group mean scores on moderate exercise frequency were very low, eighteen and forty-one percent of potential maximum respectively. These very low measures of volitional moderate physical exercise are troubling, adolescents appears to be a pivotal moment in the development of lifestyle. Great many subjects in this study have either not incorporated or maintained physical exercise in their lifestyle. As these students age it is likely that their frequency of volitional physical exercise will further decrease, and the link between poor cardiorespiratory fitness, sedentary behavior, and mortality will be realized. Future efforts must target the frequency of volitional adolescent physical exercise behavior in order to reverse the tendency these students have toward a sedentary lifestyle. The dependent variable frequency of volitional moderate physical exercise is a most logical choice because increasing even moderate physical exercise will prevent chronic disease and may in fact lead to more vigorous forms of physical exercise.
Vigorous Physical Exercise Descriptive Analysis

Mean group scores for the dependent variable frequency of volitional vigorous physical exercise were exceptionally low, 0.71 experimental and 0.79 comparison. The magnitude of these group mean scores reflects about ten percent of potential maximum score. Observation of the distribution of pretest scores across four nominal categorize it is clear that these groups are distributed very similarly. Approximately seventy percent of students in each group reported engaging in no volitional vigorous physical exercise. Only about three percent of students reported engaging in volitional vigorous physical exercise six or seven days a week.

According to the 1997 Youth Risk Behavior Survey (CDC, 1998) first and second year high school students reporting engaging in vigorous physical exercise at least three days a week should be seventy percent. Comparison students at pretest that engaged in vigorous physical exercise outside of school at least three days a week was twelve percent. Experimental students at pretest engaging in vigorous physical exercise at least three days a week was twelve percent. These two groups differ from data produced in the 1995 Youth Risk Behavior Survey. Explanation for this deviation from the national expectation is most likely due to procedures associated with this study. No physical exercise was recorded if the exercise was organized by the school or other outside agency. As most organized sports are considered vigorous in nature this procedure likely created some of the deviation away from the national expectation. It is not believed that this procedure caused the entire difference. Another probable cause of the deviation was the instrument used. The Youth Risk Behavior Survey utilizes a single question to analyze frequency of vigorous physical exercise. This study required self-report on seven
consecutive daily logs. As discussed in an earlier section of this paper self-report measures of physical exercise among adolescents may have an interaction with student memory (Caspersen, et al., 1997). If indeed student self-report of vigorous physical exercise has an interaction with memory it may be that the measure utilized in the Youth Risk Behavior Survey is less accurate. It is likely that the majority of students that engage in vigorous physical exercise do so in response to some organized effort rather than at the student's leisure. The importance of organizing events that require vigorous physical exercise is not at issue in this study, rather the rarity of student voluntary engagement in vigorous physical exercise is.

Although experimental subjects in this study increased the frequency of their volitional moderate physical exercise, no such increase was noted for the frequency of volitional vigorous physical exercise. Previous research has documented increases in physical exercise (Parcel, et al., 1989; Kelder, et al., 1993; Luepker, et al., 1996). These differences may not be due to increased vigorous physical exercise but rather to more moderate forms of physical exercise. Failure of previous studies to separate moderate intensity exercise from more vigorous exercise makes the determination of specific behavioral impact impossible. It is likely that previous findings were based only on alterations in moderate physical exercise activities. As a result of the failure in this study to increase vigorous physical exercise, and the failure of previous studies to explore treatment effects based upon exercise intensity it is concluded that the recommendation to establish moderate forms of physical exercise into a lifestyle is bolstered.
Conclusions pertaining to the Implementation of the Educational Treatment

Earlier in this paper the importance of determining the degree to which the educational treatment was delivered was discussed. Failure to examine this question may result in a type III error, an error that stems from evaluating an educational treatment that was not adequately implemented (Basch, et al., 1985). In order to prevent such an error, this study incorporated an implementation assessment. Within this section are conclusions pertaining to the implementation of the educational treatment.

The educational treatment consisted of two distinct sections, mini-lesson sessions conducted in approximately the first ten minutes of the physical education class period, and an exercise incentive program participated in during out of school hours. The mini-lesson sessions consisted of primarily lecture style teaching and student response through class activities and homework. The exercise incentive program was designed to enable students to actively use the skills discussed during mini-lesson sessions in order to maintain a personal exercise program. If completed adequately well the student would receive reinforcements. Reinforcements were distributed to students after the instructor confirmed that the student had completed the requirements to perfection. Students did not know what would be awarded upon successful completion of the week's activity. Reinforcements were small gifts ranging in value from five dollars to ten dollars. The incentive program ran for four consecutive weeks.

Only one teaching objective within the mini-lesson sessions failed to be completed by the instructor. This teaching objective was within lesson number four and involved the incorporation of the exercise incentive program. This teaching objective would have required student participation in the exercise incentive program. Failure to
complete this teaching objective made participation in the exercise incentive program optional for students. Failure to meet this teaching objective is attributed to the regular physical education teachers not wanting to force students to participate in the program. The primary reason teachers did not want to require student participation was because such widespread participation would result in a substantial increase in their workload and create problems among students who did not want to participate. Even with the exercise incentive program being optional it was interesting to note that twenty of the thirty-one members of the final experimental sample completed at least one week of the exercise incentive program sufficiently well to receive reinforcement. It is concluded that the exercise incentive program was incorporated however not as expected. The adaptation to the designed exercise incentive program resulted in a low rate of student participation, which likely diminished the potential impact of the educational treatment. It is possible that the non-significant results observed for the constructs, social situation, outcome expectation, and strength of self-efficacy, may be attributable to the failure to implement the exercise incentive program as expected. These constructs may require that students engage in all the designed educational experiences, rather than some diminished set of the designed educational experiences.

Two learning objectives within the mini-lessons failed to be completed by an adequate percentage of students. These learning objectives both involved the educational target self-control. The first was within lesson six and involved the completion of an exercise goal statement homework. This exercise goal statement homework was sufficiently similar to a previous assignment completed in the classroom, as such failure to achieve adequate student involvement is concluded to be of no consequence.
The second learning objective to have inadequate student participation was within lesson ten and involved the completion of seven consecutive days of exercise self-monitoring. This activity of self-monitoring is most likely too protracted to maintain student interest and thus decreased student involvement. It was expected that this failure to address self-monitoring would result in a minimized treatment effect.

The educational lessons developed for this study initially consisted of 205 minutes of lecture/interactive experiences for students attending an introductory physical education class for one semester. As originally designed there were ten lessons with five support days in which material reinforcements would be distributed to students for meeting self-imposed exercise goals. Lecture/interactive experiences were designed to be conducted once a week for ten weeks, while the five support days would be delivered on a separate school days but during the same week as the fifth, sixth, seventh, eighth and ninth lecture/interaction. The ten originally designed lecture/interaction experiences were designed to require 224 minutes of class-time. The five support days were to take place after all class activities had taken place and students were waiting for the class to end, this is usually a five-minute period.

During the implementation phase it became necessary to move the five support days into the associated lecture/interaction day. This was brought about by an unwillingness of teachers to deliver the lessons and impossibility for a single individual to attend two learning sessions for five classrooms each week for five weeks. The incentive program that constituted the five support days was shortened to four. This shortening of the incentive program was required due to a delay encountered in initiating the incentive program. While the incentive program was scheduled to begin as the fourth
lesson it was pushed back to the sixth lesson. Additional deviations in implementation concerned the duration of each educational experience. Lessons number one: Exercise Intensity, four: Incentive Program, five: Self-regulation and six: Goal Setting, all were substantially similar in duration as scheduled. Lessons number two: Pretest, three: Stage of Change, seven: Outcome Expectations, eight: Social Situation, nine: Overcoming Exercise Barriers and ten: Self-monitoring, all were substantially shorter than expected. The shorter duration of these lessons was the result of faster progression of students through the lesson. Faster student progression through the lesson is attributed to the attention devoted by students to the instructor and an overestimation of the time needed to deliver the necessary information. Total duration of the ten educational sessions was 175 minutes rather than the expected 224 minutes.

Looking at each lesson it is noted that lessons one: Intensity of Exercise, two: Pretest and three: Stage of Change, were not directed at changing any specific Social Cognitive Theory construct. These three lessons comprised eighty minutes worth of actual class time. While these lessons did not focus upon changing the Social Cognitive Theory determinants of exercise, their inclusion was necessary to adequately accomplish the necessary evaluations associated with this study. Removing these three lessons left about ninety-five class minutes for educational experiences that were directed at the Social Cognitive Theory determinants of exercise.
Description of the Educational Experiences for Self-control

While the educational intervention was developed to address the Social Cognitive Theory constructs self-control, outcome expectation, social situation and strength of self-efficacy, the preponderance of the educational lessons focused upon the skills necessary to control one's own behavior. Of the ninety-five minutes of classroom time used to address these Social Cognitive Theory constructs, sixty minutes were used to address self-control. Primary method by which self-control was effected was the lecture method. Lectures topics on self-control included the five necessary components of self-control, how to set an exercise goal, how to secure reinforcements for exercise, how to secure social support for exercise, how to plan for barriers to exercise, and how to self-monitor. Students were also expected to complete worksheets on which they reiterated the lecture material. A final technique to improve self-control skill was a weeklong effort to self-monitor exercise activity. A non-classroom activity was addressed using the exercise incentive program in which students were expected to practice setting an adequate exercise goal and monitoring their achievement.
Conclusions from the construct validity of this treatment demonstrate that the educational methods used in this study, effected improvements in exercise self-controlling activities. Self-control is a construct in which specific skills and actions a subject can develop in order to control the frequency of physical exercise. This construct is highly conducive to the classroom setting where students are most aware that the material is concrete. Conclusions from the behavioral assessment demonstrate that improved construct scores are correlated with increased frequency of volitional moderate physical exercise. The observed correlation between self-control and frequency of volitional moderate physical exercise, and the treatment construct validity of this intervention on self-control, indicates that this educational treatment may be useful to physical education teachers.

Description of the Educational Methods for Outcome Expectations

Educational techniques used to improve student exercise outcome expectation included a nine minute class presentation, student worksheet and continued reaffirmation for the many reasons to exercise. Students were presented with seven potential outcomes for physical exercise including, relaxation, competition, fitness, social growth, social continuation, thrills and beautiful movement. Students were then asked to complete a worksheet in which they rank ordered these seven potential outcomes in order to identify their top reasons for engaging in physical exercise. Emphasis was reiterated repeatedly throughout the curricular lessons for students to increase their reasons to exercise. In addition perceptions of outcome expectations were addressed using the exercise incentive program. After participating in this program it was expected that students would
experience the outcomes that had been described within the mini-lessons. Having been
sensitized to the potential wide range of outcomes from physical exercise, students
should have been more aware of these benefits as they occur. Once these desirable
benefits had occurred students were expected to reflect upon the process and alter their
outcome expectation perceptions.

Conclusions from the construct validity of this treatment demonstrate that the
methods incorporated in this implemented treatment were inadequate in increasing
student perceptions of exercise outcome expectations. Future efforts to address this
construct should continue to utilize the multi-dimensional utility of physical exercise
presented in this study and developed by Gerald Kenyon in 1968. Efforts however
should be given to implement the exercise incentive program more fully. The classroom
experiences that are followed by repeated reiterations from the teacher also are
considered to be important. Prior to a final determination as to the ability of this
educational treatment to increase the outcome expectation perceptions, students should be
exposed to all the designed educational experiences. It may also be that students will
change their exercise outcome expectation perceptions following increased physical
exercise. If this possibility is true, teachers should encourage students to explore types of
exercise that will likely bring about these many possible outcomes of exercise. For
instance a teacher may encourage students to begin a walking program with friends in
order to explore the results of this upon their social continuation. Teachers may also
encourage students to participate in dance programs in order to explore the results upon
their perceptions of beautiful movement. Using these methods students will become sensitized to the many useful benefits of exercise and thus increase their exercise outcome expectation perceptions.

Methods used within this project to increase outcome expectation were similar to the methods utilized within Fargo/Moorehead-250 in which the simple raising of awareness was used (Kelder, et al., 1993). These methods were substantially different from those used in the CATCH program and Stanford Heart Health. Within CATCH information is provided along with student interviews and student assigned writing projects (Luepker, et al., 1996). Video in which student peers are modeling exercise outcomes are used in the Stanford Heart Health program (Killen, et al., 1989).

**Description of Educational Experiences for Social Situation**

Within this study it was expected that social situation would be developed through student homework, incentive program, and classroom lesson. Within lesson number eight: *Social Support*, ten minutes were devoted to enabling students to understand the variety of potential social support that are available. Instrumental social supporters were identified as other persons that actively enable physical exercise. An individual that offers to exercise with the student, or provides some material resource for exercise, or encourages the student to exercise could provide this type of enabling activity. Authoritative social support was defined as instructions provided by another person that require student exercise or improves exercise skill. Students then completed a worksheet assignment in which they were asked to identify potential supporters and the type of social support this person could provide. Additionally students were asked to request the
involvement of a meaningful adult in the completion of assigned homework projects found throughout the curricular component. The incentive program lasted for four weeks and students were encouraged to participate. The incentive program required that another person sign that they were aware that the subject had completed their exercise goal for the week. As discussed earlier, the exercise incentive program was implemented but not as expected. The exercise incentive program was not made mandatory, which left the students the option of participation. Although approximately sixty percent of students in the final experimental sample participated to some degree, the level of participation was not adequate. Failure to secure greater student participation may have been a significant obstacle to documentation of treatment effect in social situation construct.

Conclusion from the treatment construct validity evaluation demonstrated that the methods utilized in the effort to increase student perception of social situation were inadequate. It is likely that the failure to secure adequate student participation in the exercise incentive program was a primary cause in not documenting a treatment effect on this construct. Future efforts to increase student perception of social situation should continue to address this construct using the exercise incentive program. If it is impossible to make student participation mandatory it would be desirable to secure enough participants to ensure an adequate sub-group analysis. Within this study there were not enough student participants in the exercise incentive program to enable an adequate sub-group analysis.

Methods used in this project in order to improve social situation measures were considered typical in regard to previous educational interventions. Fargo/Moorehead-250 used peer lead goal setting activities (Kelder, et al., 1993). CATCH utilized teacher

**Description of Educational Experiences for Strength of Self-efficacy**

Strength of self-efficacy is addressed through classroom instruction, homework activity and participation in the exercise incentive program. Classroom instruction takes place in lesson nine: *Planning to Overcome Exercise Barriers*, ten minutes. Within lesson number nine, the student is introduced to the importance of planning for potential exercise barriers, the general classification of exercise barriers, and the general classifications of overcoming actions to exercise barriers. Within the associated homework an example of an exercise goal is provided along with a troubling situation. Students were expected to identify the general classification of barrier that is presented, and provide the appropriate general overcoming action. Following this, students were asked to provide a specific overcoming action. The exercise incentive program was designed to provide a framework for students to master the action of overcoming barriers. Mastery experience is one powerful method by which individuals can improved their strength of self-efficacy (Bandura, 1986). As students participate in their personal exercise program it is a strong possibility that they will face many of the common
barriers to exercise. When such barriers were faced, students were expected to utilize their prepared overcoming actions in order to continue with their exercise. The failure to secure sufficient student participation within the exercise incentive program is likely to have limited the opportunities for overcoming exercise barriers and therefore limit the mastery experiences designed to improve their perception of their own strength of self-efficacy.

Conclusion from the construct validity of the treatment assessment demonstrated that the methods utilized to increase student perception of strength of self-efficacy were inadequate. Failure to make student participation in the exercise incentive program mandatory enabled many students to opt out of the program and yet remain in the study. Therefore it was concluded that the exercise incentive program was implemented yet not as expected. Failure to secure adequate student participation in this incentive program is likely the primary reason student perception of their strength of self-efficacy were not increased. Future efforts to improve student strength of self-efficacy should include the exercise incentive program however student participation should be made mandatory. If student participation can not be required it is desirable to secure sufficient students that do participate voluntarily in order to enable a sub-group analysis. Within this study there were not adequate student participates to allow such a sub-group analysis.

This project targeted strength of self-efficacy, all other educational interventions targeted exercise self-efficacy. Mastery experience is the consistent method by which self-efficacy is targeted by other educational interventions, Fargo/Moorhead-250,

Conclusions of the Implementation of this Curriculum

Understanding why this curriculum was judged to be construct valid only for self-control was apparent after considering the curricular balance. The amount of time and resources allocated to each educational target should be sufficient to accomplish an alteration in each target. The adequacy with which these resources are distributed between educational targets is referred to as curricular balance. The classroom experiences within this curriculum were developed primarily in order to improve self-control. The out of school experiences within this curriculum, exercise incentive program, was designed to provide an opportunity for students to enhance their outcome expectations, social situation, and strength of self-efficacy perceptions. As developed and implemented there is little evidence for curricular balance. Of the ninety-five minutes allocated to altering the targeted Social Cognitive Theory constructs, sixty minutes were directed at the construct of self-control the remainder of class time is divided between outcome expectations, social situation, and strength of self-efficacy. The failure to implement as expected the exercise incentive program resulted in
inadequate curricular balance. Without a complete exercise incentive program there was
inadequate time or opportunity for students to reassess their perceptions of social
situation and strength of self-efficacy.

Exercise outcome expectation is addressed using a nine-minute class presentation,
one homework assignment, and continued reaffirmation of the ability of exercise to
generate desirable end products. Efforts such as these were apparently inadequate for
altering long-standing perceptions such as the usefulness of exercise. It is likely that in
order for a student to change their perception of exercise outcome expectation the
behavior of exercise must be initiated and maintained for sometime. Perhaps only then
does an individual have enough information upon which to base an alteration in exercise
outcome expectation.

This curriculum sacrificed curricular balance in order to improve the skills of self-
control. This curriculum was judged to be construct valid only for the construct self-
control. Improvements in self-control are correlated with increased frequency of
moderate physical exercise. Increased moderate physical exercise may lead to
experiences that alter exercise outcome expectation. Improvement in self-control is
expected to lead to future alterations in social situation and self-efficacy. Therefore while
the curriculum is currently judged to be construct valid only for self-control, at post-
posttest it may be found that the constructs outcome expectation, social situation and
strength of self-efficacy may also improved. It is desirable to conduct such a post-
posttest in order to test this possibility of a delayed effect of the curriculum on outcome
expectation, social situation and strength of self-efficacy. This post-pottest however is
beyond the capacity of this study.
Conclusions of Study Population and Samples

The populations from which the samples were drawn differed in respect to the proportion of black students and percentage of students identified with lower socioeconomic status. In each case the experimental population had higher percentages. These populations were similar in regard to the sex and age of students. Previous research indicates that both race and socioeconomic status are correlated with physical exercise. African-American persons tend to participate in physical exercise less than Caucasians (Gordon-Larsen & McMurray, 2000). Lower socioeconomic persons tend to participate in physical exercise less than higher socioeconomic persons (Gordon-Larsen & McMurray, 2000). These differences indicate that the experimental population in this study should be expected to participate in physical exercise less than the comparison population. It is concluded that the experimental and comparison subjects were drawn from two distinct populations.

Final experimental and comparison samples were similar in respect to the percentage of females included and the age of subjects. A difference between these final samples was the percentage of black students included in the final experimental sample. The final experimental sample had a greater percentage of black students than the final comparison sample. Due to an unwillingness of school administrators to provide data on individual student participation in the reduced or free school lunch program it is impossible to determine the exact difference between final samples in respect to socioeconomic status. Knowledge of school wide participation in the reduced or free school lunch programs indicate that the final experimental sample and final comparison sample were different in respect to proportion of subjects that qualify as lower
socioeconomic status. Previous research indicates that both race and socioeconomic status are correlated with physical exercise. African-American persons tend to participate in physical exercise less than Caucasians (Gordon-Larsen & McMurray, 2000). Lower socioeconomic persons tend to participate in physical exercise less than higher socioeconomic persons (Gordon-Larsen & McMurray, 2000). Difference between final samples on these characteristics indicates that the two samples can not be assumed to have equal rates of physical exercise at the outset of this study. This assumption was demonstrated to be correct using a one way analysis of variance statistic on pretest frequency of volitional moderate physical exercise. This assumption was not supported in respect to pretest analysis of frequency of volitional vigorous physical exercise. The selection of the analysis of covariance statistic was justified for examination of posttest differences. The experimental group was determined to be the disadvantaged group in respect to race and socioeconomic status. Having the experimental subjects be selected from the disadvantaged population required that improvements in the dependent variable be more substantial in order for the educational treatment to be deemed effective. It is concluded that while the two samples were from differing populations, the direction of disadvantage and use of the analysis of covariance insure that between group comparisons were adequate to determine the effectiveness of the educational treatment.
Recruitment of Teachers

Great difficulty was experienced in finding physical education teachers willing to participate in this project. During the curricular development process five teachers were identified in the suburban areas of Columbus, Ohio. Each teacher was identified as the physical education curricular supervisor within his or her respective school. It was expected that each of these teachers would allocate at least one of their freshman level classes for participation in this study. It was also expected that these teachers would be willing to advise their colleagues to also participate. As the project developed it was disappointing to find that each teacher and their colleagues withdrew from the process. One teacher withdrew after accepting another job in the Dayton, Ohio area. A second teacher withdrew due to stress pertaining to his pending divorce. Another withdrew because of a lack in interest in continuing into the teaching stage. When questioned, this teacher explained that coaching responsibilities restricted the time available for the organization required of teaching a new curriculum. Explaining further, the time and organization required of teaching content rather than sport skills were this teacher's primary deterrent. The fourth teacher altered her participation due to pressure from her colleagues.

The teacher who altered her participation due to pressure from colleagues had requested the participation of her colleagues. Responses from the three colleagues were all negative and followed an expected pattern. One teacher explained that participation in the project would take time away from a primary desire to coach. A second teacher explained that students would not be willing to listen during the ten to fifteen minute educational messages because the class had an agreement to begin play immediately upon
starting class. A third teacher was willing to participate if this author would deliver the lessons. When class lessons began to be prepared however this teacher demonstrated a complete lack of interest in teaching and clearly had no intention of continuing with the study. This teacher was discontinued from the project. The remaining teacher after witnessing the behavior of the colleagues requested being assigned to the comparison group.

A further difficulty in the recruitment of teachers came after a meeting with the school district curriculum director of physical education. It was expected that this school district curriculum director could persuade the teachers to participate. After meeting as a group with this curriculum director and all the high school physical education teachers, it was clear that no encouragement would be given to the teachers. It was explained that the teachers were doing good things in the curriculum and that there was no need for them to feel pressure.

Acceptability of the Curriculum

Failure to find a single teacher willing to present the lessons presented within this study brings questions to the acceptability of the curriculum. It should be noted that many of the teachers who eventually turned down the opportunity to incorporate the curriculum were the same teachers that participated in shaping the components. It is difficult to attribute their unwillingness to incorporate the curriculum to it being judged unacceptable. Widespread teacher unwillingness to incorporate the curriculum after helping in its development may be attributable to the factors the developers identified, divorce, professional move, and peer-pressure.
Teachers that were not part of the curriculum development team that denied participation in the study provided some enlightening excuses. The time the curriculum would take away from other coaching responsibilities was an interesting comment that demonstrates the priorities of some physical education teachers. This statement clearly indicates that the teacher feels that their primary responsibility is as a coach and not as a physical education teacher. Ramification of this priority system among physical education teachers may explain the long held belief that physical education teachers practice the "Four R's" in their practice, roll-call, roll the ball out, relax, and read. Such behavior among teachers should not be construed as evidence that the curriculum was unacceptable. A second teacher indicated that he had an agreement with his students that he would roll the ball out as soon as roll-call was taken and would not bother them with instruction. Again this personality suggests teaching by the "Four R's" and should not be mistaken as curricular unacceptability.

Gaining Classrooms

Failure to identify a single teacher willing to deliver the lesson plans required a second attempt to locate potentially willing teachers. A letter was written prior to the completion of the 1998 - 1999 school year and mailed to each high school chair of physical education within Franklin County. Within this letter there was a brief explanation of the program, interest sheet and a self-addressed stamped envelope. Six teachers responded by returning the interest sheet. Of these six interested teachers, two failed to return repeated phone messages at their provided telephone numbers. Two teachers after being contacted withdrew their interest due to time constraints. Two
teachers were willing to participate if they did not have to deliver the educational lessons. These teachers taught within a large urban school district located in Franklin County. It was decided that in order to complete this study this author would deliver each of the planned lessons. In order to facilitate this however it was necessary to condense the two weekly lessons into a single session. This required that the lesson in which the exercise reinforcement program would be conducted would now be attached to the conclusion of the lesson plan directed at the Social Cognitive Theory. This effectively moved the reinforcement program so that it functioned not as a stand-alone experience but rather an appendix to the mini-lesson. While this is not an optimal situation it was deemed necessary for continuation of the study.

Teaching Objectives

An unexpected development in this project was the unwillingness of classroom physical education teachers to deliver the educational component. In order to overcome this barrier, it became necessary for the author of this curriculum to deliver all educational lessons. While it was not expected that this author would be presenting all prepared lessons, this adaptation was necessary in order to complete the study. The fact that the regular classroom teacher was not going to deliver the curriculum did not diminish the necessity for assessment of curricular implementation. Documentation of the level to which the curriculum was implemented required certain actions. Each lesson plan contained a list of teaching objectives. These teaching objectives were designed to allow for an assessment of program implementation. A random selection of a classroom was conducted for each lesson. In the selected classroom at the time of the lesson, an
audiotape was made of class activities. From this audiotape, this author prepared a transcript. This transcription enabled verification of teaching objective completion and is presented at the conclusion of this paper (Appendix A). Results of this assessment were presented in an earlier section of this text.

Learning Objectives

Even the most comprehensive educational experiences that are taught with great skill must be adequately received in order for learning to take place. In recognition of this, it is important to consider the amount of reception the students had in each lesson. As this project was designed to be prototypical, and therefore permitting a most advantageous design for potential effects to be realized, it was desirable to identify the students with the greatest involvement in the curricular component. Only students completing eighty percent of learning objectives were admitted into the final experimental group. As an extension, the standard for acceptable group involvement was eighty percent of student completion of each learning objective. Failure to achieve this acceptable group involvement on any learning objective is viewed as a weakness that may limit the ability of students to improve their score on the subsequent posttest.

Student involvement was acceptable. Of the thirty learning objectives identified, student completion on seven objectives fell below the expected eighty percent standard for group involvement. Four of these learning objective were direct measures of the incentive program introduced in lesson number four. Even though the incentive program was voluntary, more than fifty percent of the final experimental students had at least one week of adequate participation. The three learning objectives not associated with the
exercise incentive program and did not achieve eighty percent student involvement
included a measure of student self-monitoring, a goal-setting assignment, and naming of
specific exercises. The goal-setting assignment is redundant thereby limiting its
importance, the naming of specific exercise was used mainly to indoctrinate students into
the process of this curricular intervention. Exercise self-monitoring however was crucial
because it was the only exercise of self-monitoring required of students. Failure to obtain
satisfactory student involvement on this assignment indicates that student scores should
not be expected to rise on this sub-scale. Differences between the experimental group's
pretest and posttest measures of self-monitoring indicate no meaningful change. At
pretest the experimental group reported a mean score of 35.55 and at posttest this mean
score was 36.06.

Adequacy of Social Cognitive Theory Measures

The dependent variable measures used to assess improvements in student learning
were derived from instruments measuring Social Cognitive Theory constructs, outcome
expectation, self-control, strength of self-efficacy, and social situation. These Social
Cognitive Theory constructs were targeted by this physical exercise intervention because
of evidence indicating their value as determinants of physical exercise. This study was
designed to test the causal efficacy of these determinants at improving frequency of
volitional moderate and vigorous physical exercise. Successful manipulation of the
determinants through the use of the educational method is to be confirmed in an
evaluation into the treatment construct validity evaluation. Sensitivity of
this treatment construct validity evaluation depends in part upon the adequacy of the instruments used to measure the targeted determinants. The adequacy of determinant measures were investigated using the processes of instrument validation and reliability, the results of these procedures are discussed in this section.

Reliability

Reliability indicates the magnitude of observed variance that is true and not associated with error. Reliability was measured using the SPSS 9.0 computing program for Chronbach's Alpha. Higher alpha reliability values are considered more desirable, however, as presented earlier, it is expected that each instrument or sub-scale will achieve a minimum 0.70 value.

Reliability values for the sub-scales contained within the outcome expectation were all very high. The range was between 0.86 and 0.95, indicating the outcome expectation scores were highly reliable.

Reliability values for the sub-scales contained within the self-control instrument were acceptable if somewhat lower. Range was between 0.69 and 0.91. Self-monitoring provided the lowest measure of reliability, 0.69, this measure is lower than the 0.70 expectation although it is close enough as to not cause grave concern and was therefore continued to be used in this study. The low reliability on self-monitoring sub-scale may result from a restricted range. The first four items describe mental notations while the final three items describe written notations to self-monitoring. This great increase in self-monitoring activity may have reduced item variance that would subsequently limit the instrument reliability score.
On the final two instruments used to measure the targeted Social Cognitive Theory constructs high levels of reliability were achieved. Social situation instrument yielded a reliability measure of 0.87. Strength of self-efficacy instrument yielded a reliability measure of 0.89.

Validation

Item construct validity was confirmed using an analysis of Chronbach's alpha with sequential removal of items. Using this technique if it is observed that the instrument's reliability value increased substantially with the removal of a specific item it can be concluded that the item contributes excessive error variance to the instrument measure. When an item contributes information that is associated with excessive error variance it can be assumed that the item is not measuring the same construct as the remaining items. When an item does not measure the same object that is measured by the instrument in which it was found the construct validity of the item must be questioned.

In consideration of the outcome expectation instrument there are seven sub-scales that require construct validation these include beautiful movement, competition, fitness, relaxation, social continuation, social growth, and thrills. Each item in six of the seven sub-scales functioned very well, indicating adequate construct validity. One item provided information that was inconsistent with its sub-scale. The reliability value for this instrument increased substantially when the fifth item in the social continuation sub-scale was removed. This item indicated the degree to which students felt physical exercise could enable them to work through problems with friends.
Self-control was measured using an instrument containing five sub-scales, goal setting, self-monitoring, planning to overcome barriers, reinforcements and gaining social support. Each of the seven items contained in the goal setting sub-scale functioned well. All of the seven items in the self-monitoring sub-scale functioned well. All items in the planning to overcome barriers functioned well. All five items within the reinforcement sub-scale were good. All thirteen items within the gaining social support sub-scale functioned well. Indications that all items used to develop sub-scale measures and subsequently derive an overall score for self-control were construct valid.

Social situation is a single dimension instrument containing eight items. The instrument's reliability value did not increase substantially with the sequential removal of items. Evidence indicated that each social situation items are construct valid.

Strength of self-efficacy is a single dimension instrument containing four items. The instrument's reliability value did not increase substantially with the sequential removal of items. Evidence indicated that each strength of self-efficacy item was construct valid.

It is concluded that all instruments and sub-scales utilized in this study yield measures that were adequate. Measures obtained from these instruments can with confidence be used in all subsequent statistics and be interpreted with confidence. The outcome expectation and self-control instruments were of particular importance. There is not, to the author's knowledge, another outcome expectation for physical exercise instrument as comprehensive or as sensitive than that presented here. Contradicting results exist in the exercise promotion literature as to the value of physical exercise.
outcome expectations. The use of this outcome expectation instrument should allow for a thorough test that will increase understanding of the role of outcome expectation at increasing physical exercise.

The self-control instrument presented within this study is the only instrument adequate for measuring the construct. Many authors have included self-control strategies in their exercise promotion efforts without any effort to assess student self-control capacity. This has lead to a complete absence of empirical evidence that links self-control activity to the initiation or continuation of a lifestyle including physical exercise. Using the self-control instrument within this study will enable valuable information to become available.

**Exploration of the Type II Error**

The probability that a false null hypothesis has been accepted is known as statistical power. If statistical power is inadequate and as a result, a false null hypothesis is accepted this type of error is named type II error. This type II error is dangerous because failure to detect meaningful treatment effects commonly lead to the abandonment of promising treatments (Murphy, 1998). As the type II error is associated with the risk of accepting a false null hypothesis, any null hypothesis that is accepted must be assessed for statistical power. If statistical power is eighty percent, statistical power is considered adequate and a false null hypothesis will be detected eighty percent of the time. This false null hypothesis will fail to be detected twenty percent of the time.
Discussion of Statistical Power

Within this study it was concluded that at posttest there was no difference between experimental and comparison groups in respect to outcome expectation, social situation, strength of self-efficacy, and frequency of volitional vigorous physical exercise. Upon examination it was reported that statistical power for each of these dependent variables was, twenty-two, twenty-four, twenty-three, and twenty-six percent respectively. This indicates that the possibility that there was an undetected group difference was seventy-eight percent for outcome expectation, seventy-six percent for social situation, seventy-seven percent for strength of self-efficacy, and seventy-four percent for frequency of volitional vigorous physical exercise. Each dependent variable had a substantial possibility that true group differences were undetected. In recognition of this possibility, it is necessary to pursue additional examination of group differences for each of these variables.

Substantive Evaluation of Group Differences on Accepted Null Hypotheses

The low statistical power reported for the inferential statistics associated with the dependent variables outcome expectation, social situation, strength of self-efficacy, and frequency of volitional vigorous physical exercise raises the possibility that within this study a type II error was made. Within this substantive evaluation of group differences on the accepted null hypotheses, descriptive statistics will be utilized in order to determine the magnitude of differences between group scores. Results from these results
will enable determination as to the clinical relevance of observed group differences. If
group differences were deemed clinically irrelevant, it will be concluded that the
acceptance of the null hypotheses associated with these dependent variables were correct.

For the dependent variables, outcome expectation, social situation, strength of
self-efficacy, and frequency of volitional vigorous physical exercise a standard effect size
will be calculated. The magnitude and direction of the standard effect will be used in a
substantive evaluation of clinical relevance of the observed group differences. Standard
effect size is calculated by subtracting the comparison group's mean score from the
experimental group's mean score. This figure is then divided by the comparison group's
standard deviation. Using the literature presented earlier in this text a review of
standardized effect size was conducted. The standard effect sizes observed for
educational targets were as high as .35 and as low as .10. Effect sizes in the range of .30
were reported as significant while standardized effect sizes around .10 were not identified
as significant. Using this standard the following guide is adopted for further discussion
of standard effects sizes. A standard effect size equal to or less than .1 will be considered
inconsequential. A standard effect size equal to or less than .2 will be considered
minimal. A standard effect size equal to or less than .3 will be moderate. Finally a
standard effect size greater than .3 will be considered large. In addition to the
examination of the standard effect size, the direction of effect will be examined. It was
hypothesized that the effect would be directional, the experimental group should at
posttest score higher on the dependent variable than the comparison group, direction of
effect would be positive. Effects found to be negative were presumed to be in an
unexpected direction providing evidence that the treatment was ineffective or potentially
harmful to students.

Finally the treatment effect will be reported in order to determine if the observed
treatment effect was similar to that estimated prior to the implementation of this study in
order to estimate the number of subjects required to achieve eighty percent statistical
power. Treatment effect, PV, is determined by the percentage of the variance in the
posttest dependent variable that is attributable to the educational treatment. Prior to the
implementation of this study it was estimated that the treatment effect would be minimal,
that is to say, PV = 0.05. This magnitude of treatment effect described the anticipation
that five percent of the posttest variance on dependent variables would be attributable to
the educational treatment. If actual treatment effect falls below this magnitude it can be
concluded that the impact of educational treatment fell below that which was anticipated
and therefore the acceptance of the null hypothesis was justifiable (Murphy, 1998).

At posttest the standard effect size on the variable outcome expectation was -0.16.
This represents a minimal effect size. Direction of standardized effect size was negative
in direction. The negative direction of effect size and minimal magnitude does not
indicate that the treatment was of benefit to the experimental subjects. The observed
treatment effect, PV, for this educational treatment was 0.0005. This magnitude of
treatment effect falls well below the anticipated treatment effect of 0.05. It is concluded
that this educational treatment was ineffective at improving subject perception of outcome expectations. The decision to accept the null hypothesis was correct. Failure to obtain optimal statistical power is attributed primarily to an inadequate treatment effect, PV.

At posttest the standard effect size on the variable, social situation was -0.19. This represents a minimal standardized effect size. Direction of the standardized effect size was negative in direction. The negative direction of standardized effect size indicates that this educational treatment was not beneficial to experimental subjects. The treatment effect, PV, for this educational treatment was 0.002 for the dependent variable social situation. The magnitude of the treatment effect falls well below the anticipated treatment effect of 0.05. It is concluded that this educational treatment was ineffective at improving subject perception of social situation. The decision to accept the null hypothesis was correct. Failure to obtain optimal statistical power is attributed primarily to an inadequate treatment effect, PV.

At posttest the standardized effect size on the variable, strength of self-efficacy was -0.05. This represents an inconsequential standard effect size. Direction of the standard effect size was negative in direction. An inconsequential standard effect size indicates that this educational treatment was not of benefit to the experimental subjects. The treatment effect, PV, for this educational treatment was 0.0008 for the dependent variable strength of self-efficacy. The magnitude of the treatment effect falls well below
the anticipated treatment effect of 0.05. It is concluded that this educational treatment was ineffective at improving subject perception of strength of self-efficacy. The decision to accept the null hypothesis was correct. Failure to obtain optimal statistical power is attributable primarily to an inadequate treatment effect.

At posttest the standardized effect on the variable frequency of volitional vigorous physical exercise was -0.14. This represents a minimal standardized effect size. Direction of the standard effect size was negative in direction. The negative direction and minimal standard effect size indicates that this educational treatment was not beneficial to experimental subjects. The treatment effect, PV, for this educational treatment was 0.0039 for the dependent variable frequency of volitional vigorous physical exercise. The magnitude of the treatment effect falls well below the anticipated treatment effect of 0.05. It is concluded that this educational treatment was ineffective at improving subject frequency of volitional physical exercise. The decision to accept the null hypothesis was correct. Failure to obtain optimal statistical power is attributable primarily to an inadequate treatment effect.

Conclusions from the Exploration of Type II Error

Evaluation of statistical power for each of the accepted null hypotheses revealed a high probability that true treatment effects were undetected. In light of the possibility that a type II error was committed a substantive evaluation was conducted. Results of this substantive evaluation demonstrated that the standard effect sizes at posttest ranged between .05 and .19 for the variables, outcome expectation, social situation, strength of self-efficacy, and frequency of volitional physical exercise. The magnitudes of these
standardized effects were identified to be between inconsequential and minimal. Further examination of the direction of the standard effects demonstrated that on each of these dependent variables the experimental group performed less well than the comparison group. Finally exploration into the treatment effect, PV, indicated that for the variables outcome expectation, social situation, strength of self-efficacy, and frequency of volitional vigorous physical exercise all fell well below the anticipated treatment effect of .05. In light of these descriptive findings it is concluded that although the inferential statistics for these variables had inadequate statistical power no type II error had been committed.

Conclusions of this Study

This study was conducted in order to increase the frequency of volitional moderate and vigorous physical exercise among adolescent students. The specific research question was whether a Social Cognitive Theory-based educational treatment would be effective at causing the increase in frequency of volitional moderate and vigorous physical exercise. In order to accomplish this an educational treatment was developed and implemented within a physical education curriculum for introductory high school students. This educational treatment targeted alterations in the Social Cognitive Theory constructs, self-control, outcome expectations, social situation and strength of self-efficacy. Upon completion of the educational experiences three separate evaluations were conducted. Implementation evaluation was conducted in order to determine the degree to which the educational treatment had been delivered to students and received by students. Treatment construct validity evaluation was conducted in order to determine
the degree to which the targeted Social Cognitive Theory constructs changed after the implementation of the educational treatment. Behavior evaluation was utilized in order to determine the degree to which the frequency of volitional moderate and vigorous physical exercise increased following the implementation of the educational treatment.

Implementation evaluation indicated that the classroom instructor completed ninety-three percent of the teacher objectives. Seventy-seven percent of the learning objectives were met. Although student participation in the exercise incentive program was not mandatory, approximately sixty percent of students within the final experimental group voluntarily participated. One of the three teaching objectives remaining unmet involved this exercise incentive program. Four of the seven learning objectives that failed to achieve the eighty percent student participation criteria were direct reflections of the exercise incentive program. From this implementation evaluation it is concluded that the classroom mini-lesson experiences were implemented as expected. It is also concluded that the exercise incentive program was implemented however it was not implemented as expected. Deviation away from the designed implementation of the exercise incentive program resulted in inadequate student participation. This decreased student participation in the exercise incentive program may have lead to a diminishment in the treatment construct validity. Although an inadequate number of subjects were available, the scores obtained from subjects that voluntarily participated in the exercise incentive program were compared with the scores obtained from subjects that did not participate in the exercise incentive program. The results of this sub-group analysis indicated that there were descriptive differences between the two groups. Subjects, who participated in the exercise incentive program scored higher on each of the dependent
variables except for frequency of volitional moderate physical exercise, however, these differences did not reach the level of significance. Therefore although the importance of the exercise incentive program can not be confirmed, it is possible that this program is important in enhancing the effectiveness of the educational treatment.

Evaluation of the construct validity of this treatment indicated that the implemented educational treatment was construct valid only for the Social Cognitive Theory construct self-control. This is confirmed by the observation that the self-control construct was the only educational target manipulated by the educational treatment. Self-control is a five dimensional construct comprised of goal setting, self-monitoring, receiving reinforcements, gaining social support, and planning to overcome exercise barriers. Students were presented with sixty minutes of unique educational experiences to which there is no competition.

Other targeted constructs from the Social Cognitive Theory, social situation, strength of self-efficacy and outcome expectation remained unchanged after the educational intervention. Attribution for the failure to improve these constructs may be due to the failure to implement fully the exercise incentive program, which resulted in an imbalance in the treatment that favored the self-control construct.

Behavioral evaluation indicated that improvements in the Social Cognitive Theory construct, self-control are correlated with increased frequency of volitional moderate physical exercise. This finding is a meaningful addition to the exercise promotion literature. Throughout the exercise promotion literature it has been assumed that the construct self-control was a determinant for exercise behavior among adolescents. This assumption however was never tested. Never before has the construct
of self-control been the primary educational target of an exercise promotion intervention among adolescent students. This project provides the first evidence that the assumption regarding self-control is correct but only for frequency of volitional moderate physical exercise. This does not hold for frequency of volitional vigorous physical exercise.

In addition to the conclusions already presented, this project yielded further advancements for exercise promotion efforts among adolescents. It is believed that the outcome expectation instrument developed within this project is the most comprehensive instrument to date for use in the study of exercise behavior among adolescents. Continued use of this instrument among researchers within this area is strongly encouraged. This project also utilized a self-control instrument developed by Scott Petosa. The value of this instrument for the explanation of adolescent exercise behavior was demonstrated. To date this appears to be only the second application of this instrument. Expanded use of this self-control instrument should follow.

This project was only one of a handful of projects that attempted to manipulate theoretical constructs in order to understand more fully the dynamic between these theoretical constructs and exercise behavior among adolescents. More specifically this project was one of only a few efforts within the reviewed literature to increase physical exercise among adolescent students using classroom educational methods (Kelder, et al., 1993; Killen, et al., 1989). In order to provide empirical guidance to classroom teachers it is necessary for additional research to be conducted in this area. Even though research in this area is rare, this project makes clear the superiority of classroom experiences that go beyond the traditional sport skill approach to physical education. This research demonstrates the need for classroom teachers to pursue improvement in student exercise
self-control. The unwillingness among physical educators to participate in the implementation of this educational treatment may explain the limited number of empirical studies. Classroom teachers must become more willing to participate in projects such as this in order to alter the observed minimal participation of adolescents in volitional physical exercise. This project has made such willful neglect among physical educators to expand the breadth of teaching less defensible.

Limitations of Conclusions from This Study

The current study was proposed as a first step in producing an effective educational treatment to increase the frequency of volitional moderate and vigorous physical exercise. As this project is an early attempt to explore potentially useful educational experiences that can increase the frequency of volitional physical exercise among adolescent students, this study qualifies as a prototypical study. A prototypical study is one in which the treatment is delivered using a less rigorous research design in order to determine if there is any purpose of further study (Flay, 1985). While results of this study were promising, the conclusions should be viewed with consideration of certain limitations that are inherent with any prototypical study and the specific limitations that effected this study.

Prototypical studies sacrifice external validity for maintaining internal validity (Flay, 1985). External validity is the confidence one has in the generalizability of conclusions, internal validity indicates the confidence one has in the demonstrated causal link (Campbell & Stanley, 1963). Threats to internal validity include history, maturation, testing, instrumentation, statistical regression, selection, experimental mortality and
Selection maturation interaction (Campbell & Stanley, 1963). This project attempted to control for these threats by use of the quasi-experimental pretest posttest comparison group design. Within the remainder of this section each of these threats will be evaluated for level of concern.

Due to the unwillingness of physical education teachers to implement this curriculum even after they assisted in its development, this author delivered all educational lessons. It is possible that this activity created a demand characteristic among experimental students. Students are certainly aware of the value placed upon the curriculum by the author and the results that the author hoped to find. When students become aware of these values it is likely that their perceptions will change. Subsequent changes may have been influenced by the classroom presence of this author rather than student participation in the experimental educational treatment.

In exploring the potential for a selection threat due to subject mortality it was noted that there were no significant differences between subjects included in the final experimental group and those experimental subjects who provided pretest data but failed to complete the requirements for inclusion in the final experimental group. While no significant differences were found it is important to note that the relatively few subjects available for this analysis rendered statistical power far below the desired level of eighty percent. If statistical power was inadequate than relevant differences may have appeared non-significant. Given this possibility it was important to examine the descriptive data in order to rule out potentially relevant differences that may indicate the presence of the selection bias due to subject mortality. Among experimental subjects descriptive differences that are relevant were identified for the variables frequency of volitional
moderate physical exercise, frequency of volitional vigorous physical exercise, self-
control, and social situation. Differences among the experimental subjects was in the
favor of the subjects that provided pretest data but did not complete the requirements of
the experimental educational treatment. Therefore it is possible that the experimental
subjects who were included in the final experimental group participated in volitional
moderate and vigorous physical exercise less often, engaged self-controlling mechanisms
less often, and perceived lesser amounts of social situation than the final experimental
subjects. This was an unexpected development. The bias was expected to be in the
opposite direction. It was expected that those experimental subjects who dropped out of
the treatment would be those who exercise less often, perceive a lesser degree of social
situation, and engage in fewer episodes of self-control. This observation indicates that if
there was a selection bias due to subject mortality in this study it is unlikely to have
cauised the educational or behavior effect documented.

Exploration of the selection bias due to athletic participation was necessary due to
the definition of volitional physical exercise within this study. Volitional physical
exercise was defined to be any physical exercise in which a student chose to engage
outside of school hours and that was not associated with an organized sporting activity.
Given this definition there is a possibility that athletic subjects may refrain from
additional volitional physical exercise and in doing so would result in a false indication
that the subject was less active than was the case. In recognition of this possibility an
evaluation was conducted that could indicate the magnitude of the selection threat due to
athletic participation. This evaluation yielded results that indicated that at pretest this
selection bias due to athletic participation may have caused the difference between
groups on the dependent variable frequency of volitional moderate physical exercise to be somewhat less than what should have been expected. At pretest there were substantially more athletes in the final comparison group than athletes in the final experimental group, twenty-five percent comparison and fourteen percent experimental. Athletes within the final comparison group reported substantially less participation in frequency of volitional moderate physical exercise than did their non-athletic peers. Athletes and non-athletes within the final experimental group appeared to reported equivalent participation in volitional moderate physical exercise. The pattern therefore indicates that at pretest the comparison group may have had a higher frequency of volitional moderate physical exercise had the athletes not participated in organized sporting activities. At posttest the percentage of athletic subjects in both groups was so low that it is unlikely that any underreport of volitional moderate physical exercise would have adversely effected the observed frequency. Taking into account the selection bias due to athletic participation the observed decrease in volitional moderate physical exercise from pretest to posttest among comparison subjects may have been greater than was observed in this study. This bias therefore may have diminished the observed impact of the experimental educational treatment.

Historical threats to internal validity are occurrences that act as spurious treatments that render all study interpretations questionable. The current study utilized a comparison group in order to limit this threat. A comparison group, it is presumed, would respond to any spurious treatment that was presented across a geographical area in much the same way an experimental group would. Therefore any within group change while significant would not result in a between group difference at posttest. This
provides insightful information upon which to base the interpretation of changes in the experimental group scores. The single most important historical event that likely intervened in this study was the change in seasons. At the initiation of this project the weather was warm allowing for much outdoor activity. At the conclusion of the study the weather was consistent with winter which prohibits many outdoor activity. The magnitude of this impact has been previously discussed (USDHHS, 1996). With the inclusion of a comparison group it was determined that this historical threat was mediated. Therefore the historical threat to internal validity is of little concern.

Maturation is a source of potential internal invalidity as a function of the aging process. Alterations of the dependent variable may be caused not from the intended intervention but rather from the biologic and psychological process of maturation. Again the inclusion of comparison group of similar age limits this threat. In the case of this study all students were enrolled within introductory physical education classes. First and second year students almost exclusively attend these classes. No substantial difference in grade level was noted between groups. Therefore it is presumed that students within the comparison group will mature at approximately the same rate as experimental students. Again within group difference within the experimental group as a result of aging will simultaneously be observed within comparison students thereby nullifying between group difference at posttest. It is concluded that the maturation threat to internal validity is limited.

Testing of subjects may create an atmosphere in which alterations observed in the dependent variable confuse all interpretations. The process of testing may influence the observed scores obtained upon subsequent episodes of testing. This threat is also
mediated with the inclusion of the comparison group. Any demand characteristic for an assessment instrument would presumably effect both experimental and comparison students equally. Therefore changes from pretest to posttest should be similar between groups if no treatment were to have occurred. However the fact that this author presented all educational experiences that are associated with this educational treatment may have created a bias among experimental subjects. It is concluded that the testing threat to internal validity is a possibility to the conclusions of this study.

Changes in testing instrumentation can lead to questions of internal validity. Within the current study all instruments used at pretest were maintained through posttest. Therefore this threat to internal validity is of no consequence.

When a study is conducted upon populations that are considered to be outliers there is a potential threat to internal validity. This threat is statistical regression. Statistical regression is a threat to internal validity because extreme group scores contain large quantities of error variance and at posttest it is the error variance that is naturally corrected resulting in mediation of pretest scores. This mediation or regression back to a true mean score may incorrectly lead to the conclusion that the intervention had impact. In this study the experimental students reported significantly lower scores at pretest on the variable frequency of volitional moderate physical exercise. It is likely that observed difference may be associated with demographic characteristics, racial composition and socioeconomic status. It is therefore concluded that the experimental group is not composed of outliers who contributed a large quantity of error variance, rather it is composed of many individuals from demographic groups in which there is a true
difference in frequency of moderate exercise than the comparison group. It is believed that in the presence of no intervention the experimental students' measures would remain substantially below the measures of experimental students. This would indicate that the statistical regression threat to internal validity is minimal.

Subject mortality threatens internal validity when subject mortality is differentially distributed between groups. Differential subject mortality is identified at two periods of this program implementation. The first is when students are moved from the accessible population through pretest. The teachers of the experimental classrooms permitted students to take their pretests home for seven days. Comparison group teacher required students to keep the pretest in class and was willing to set aside class time for students to complete daily sections. It is likely that the forty-six experimental students that failed to return the pretest were different from the seventy-six experimental students that returned the pretest. It is likely that the eighteen comparison students that failed to complete the pretest were different from the 107 comparison students that completed the pretest. Difference between the compliant and non-compliant students likely is reflective of willingness to participate. The difference between the comparison and experimental student pretest return was twenty-eight. The greater number of non-compliant students among experimental group indicates that a greater number of unwilling students from the experimental groups than comparison group were enabled to opt out of the study. This would leave the experimental group with very few students with negative reactions to being in the study; presumably the remaining experimental students would have neutral or positive reactivity to being in a study. Comparison group would have more students with negative responses to being in the study thereby making it more difficult to predict
student receptivity of teaching. A second stage in which subject mortality was observed to be differentially distributed between groups was the selection of students on quality of work. This differential in mortality was examined within a previous section (page 353).

Selection of student participants can be a threat to internal validity. Students selected from different populations may be different on the variable of interest. In this case observed differences may be falsely attributed to the treatment when true differences predated the application of treatment. Pretest measures can detect this threat prior to the application of the treatment. In the current study it was determined that the comparison and experimental students were similar at pretest on all dependent variables except for the frequency of volitional moderate physical exercise. These differences may be differences that are associated with demographic characteristics such as race and socioeconomic status. It was concluded in earlier sections of this paper that pretest between group differences on frequency of volitional moderate physical exercise were likely to be continued throughout the study period if this educational treatment was not conducted. Increased participation in volitional moderate physical exercise among experimental subjects is not likely to be attributed to the selection error.

Selection of subjects and the rate of subject maturation may interact to create difference at posttest when no pretest difference was noted. This is the selection maturation interaction threat to internal validity. In order for this threat to be recognized, there must some reason presented that would explain why the experimental students would mature at a faster rate than comparison students within a relatively brief
intervention. It is expected that little physiological or psychological maturation would take place during the fifteen intervention weeks. The maturation that does occur in this time is not expected to take place differently between groups. The selection maturation threat is concluded to be minimal.

Summary

This study was conducted in order to increase the frequency of volitional moderate and vigorous physical exercise among adolescent students. The specific research question was whether a Social Cognitive Theory-based educational treatment would be effective at causing the increase in frequency of volitional moderate and vigorous physical exercise. In order to accomplish this an educational treatment was developed and implemented within a physical education curriculum for introductory high school students. This educational treatment targeted alterations in the Social Cognitive Theory constructs, self-control, outcome expectations, social situation and strength of self-efficacy. Upon completion of the educational experiences three separate evaluations were conducted. Implementation evaluation was necessary to ensure that the educational treatment was delivered as anticipated and that adequate student participation was achieved. Treatment construct validity evaluation was necessary to determine the degree to which the targeted Social Cognitive Theory constructs changed after the implementation of the educational treatment. Behavior evaluation was utilized in order to determine the degree to which the frequency of volitional moderate and vigorous physical exercise changed after the implementation of the educational treatment.
Implementation evaluation revealed that the curriculum was not delivered as expected. The classroom educational experiences were delivered as expected. The exercise incentive program was delivered, however it was not delivered as it was designed. The exercise incentive program was designed to be a mandatory experience for all experimental students however, the classroom teachers refused to impose this expectation on the students. As a result, the exercise incentive program was implemented as a voluntary experience in which students could choose to participate. Failure to implement the exercise incentive program as a mandatory activity limited student participation in experiences that may have improved their perceptions of outcome expectation, social situation, and strength of self-efficacy. By not participating in the exercise incentive program students could refrain from engaging family and friends in their personalized exercise program. By not making the exercise incentive program a mandatory experience students could choose to not design and pursue a personal exercise goal and by not doing so they may not have opportunities to overcome common barriers to regular exercise. In addition students that did not participate in the exercise incentive program would not experience the intrinsic and extrinsic reinforcements that can be derived from regular exercise and therefore not have the experiences that may have altered their perceptions of the outcomes that are associated with regular exercise.

Construct validity of the treatment evaluation provided evidence that suggested that the implemented educational treatment was effective at improving the experimental subject's actions of self-control. This educational impact was greater than that noted among students who were exposed to a traditional sport skill based physical education curriculum. The implemented educational treatment appears to be no more effective at
improving perceptions of outcome expectation, social situation or strength of self-efficacy than that noted for a sport skill based physical education curriculum. These results demonstrate that this educational treatment is construct valid only for self-control.

Evaluation of physical exercise indicated that the implemented educational treatment was more effective at increasing the frequency of volitional moderate physical exercise than a traditional sport skill based physical education curriculum. The implemented educational treatment however was no more effective at increasing the frequency of volitional vigorous physical exercise.

The most important threat to internal validity is the selection threat due to subject mortality. At two points in the implementation of this educational treatment experimental subject mortality was greater than that observed among comparison students. It was impossible in this study to evaluate the magnitude of difference between those subjects who failed to return pretest data and those who were included in the final experimental group. Therefore this selection threat is considered to be the most problematic threat to internal validity. The selection threat due to subject mortality was evaluated for those who returned pretest data but excluded from the final experimental group and those who were included in the final experimental group. This evaluation indicates that subjects included in the final experimental group participated in volitional moderate and vigorous physical exercise less often, engaged self-control activities less often, and perceived less social situation than did the experimental subjects that returned the pretest but were excluded from the final experimental group. Therefore this selection threat may have served to diminish the observed impact of the experimental educational treatment.
Having this author deliver the educational experiences may have created an additional threat to internal validity. When an investigator delivers the treatment, students become aware of the importance between the investigator, the treatment and the outcome. These students are likely to work harder to adapt in the expected direction. The expected adaptation in this study was for students to increase their self-controlling activities, improve perceptions of outcome expectation, social situation, strength of self-efficacy, and finally to increase the frequency of volitional moderate and vigorous physical exercise. An interesting note about this potential threat however is that students are always aware of the importance of the curricula to the teacher and some students will always work harder in order to achieve the results expected by their teacher. Therefore it may be concluded that this study as implemented is biased by the same interaction that can be expected within any educational setting.

An additional bias that may have been expressed within this study was a response bias. This response bias is due to students altering their true responses to questions of self-control, outcome expectation, social situation, strength of self-efficacy, and frequency of volitional moderate and vigorous physical exercise even when these targets were not truly altered by this educational treatment. It is important to note that results from this study demonstrated a treatment effect only on self-controlling actions and frequency of volitional moderate physical exercise. If the response demand operated within this study it was only realized on two of the six potential targets. Students did not alter their responses to four of the educational targets. In light of these results it may be
concluded that students were selective in submitting to the response demand. This would be an unexpected manifestation of a response demand. If the response demand were strong it would have been expected that students would alter their responses to each of the six outcomes.

Although it is possible that bias may have been expressed within this study, the observed favorable results warrant addition research in order to replicate results using differing populations and methods. Additional research will take time to complete, until these future studies can be completed physical education teachers can feel confident citing this study as a reason to alter their introductory courses. Physical education teachers can incorporate the educational experiences described in this study. This study provides evidence that with minimal adaptations to the existing curriculum, student self-control can improve and the frequency of volitional moderate physical exercise can increase. These minimal adaptations need not be a substantial deterrent to the motivated physical educator.

Future research should focus efforts to fully incorporate all of the experiences within the designed educational treatment. It is possible that if the exercise incentive program were to engage a greater proportion of experimental students, the educational treatment would have demonstrated a higher level of treatment construct validity.

It is important that future studies that target adolescent exercise incorporate implementation and treatment construct validity evaluations prior to the more common evaluation of physical exercise. In so doing it is possible to derive results that go beyond any one curriculum and can be applied to the underlying behavioral theories that guide
curriculum development. This study provides evidence that one such theory, Social Cognitive Theory, has at least one construct self-control that is positively correlated with increased frequency of volitional moderate physical exercise.

Within the exercise promotion literature among young persons there are not standard instruments that are used to measure theoretical constructs. In the future it would be beneficial if there were a greater use of standard instruments. More frequent utilization of such standard instrumentation will limit the variety of theoretical operationalization. This study has provided two new instruments that adequately measure both the self-control and outcome expectation constructs. This study has provided evidence that each of the four instruments used are valid and reliable among adolescent students. This author suggests that these four instruments be incorporated as standard instrumentation for the constructs self-control, outcome expectation, social situation and strength of self-efficacy.

It may be helpful if researchers begin separating physical exercise into at least two types, moderate intensity and vigorous intensity. This study demonstrated that these two types of physical exercise are effected by different determinants. While frequency of volitional moderate exercise was correlated with self-control, frequency of volitional vigorous exercise was not.

In the future it may be beneficial if there is a focus upon volitional physical exercise rather than compulsory physical exercise. This author believes that the true value of exercise promotion among adolescent students is not the quantity of time students exercise within physical education classes or even within organized programs such as athletics, rather it is the quantity of physical exercise that is accomplished at the
discretion of the individual. Physical exercise that is engaged during discretionary leisure
time is likely to be a greater predictor of an exercise lifestyle than other mandatory forms
of exercise. If such focus prevails these recommendations could provide a method by
which a great quantity of knowledge pertaining to adolescent exercise could be obtained.
APPENDIX A

TRANSCRIPTS FROM THE EXPERIMENTAL TREATMENT
Teacher: All right, all right, ladies and germs. With us, with us we have Mr. Winters. Mr. Winters is a professor at Denison, as well as a doctoral student at Denison also?

Eric: Ohio State

Teacher: Ohio State. Um, and the booklet that you just received is part of a project that he is working on, and I would introduce him to go through this information with you.

Eric: I appreciate the opportunity to be out here with you all. I’ll be joining you about once a week for a brief period of time. And what were going to be doing is, were working with, well I’m working with the teachers in the uh Columbus area to uh try to uh encourage students to not only exercise in school but when you at home and your kind of on your own, or when your with a group of friends and uh we would like to do is to encourage that kind of exercise. And a couple thing is that were going to focus on a couple points, one is that you don’t have to be doing sports uh, you know you could be doing all kinds of things, there are all kinds of reasons to be exercising, but exercising is a good healthy thing to get into the habit of doing. And so what we’re going to be doing is focusing on the skills necessary for you to develop that capacity.

And what you see here is a workbook that we’re going to be using and uh, really, what’s, what’s, what’s in here is all the worksheets that we’re going to be doing so as we go through one of these lessons you’ll be able to fill in the worksheet uh and uh finish that up you’ll keep this in your physical education folder, so uh you can work on it at home and uh bring back in, that sort of thing. Ok or you can fill it out while we’re sitting here, if you want, ok. Now also within this is going to be an as you like do some activities then there’s kind of a built in reinforcement so we’ll have some gifts to give you if your actually doing the projects and doing some of the stuff, so those, those will come later on. But today I just really wanted to kind of introduce the notion of this.

So the first step if you’ll turn to the last two pages in the worksheet, or in the workbook, last two pages,… You’ll see that, what we have here is the heart rate worksheet, and I know that you have just been studying about the heart, and the resting pulse rate, and what will happen to the heart rate when you exercise at different levels, and that’s what I wanted to focus on today, is basically first let’s calculate, learn how to calculate the target heart range, all-right, and I know that you probably already done this, so I’ll just reinforce it with you, ok. And basically what we’re going to do is the target heart range is important because if you can get your heart rate up to this level for a period of time your going to get the optimal benefits of exercise. OK, that’s the optimal fitness benefits, but its not the only way you can exercise. You can exercise you know, either vigorously, moderately, or even lightly, and your going to get some benefits from that. OK, now the characteristic of the intensities of exercise is usually characterized by how fast the heart is beating, and how fast your breathing, and sometimes how much your
sweating. Also what we do is we want to have about a fifteen minute period of time where your exercising continuously, OK, so those are kind of what we were talking about. Now I know that the 0 on this uh, chart, oh I'm sorry let me come back to this. Uh, then your going to take, in order to calculate it, your going to take 220 minus your age, and then for the lower level of that, your going to multiply that maximum heart rate by 60, .6, 60%, alright that's going to give us the lower bound of the target heart range. OK. In order to find the higher range of the target heart range were going to multiply the maximum heart rate by 90%. Now, we could sit here and calculate it, but I thought I would make it a little bit easier on us, and, uh, generally speaking for the common ages were going to dealing with is 14, 15, 16, or 17 year old you can see that its not going to change that much. So your target heart range if your 14 years old is going to be about 185 and the lower boundary is going to be 125 beats per minute. OK. If your 15 years old its going to be 185 at the upper bound and the lower bound is going to be 124, so its not changing a whole lot. Alright, and then 16 years old its going to be about 184 and the lower boundary is going to be 124, and again this is, that's how you know if your exercising vigorously or moderately, alright.

So, let me uh, let me also, again you can fill this in while were sitting here that's what I would like you to do.

The zero right here on this chart, this zero represents your resting heart rate. You know what's your heart rate as your sitting here in class, and I think that on the test there's a question dealing with that so you should know pretty well what your resting heart rate is, so if you would, right here, let's say that my resting heart rate is 80. I'm going to put a dot, ok, right there, that represents my resting heart rate. Now what I want you to do is think about if we were to do, not just sitting here but lets say that we were going to get up and we were going to move around, let's say just go for a nice walk with your friends, your not going real hard, right, that would be light exercise. And then what I want you to think about is anticipate what would be your heart rate if you were to exercise lightly during that walk for about 15 minutes, where would it be, ok, now I want you to put a dot up here. I don't know I'll just put a dot right there. You can, you can think about your own self and, and, and, uh, figure out where you think that it would be. OK. And if we were to do a moderate exercise, you know we were going to step up the intensity a little bit, instead of walking slowly we going to walk kind of fast. Alright, what would happen to your heart rate in that case, would it go up? Would it go down? Would stay the same? Is there any difference? Ok, and you can uh, think about that, and put a dot, wherever on this line you think that it would be in relation to heart rate. And then obviously if were talking about vigorous exercise, or hard exercise were going to talk about target heart range. And so you already have a good indication as to where your heart range, or heart rate would be if you were exercising really hard. OK. And so, I don't think the scale goes up necessarily any higher than 140. But you would want it somewhere probably over the 120 and below the 185. And so let me just put a dot up here, ... estimate the moderate exercise at that point. And so that's what we would anticipate, or, you know I want you to think about what you would anticipate and put that on your chart. And what were going to do is as we start exercising, let's say you know your in gym class and, and, and your exercising, you know what you think would be a light exercise, I actually want you to stop, er, maybe not stop but take your pulse during
that time and I want you to see kind of what is the actual pulse alright, what is your actual pulse when your exercising lightly and at that point I want you to put a star. OK. So the dot would represent the expected heart rate and then the star will represent the actual heart rate. OK. Any questions about that? Now what you’ll see on the next page so you can fill out that page fairly quickly, and then on the next page you’ll see a worksheet that I would like you to do with some adult, it could be your parents, could be a grandparent, could be an adult brother or sister, I just want you to work this out with an adult, because you know what I want you to do is get in the habit of talking with uh, with adult members of either your family or friends about exercise. OK, I want you to get in the habit of that, and so work that out with uh, with uh somebody, and uh, do that exercise. OK, that’s all.

Teacher: Ok, on this chart thing, again were going to use that book, um, from time to time, I might stop our activity all the way into the winter, I might stop the activity and say uh, if were doing an aerobic something, take your pulse, where do you think it is, were going to mark it down, so your going to have a bunch of stars on that paper, so don’t make it too big. This paper right here (chart) were going to use again today, um, just a little bit, so you can, when we leave you can leave them right here and pick them up and chart your pulse rate for the exercise we are going to do. Now what we are going to do now is get a mile in, first I want everyone to begin with a light pace, not fast at all. When I tell you I want you to take your pulse. Next we are going to pick up the pace a little bit so that we are walking at a moderate pace, we will do that for a little bit, and then we’ll take our pulse. Finally we are going to run for a while, again afterward we will take our pulse. When we have finished we’ll chart it on the chart.

Class leaves for exercise.
Eric: As I promised, I'm back again, again for just a brief period of time, today, alright. And I wanted to discuss...I wanted to discuss one more topic with you.

Student: Generally disruptive, with a profound whistler in the room.

Eric: If you remember, last week's topic was that there's different levels of intensity of exercise. Everybody remember that? What are the three? What are the three levels?

Student: Medium, Hard, and Light

Eric: We got medium and hard and light, right? Ok, so today, and remember what I was saying last week is that you don't have to exercise at that hard level, at that vigorous level. That there's other levels.

Eric: Today what I'm going to do tell you that one of the hardest things for students to do is to find time during their day to exercise. Ok? At any of those intensity levels. So what we're going to do, is I'm going to kind of take you through an exercise in order to see what you do during a given day. And identify time slots that you might be able to exercise. Might be open to you. Ok, and the way we're going to do that is turn to the first page. Turn to the first page.

Now what you see on that first page is, different kind of pictures as to what is light activity, what's medium activity, and what's hard activity. Ok, and remember the, kind of the characteristics of each, the heart rate, respirations, breathing hard, and uh the sweating, ok. So when you answer the questions later on about intensity of exercise keep these pictures in mind in terms of what is light, what is moderate, and what is vigorous exercise. Alright? If you turn to the next page.

You're going to see a sheet with a bunch of activities on it. These are the typical activities that students are going to do during the day. Alright? You'll see that each one of those activities has a number beside it. And their split into categories so like eating has meals, snacks, cooking. Ok? You'll also see that there's a category sleep, bathing, grooming, ok? And there's going to uh, there's going to be activities within each one. And what I want you to do is I want you to start thinking what you're doing during the day, and remember we're going to focus on these numbers that represent these activities, Ok. So if you turn to the third sheet. If you turn to the third sheet. Everybody on the third sheet?

Students: Yes
Eric: Now what you're going to see here, this is actually where we're going to record the behaviors that we do. When we do a given behavior, and what that behavior is. Alright? So now what I'm going to do is I'm just going to show you an example of how we're going to do this, Ok? And so the first thing is I wake up, this 7:00 o'clock in the morning. Notice we're going to go from 7:00 o'clock to 11:00 o'clock at night.

Student: We are?

Eric: Now I don't know about ya'll but at 7:00 o'clock this morning I was asleep.

Student: Woooo!

Student: I was on the bus

Eric: You were on the bus, wow, you guys start early.

Students: General conversation between all students.

Eric: Now hang on.

Students: General conversation between all students.

Eric: Now hang on. I was asleep. I was asleep. So what number does s, is sleep on that previous page?

Student: four

Eric: It's a four right? Now, tell me this, how hard would that activity be? What, what is that.

Student: Medium

Eric: What was that?

Student: Medium

Eric: Now that wouldn't be medium.

Student: No that would be light.

Eric: I'm thinking very light. So what I'm going to do is I'm going to put an X right there.

Student: Um,
Eric: Ok, so, somebody give me an activity they did at 7:30.

Student: On the bus

Student: Getting off the bus

Eric: You were on the bus, ok.

Students: General conversation centering around the school bus.

Eric: That's alright, now hang on.

Students: General conversation between all students.

Eric: Right now we're on the bus. Ok? So tell me what activity would be riding the bus?

Student: Seven

Eric: Number seven, right?

Student: Double wide

Eric: So now how long were you on the bus?

Student: About fifteen

Eric: About fifteen minutes. So now in this next time slot you're going to put a seven. Ok? Now, that's, you don't have to fill this out unless, at that time you were on the bus. So you're doing a seven. What else do you do during the next fifteen minutes?

Student: Get off the bus and walk in class.

Eric: So, after you're on the bus, you're at class. You're doing school work, right?

Student: Um mm

Eric: So what would be school work on this next page, or on that previous page?

Student: Homework paper

Student: Number eleven
Eric: Ah, number eleven. Ok, so if you notice, you have a thirty minute time block, but you're doing two activities during that time block. For fifteen minutes you're on the bus, and then for the next fifteen minutes of that time block you're in class. So we're going to do a back slash, eleven. Now how hard are those two activities?

Student: Not very hard.

Eric: Probably very light, right? You're sitting on the bus you're not moving around, and then you're in class so you're probably sitting around again. So where would you place that X.

Student: Very light

Eric: Very light. Now, and you're probably in class until, I don't know, what time you out of class?

Student: 9:05

Eric: What's that?

Student: 9:05

Eric: 9:05. And so you're, you know you're going to go down through here and you're going to put, eleven, eleven, eleven.

Student: Eleven right up to lunch

Student: No, because we walk around while we eat lunch.

Student: Not much difference, you walk around...

Student: So we don't walk around as much.

Eric: If, If you have a fif, If you a lunch break, you know and you're doing some activity during that. You can put down. What times lunch at?

Students: Any way we got a 10:30.

Eric: 10:30, So at 10:30, tell me, what would be an activity that you would do during a, a, lunch break?

Students: Walking and eating

Student: 1, 1, 1
Eric: Ok, at 10:30 you're doing 1, and how hard is that activity, eating?

Student: I'm doing 1

Eric: It's probably, pretty, pretty light.

Student: 1 and 22

Eric: So let's try to find, let's see, this class starts at uh, what time? Does this class start?

Student: 11:45

Eric: At 11:45, you're still in class, but you're doing probably hard exercise right, because this is physical education.

Student: Not really no.

Student: Not necessarily

Eric: Not necessarily, but,

Student: What number is it?

Eric: It would be 11, because you're still in class, ok, but you're doing hard activity.

Student: At what time, everything else is 11.

Eric: So what I want you to do, I've shown you some examples as to how to go through your day. Let's say after school sometime, let's say after school sometime, you have, uh, I don't know you go out skateboarding. On the way in I actually saw some people out there skateboarding, ok? If you were to go out and skateboard for about an hour what activity would that be?

Student: R, skateboarding

Eric: 25. Ok, and you would just put that in a time slot, and then put how hard you were exercising. So what I want you to do, for the next, for the next few minutes, I want you to work through the first page of your, of this exercise sheet. Which is today. Ok?

Students: General conversations among students.

Students: Questions that can not be understood.
Eric: Just one page. I just want you to work through just the first page.
Student: Do we have to turn this in?

Eric: At the end of this week.

Students: General conversations among students.

Eric: Hey folks, hey folks! The sooner we get through this, the sooner we can move on to the next thing. It should only take about 5 minutes to work through this first one.

Students: Are working, and talking....For about 3 minutes.

Eric: You should be finishing up the first sheet. What I want you to do, is I want you to look over your list of activities that you did during that day. And I want you to try to identify, just in your own mind, you don't have to, you don't have to write anything down. But what I want you to do is just identify somewhere on that first day, yesterday's activity, that you could have fit in some exercise. You don't have to write anything down.

Now, everyone should be finished with that first one. What I want to do, is I want to explain something to you. Each day this week, each day this coming week. What I want you to is take the five minutes, not very long, and just kind of fill that in each day. So that this time next week you have seven days of activity that you recorded. So this time next week when I come back in you all should be finished.

Teacher: Does everybody understand what they need to do with this sheet?

Students: Yes

Teacher: It will be part of your grade. If you don't turn it in then you will receive an F for it.

Student: Cool

Teacher: It needs to get done.

Student: We only need to do this for a week right?

Eric: Yes, each day, once a day just sit down and write down what you did.
Eric: OK, does everybody have their workbook? What I want you to do now is just open up to the first page, just open up to the first page, you should see something that looks like this called exercise stage of change. Alright, Yea its not going to take very long because what your going to do is while I talk today, what I want you to do is listen to what I’m saying and then identify one of these four blocks that your going to fit into and just put your initial in that block, OK. Now remember the first thing that we talked about a couple of weeks ago we talked about, what, anybody remember?

Student: Heart Rate

Eric: Heart rate, right, and responses to exercise. Then the second time I came in we talked about what you do all day trying to find times that you can exercise and days that you can exercise. What we’re going to talk about today is we’re going to talk about exercise kind of throughout a lifetime, and what I’m going to try to convince everybody of in here is that you all are exercisers of some sort. And we have a few different classifications of exercisers, in order to accomplish this.

Let’s see a piece of chalk, don’t have a piece of chalk, that’s it does she have one? Yea.

The first stage that we talk about in terms of this exercise continuum, people are all over the continuum, people are all over the continuum, the first section of this continuum is called contemplation, now what’s contemplation mean? What’s contemplation? What’s contemplation anybody?

Student: Thinking about

Eric: Yea thinking about, OK. So if your in the precontemplation stage what would you be doing?

Student: Not even thinking about it.

Eric: You, You wouldn’t even be thinking about it yet. So some of you might be in the precontemplation stage, in other words your not even thinking about exercise, for some reason it does not even appeal to you at all. Alright, and if you look there the first box on the bottom is labeled zero, Ok, and uh, one more page, that zero, the statement that goes with it is, what?

Student: I presently do not exercise, and I do not plan to start exercising in the next six months.
Eric: Right, in other words you're not exercising, your not even planning on it, your not even thinking about it. If that sounds like you, remember you have one box that you have to put your initials in, if that's most like you then put you initials in that box. The second step, or the second stage in this continuum of exercise is contemplation. Now in the contemplation stage as the name would tell you is that your thinking about it, your thinking about exercise but you haven't made a move yet. OK, and the statement that goes with this is in box number one, and its, I presently do not exercise but I have been thinking about exercising in the next six months. OK, if that sounds most like you then I want you to put your initial in that box, very simple right, only going to take a second. The next step in the continuum of exercise is the people who are planning... OK, now these are people who have been thinking about exercising, and are actually starting to make a plan. There actually starting to like figure out when their going to exercise, and they may have actually made a few efforts. And so this box is number two, and it says, I presently get some exercise but its not regular. If that sounds like you put your initials in box number two. The next step in the exercise continuum is action, the action stage, these are people who are exercising, but they haven't been doing it, they regularly exercise, but they haven't been doing it for a long time. OK, that's box number three, and it says, what? What's box number three say?

Student: I presently exercise regularly, but I have only begun doing so in the last six months.

Eric: Right, OK, so if that sounds like you, put your initial in there. Alright, now I'm going to make a statement right here, and that is if you find yourself in one of these categories down here, precontemplation, contemplation, or planning remember that it's a continuum of exercise so you can move from the precontemplation to the contemplation stage by making some action particularly by thinking about it. If your in the contemplation stage, you can move up to planning. And what we're going to see, the likewise of this is people can also stop exercising, and what I'm going to try to convince you of is if your, if you've not exercising, start planning to exercise, if your currently exercise and your finding yourself getting out of the routine, start planning to get back up into it, OK. Now the last stage is maintenance. OK, and maintenance is people who have been exercising regularly for over six months, so for a long time, these are people who exercise quite a bit, and for a long time. Now wouldn't it be nice if everybody were to get some form of exercise, be up here in the maintenance or action stage. And remember that in order to exercise you don't have to be doing it vigorously, you can do it moderately or lightly. You don't have to be playing sports you can do other things that are more enjoyable to you. But let's consider what happens as we get older. So pay attention to this chart that I have on the board. On it I have drawn a curve that indicates the exercise participation across the lifetime. So as we see here, when you are real young almost everybody participated in exercise anybody know what we called it then?

Student: It was just play, isn't that different from exercise.
Eric: No not really because when you play you have an increase in heart rate, breathing. The only difference was that you had no schedule, you just went out and played.

No look here, as you entered high school probably seventy percent of you engaged in some form of exercise. No that is down a little bit from when you were very young but it is still pretty high. During high school this percent continues to decrease. The rate decreases most when people begin to drive, get jobs and find significant others.

The next step is here as you leave high school. The rate drops way down to about thirty percent if you go to college, and as you get out of college and get your first job the percent drops again down to about twenty three percent. From that point on there is a slow decrease in number of people continuing to exercise.

Remember on thing. I'm here to get, or convince you to continue your exercise not only now but into the future. Exercise is very good for your health, and for other reasons. The things that consistent exercisers have that others don't is a clear understanding as to why they exercise. I mean what they want to get out of the exercise. Ability to control their life so that exercise is possible. These are the things that we will work on during the remainder of my trips over here to see you.
Eric: So ok everybody, if you go ahead and settle down. Go ahead and take a seat also, cause we have some work to do today, and um, we want to get started so that we can on with the exercise later on. Um, right? Everybody set? Alright, make sure you have your spiral notebooks, your spiral workbooks, we're going to be using these today. Ah, remember what we're talking about, in, in general what we're talking about is, we want to promote a, ah, lifetime of exercise, physical exercise. For many reasons but, ah, ah, among them is because it is a healthy ah, good experience that ah, that's going to, um, help ya social as well as physically and and so we want you to take that exercise and plan it for yourself, and make certain that you're continuing to do that over a lifetime.

And if you remember last time we talked about the exercise stage of change which is, ah, ah, we talked about it being over a lifetime. Now today what we're going to talk about is the first step in taking control of your own exercise activities. And that process is ah, a process with five components to it. And that process is called self-regulation. So if you would open your spiral ah, workbooks to ah, parts of the self-regulation process. And ah, we'll be able to start working. Everybody got it? Its right there at the beginning, it's like the third exercise in.

Student: Where is it?

Eric: Right there at the beginning, just a few exercises into the workbook.

Eric: Got it? Ok, now like I said self-regulation is a process by which you're taking control of your own exercise activity. And, ah, it's becoming your own, ah, you set things and you, and you take control of them. So there's, like I said there are five components to the self-regulation process. What I'm doing today is I'm just going to overshadow, or I'm going to foreshadow each one of these steps today. And then in the next five weeks what we're going to do is we're going to be talking about each one of these steps individually and we're going to talk in in greater depth each one of these.

Ah, The, first step in the self-regulation process is goal setting. Remember goal setting is necessary because what you're doing with that is you're telling yourself in a clear concise way, what it is that you want to accomplish. Ah, what exercise you want to accomplish it, how long you want to exercise when you do exercise. On what days you're going to exercise. You're basically saying to yourself, here's what success is going to be for me. Ah, when you do this goal setting process correctly you're setting yourself up to be very clear, and know exactly when you're having success and where you, ah, are not having success, so that you can then take some actions later on so that you can, ah, ah, achieve greater levels of success. That's goal setting, and that's the first process, that's the first thing that you have to do when you start to take ownership. You have to be honest with yourself as to what you want.
The second, ah, process here is self-monitoring. The self-monitoring process is necessary because once you have become clear with yourself as to what you would like to have happen and what success would look like, you now have to be very careful with observing your actions and the things around you, the environment, your friends, because you want to make clear that you are having success and, ah, how are the things, affecting your exercise activities. You're going to find when we talk about self-monitoring in greater depth, you're going to find that your environment can, ah, either make exercise easier or less easy. Um, and that's, that's ah, going to be something that you have to be aware of in order to ah, ah, start meeting your exercise goals. A lot of people go through life just making a goal and then blindly assuming that they're having success but never fully, ah, never fully, ah, watch, never fully pay attention to what they're doing so that they are absolutely certain that they're having success. Self-monitoring is a, is an important part of your own activities.

Now, the third step is gaining social support. Gaining social support is, ah, you know our exercise its, ah, we don't exercise in a vacuum, we, ah, live in a society in which other people are going to effect us. They can either effect us in a positive way, or they can effect us in a negative way. What we're going to talk about when we talk about social support, is we're going to explicitly find out what it is, what are the types of social support that are positive and that we can start to use to our own benefit. Um, and that's, ah, that's going to be two general classifications and I'll foreshadow that, that, an instrumental social support, and an authoritative social support. Because we want people to help us continue our exercise. Without that type of help we're going to have a less easy time of exercising on a regular basis, and over a long period of time. Of course you have to be careful, because social support can also act in a negative way. As you may already know with other things, ah, ah, individuals can distract you from your goals. Individuals can actually attempt to influence you in doing something which you don't necessarily want to do. Ah, so these social supporters can also be a negative. And what we're going to try to do, when we talk about social supporters, we're going to not only worry about the positive type and try to amplify the positive type of social support. But we're also going to try to identify the negative types of social support, so that we don't fall into the trap of that negativity. That's social support.
The next step, ah, this is what the fourth step in, ah, the self-regulation process, so it is called, reinforcements. Now, reinforcements is important because these are the things that we're deriving from our exercise activity. Ah, these are the things that make our exercise worthwhile to us. Now, I always talk about reinforcements as being either intrinsic reinforcements or extrinsic reinforcement. An intrinsic reinforcement would be that which is, ah, self-derived. That's, ah, those are the things which, ah, that, ah, we find desirable, ah, from the exercise itself. Now I'm going to break this up when we talk about reinforcements into about seven different types of categories. Ah, and those categories would be, I exercise because of social continuation. In other words, I want to continue to be with my friends more often. Ah, the next one is, self, ah, or ah, social growth. Ah, social growth is important because exercise can bring about new friends. Ah, it provides us with an opportunity in which we can talk to new people, get to know new people, and actually expand our network of friendship. Ah, another one is thrills, ah, you know I always call exercise can be your extreme games, um, in other words it can be thrilling, ah, you can, ah, really test, ah, your physical limitations. So, ah, reinforcements, can be, ah, intrinsically reinforcing for the thrilling nature.

Another is competition, you know we talk a lot about competition in our culture. Competition is, ah, enjoyable for a, ah, for some people. Ah, they join competitive teams or they join competitive athletics because they want to have that drive for competition. Its what you usually see at Ohio State Buckeye games, ah, these people who are on the football team really want to compete, they want to win, they want to demonstrate how effective they are in doing that.

Ah, we also have after competition, we also have fitness, its another thing that we talk about in our culture, fitness. Ah, of course we pretty much know that exercise when engaged in on a regular basis over a longer period of time, we become more fit. That, ah, would be things like, ah, we have, ah, a greater ability to, ah, run longer distances. Ah, our muscles become stronger so that we can lift heavier objects. Ah, we actually have a lesser amount of fat on our bodies, um, and, ah, flexibility increases. These are all things that amplify our physical capacities, and that's why we call them fitness. Ah, so some people really enjoy exercise as a way of deriving fitness.

Some people also enjoy talking about, ah, exercise as a way of bringing about beautiful movement. Ahm, now obviously you can talk beautiful movement, ah, in regard to dance, ah, in, ind, ah, some of you may engage in dance during your days, and, ah, and get a thrill out of having that, that, precise beautiful communicative movement, ah, which is, which is, ah, expressive, ah, and that's, ah, certainly a a desirable product of exercise. We also have to remember that even other forms of exercise can be beautiful, uh, I don't know many people who would say that, ah, a Michael Jordan when he plays basketball, ah, the movement that he has, is certainly beautiful, its, ah, characteristic of Michael Jordan's basketball playing. And there other athletes also who, ah, who, ah, have that capacity.

And then, and so those are the intrinsic reinforcements of exercise, and we'll talk more about those when we get to, ah, that section. Ah the other part of reinforcement is the extrinsic reinforcements. Does anybody know what an extrinsic reinforcement would be?
Student: Getting, ah, getting money for exercise?

Eric: Yea, getting money for exercise would be an extrinsic reinforcement, why? Because somebody is providing us with money because we exercise. And so we call that, the exercise itself, ah, isn't causing the money to be there. But remember that money is only one type of reinforcement. Ah, we can, ah, we can, have another person praise us for our exercise activities. Ah, you know, a mom or a dad, who says, you know I'm, I'm proud of you because you exercise, or because you did this or that. Ahm, that's an extrinsic reinforcement. So there are those two types of reinforcements.

And then finally the last step in, ah, the self-regulation process, would, ah, planning to overcome barriers to your exercise. Now when I say this, I, I, I say it because, ah, if you're going truly have ownership of your exercise activities you have to be aware that in order to achieve your goals you're going to have to exercise over a longer period of time and regularly. Well many things happen in our daily life which makes exercise less possible. Ah, if you want to run for instance, and you live on a busy street. Then the, ah, barrier, in this case is that you don't want to get hit by a car. And so, not, you know, running on a busy street is a barrier to achieving your goal of running. Ah, and so what we try to do with this step of self-regulation is to identify those barriers and then try to overcome them. So instead of running on a busy street I would say why don't you, ah, walk over to the park and then run in the park. That would an overcoming, ah, action to this barrier. But there are other barriers also. You can, well anybody, anybody give me another barrier that might be pro, might be present.

Student: Weather

Eric: Ah, yea, weather, ah, for instance if you were going to ride your bike today, ah, and it was, ah, raining. Then you may not want to go out and ride your bike in the rain. So that would be a barrier to your exercise. And so we would have to come up with something else, that would, ah, that would allow you to exercise, achieve your goal, and yet not get out there and ride your bike in the rain. And there are things that we can do for that, and there are other barriers, and we'll talk more about these barriers as we get into that one section.

Now for a few minutes, if you haven't already, complete the worksheet for today in your spiral folder. It should not take a lot of time. Just identify the steps to self-regulation, and then explain how you would use that step in self-regulation. Finally after you have done the worksheet, take it home talk to an adult about these steps, and have them sign your sheet. So go ahead.

Students: General buzz of activity.

Eric: Ok, everybody, I assume you have all completed the page by now.

Student: No, we need more time.

Eric: No, you can take this home with you and finish it there if you haven't completed it. But we need to be moving on now.
Eric: Ok, what have we talked about up to this point? By the way, open your workbook before we get too far into it. Open your workbook to exercise goal statement, or exercise goal worksheet, exercise goal worksheet. Should look like a series of seven questions. Remember to write these things in as we go, it makes it a lot easier on you. Did I tell you last week, basically if you complete at least 80% of all the assignments that we work on, that includes that ah, you know, that packet that I gave you at the beginning, this workbook, um than what I’ll do is, ah, like a movie over at Easton, is it Easton, you know that movie theater over there?

Student: Something unintelligible

Eric: What is that? If you get 80% of the projects, or 80% of the assignments. Than I can get you a movie over at Easton, but you have to get 80% or more... of all the projects.

Student: Are you saying Easton or Eastland?

Eric: Easton

Student: Eastland is closed

Eric: Yea, Easton, you know the new one, you know Lex Wexner

Student: Something Unintelligible

Eric: But you have to get 80% of the homework, 80% of the assignments that we do. So that means ah that means ah, just keep working on it, because we make a lot of progress just by showing up and just by working on it, ok. So what have we talked about up to this point? Let’s just kind of refresh our memory.

Student: Self-regulation

Eric: Right, the last time I was here I talked about self-regulation. And remember the point of self-regulation that I would like you to understand is, that exercise is something that ah, I hope that one thing is that you start to value, start to, you know have been thinking about perhaps wanting to participate in. And remember we said that exercise doesn’t just have to be vigorous. Exercise can be moderate intensity and exercise can be lighter intensity. Exercise doesn’t have to be competitive were going to talk about that in a couple of weeks, but exercise can be for many reasons, reason, fitness is one, competition is another, but there’s a lot of other reasons why you may want to participate
in exercise. But remember the purpose of self-regulation is that your going to take ownership of it. Your not going to require the school to tell you when to exercise or how to exercise, or anything like that, what your going to do is your going to develop your own desires and self-regulation is the skills that will help you do that.

Remember there are five steps to self-regulation, what would those be? Anybody? Five steps to self-regulation…. Oh come on.

**Student:** Goal setting

**Eric:** Goal Setting

**Student:** Self-monitoring

**Eric:** Self-monitoring

**Student:** Gaining Social Support

**Eric:** Gaining Social Support

**Student:** Reinforcements

**Eric:** Reinforcements

**Student:** Planning to Overcome Barriers

**Eric:** And then Planning to Overcome Barriers

**Eric:** And remember I said that we were going to break each one out a little bit more and talk about each one of those. So were going to talk about goal setting today. And the purpose of this is, you know I’ve taught goal setting at college, I’ve taught goal setting in high schools, and between those two groups I’ve come to realize that goal setting is not one of those things that student do very well. Because usually goal setting is a very nebulous thing, it’s a, it’s a fluffy thing which you can’t really see, it’s very fuzzy. What’s the purpose of goal setting?

**Student:** Unintelligible
Eric: Yea, its to let you know concretely, what’s my goal? What’s my desire? And then to give you something to compare that to. Am I having success, or am I not having success? If you don’t write an appropriate goal then you don’t have a clear picture as to success. That’s one of the reasons why we goal set. And so we have to do it in a concrete way. And in order to do that what I’ve come up with is a group of components which have to be in a goal. An exercise goal has to contain these three components.

The first of which is that there has to be an exercise mentioned, a specific exercise. A specific exercise has to be mentioned. So give me a specific exercise you can think of.

Student: Jogging

Student: Jumping Jacks

Student: Sit-ups

Eric: So you get the idea, you can choose any of these exercises that are desirable for you. So let’s just say for instance so we can give an example. Let’s just say that it’s going to be running. No let’s say walking, I don’t like to dwell on the vigorous stuff, it’s already dwelled on enough in our culture. So let’s say walking, so you have to mention walking specifically in your exercise goal, or any other exercise that you choose. The second component which is necessary is you have to mention a duration. And when I say duration I mean how long are you going to do the exercise. You know are you going to do it for 10 minutes, 15 minutes, half an hour? How long will you do this exercise when you do this exercise? Ok, so how long do we want to walk? Let’s say,

Student: half hour

Eric: Ok, half an hour

Student: hour

Eric: You can choose, you can choose anything that you like, but just for this example that I’m doing, I’m going to say half an hour. You can choose your own. Ok, in this worksheet you can choose your own. The third thing that you have to say in a goal set is on what days am I going to do this exercise. On what days? So, on what days are we going to do our exercise of walking? Go ahead.

Student: Saturday

Eric: Ok, any other days? Let’s say, let’s say Saturday, Thursday, and Wednesday. Ok, Thursday, Saturday, and Wednesday. Ok, so somebody give me, put these three things into a sentence form.

Student: I will walk for a half an hour on Saturday, Thursday, and Wednesday.
Eric: Well done. That has each one of the components in it, tell me this, are you going to have a concrete view as to whether or not your achieving success when you phrase it like that? I will walk for 30 minutes on Thursday, Saturday, and Wednesday. Ok, so you have all the necessary components of a goal. But its not necessarily enough just to leave it at the components of goal, we have to start having a criteria upon which we can evaluate the validity of this goal. Ok, so criteria. Again there are three criteria for appropriate goals. The first is can I expect some fitness gain. Is there some fitness gain if you walk for 30 minutes, three days a week?

Student: Yes

Eric: Yea, we can expect that your going to get a fitness gain by doing that exercise goal. So therefore the first criteria of fitness has been met. The number two, ok, do you enjoy the exercise goal. Will you enjoy walking for half an hour on Thursday, Saturday, and Wednesday? If you don’t enjoy the exercise goal that you set, then change the exercise goal. Cause if you don’t want to, if you won’t enjoy doing the exercise, than your not going to have success.

Student: You not going to be able to achieve anything.

Eric: Yea, you won’t be able to achieve anything if you don’t enjoy it. So find something that you will enjoy. The third one, the third criteria for a goal set, or a goal statement, is possible. Possible, in other words, if you choose to play tennis, and yet you don’t have a tennis racket, its not going to be possible to meet your exercise goal is it?

Student: No

Eric: And so what you want to do, is your going to have to change your exercise goal so that you can have enjoyment, a fitness gain, as well as expect that it can be done. Ok, and if you don’t have a tennis racket one thing that you may want to do is in gaining social support is find somebody to lend you a tennis racket.

Student: Or find a job so you can buy a tennis racket.

Eric: Or find some way to purchase a tennis racket. Ok, so if you do these things you can expect that you have set an appropriate goal. And that that appropriate goal is something that you will gain some fitness benefit from, your going to gain some enjoyment from, and that you’ll be able to do it. Your setting yourself up for success rather than setting yourself up for failure. And that’s what I want to do, is I set you up for success, so that you can take ownership of your own exercise activities, ok. Now make certain that you can fill this sheet out, this exercise goal worksheet out. And then notice that on the next page, I think next week, were going to start being able to do some homework. So there is another page of exercise goal setting homework. And again this homework will not take anymore time than we take in class. So we’re talking about 5 –
10 minutes of you taking this home, filling it out, ideally I’d like you to fill it out with an adult, and then have the adult sign it just so your getting some social support for the activity. Do you have to have an adult sign it? No, you just won’t get complete points. Alright, so remember it’s 80% that we’re looking for, Ok. So that’s all I have for you today, and we’ll move on with the rest of class.
Eric: Ok, let's review. What is it, what's the, what's the focus of what we're talking about.

Student: Exercise

Eric: Exercise, what about exercise.

Student: What you need to do.

Eric: It's something that I'm trying to ah, to ah, work with ya in order to begin an exercise program, or continue an exercise program.

Student: I exercise everyday, I don't need nobody.

Eric: Laughter. Well we got to talk about that. But the ah, the concept is that exercise can be done for many reasons, but we want to try to do a, a self initiated program so that you're choosing what you want to do, all the time. And that you're running, kind of ah, when you want to do it, where you want to do it, and what type of exercise you want to do. Because, I want to give you time to think about exercise over your whole lifetime, not just right now. And remember the main, the main way that we're going to do that, is through self-regulation. Can anybody remember any part of the self-regulation process?

Student: Uh, uh

Eric: Anybody remember any part? If I were to say goal setting.

Student: Uh, to set a goal

Eric: Ok, you got goal setting. You can open up your workbook by the way to the first exercise contract. Goal setting is one. The second, ...we talked about right before uh, right before uh the last time, or the last time I was here. We talked about reinforcements.

Student: Oh yaa, yaa, yaa

Eric: And remember we talked about intrinsic reinforcements being those things which you are going to derive pleasure from. They are reinforcing to you. Remember there are seven of um. Like ah, competition, fitness, thrills and excitement, social continuation, social growth, ok?
There's one thing that's attached to the reinforcements that we have to talk about. Not only are there intrinsic reinforcements, or those things that you're going to derive. But there are extrinsic reinforcements which would be those things that other people will give you for exercising. Alright?

And so we're going to start a process, look at your first exercise contract. What we're going to do is we're going to begin each week talking about making an exercise goal. So I want you to ah, mention an exercise, you know a specific exercise goal and write that in the blank. It's right before the social supporters homework is the exercise contract. But I want you to mention a specific exercise. I want you to mention a specific days that you're going to exercise. And there has to be at least two days that you're going to exercise. And I want you to mention how long you're going to exercise. And each time you exercise it has to be at least 15 minutes. Ok? And then finally how hard are you going to exercise. Moderate or hard. The minimum is moderate intensity, this time.

If, by the way remember those are the components of a goal statement. If you actually go ahead and follow through with that, and you achieve your exercise goal. And you turn this form back in to me next week. Then I'll give you a reinforcement. That means that each day, each one of these blanks, Monday has to be filled in because today is what Friday. So you're going to start down here on ah, Fr, on ah, you can start on Friday, Saturday, Sunday, and then come back up here Monday, Tuesday, Wednesday, and Thursday. And then next Friday you'll turn this back in to me. Make certain that you have each one of these days filled in.

Student: You have do this at home?

Student: I have to take this home?

Eric: Yes. Ok? That means that if you don't exercise one day that's fine, but you have to put in there, no exercise. And then next Friday when I come in, I have to see that you accomplished your exercise goal. Ok?

Student: Well, if you don't, well, mine will pretty much be like no exercise, its like laying around like getting up,

Eric: Nope, nope remember it has to be, the exercise has to be at least 15 minutes in duration. It has to be at least moderate in intensity.

Student: It takes me, it takes me like 10 minutes to put my shirt on.

Eric: And then, then finally you have to have an adult's signature. So somebody who's an adult has to sign off on this saying that indeed you achieved it. Alright? If you fill that in completely, I mean completely. And you bring that in back next Friday. Then I'll give you a reinforcement for it.

Student: What is it?
Eric: Ah, ah, typically, I, I can't tell you exactly but ah, there not huge, but I think their meaningful to ah, high school students. And we're going to be doing this each week. Alright. Any questions about that?
By the way the exercise can not be school related.

Student: Oh man.

Eric: So you can't count physical education class, and you can't count sports. Alright?

Student: Why not?

Eric: Because this is ou, your own personal exercise that you're going to be directing. And school exercise is what other people are directing you to do. Ok? But remember it has to be signed by an adult and it has to be filled in absolutely completely.

Student: Something unintelligible

Eric: That's fine. Good. Now by the way the adult's signature that you have, that you'll do for that exercise. By the way this is voluntary, you don't have to do, this is something that I'm just offering you. If you want to take advantage of you can. But the adult's signature there is a method by which we can get you to get some social support. And social support is important to students. In trying to exercise the main reason why is because a lot of times our exercise is not completely isolated, sometimes we are going to have to rely on other people to help us out. In different ways. And so if we don't have a group of people who are supportive of us than it's going to make it more difficult to perpetuate that exercise over time. Next week we will take more about this social support mechanism. But that's all I have for you today.
High School #2

November 12, 1999

Class 4

Reasons for exercising

Eric: Ok, Ok, hey, everybody settle down. Let's get this thing on the road. Right? Is everybody, is everybody here? Anybody still in the locker room when you came out? Good. Everybody go ahead and open your spiral bound workbooks to the sheet called, reasons to exercise. No there's not much on it. It's like 4 exercises in. Toward the front.

Student: Where is it?

Eric: Toward the front, like three or four exercises in, so it's toward the front.

Student: This one here?

Student: Something unintelligible

Eric: Yes that's the one.

Eric: Everybody have it ready to go? Everybody have a pencil or a pen?

Student: Yes, but she don't

Eric: Well you better go get one, or um, borrow one.

Eric: Ok, what did we talk about last? Anybody? Anyone remember?

Student: Exercise

Eric: Yea, but what about it? Anybody?

Student: Goals

Eric: Right, goal setting. What are the necessary components of a goal?

Student: That you got to have one

Eric: Why don't you just, um, just open the workbook you have and um, look, to see what it is. Come on now, what are the components of um, an goal statement?

Student: You got to name an exercise.

Eric: Right you have to have an exercise, what else? How about how long you're going to exercise when you do exercise? What else?
Student: The days

Eric: Right you have to have an exercise, time, and days. Also remember that each goal must be within your control, enjoyable, and when, ah, ah, you, ah, do it, you have to have some fitness benefit. Right? Ok.

Eric: Now once we have gotten this goal written down for us, we, have, we have to have some motivation for doing it. I mean that in order to continue to exercise, the exercise has to be reinforcing. After all, um, we all need some motivation, in, to exercise. For this reason we’re going to talk about reinforcements today. And specifically these reinforcements are going to be the intrinsic kind. Right? Remember we said that a reinforcement could be intrinsic or extrinsic. Can anybody tell me the difference between these?

Student: One is given to you.

Eric: Right, the extrinsic reinforcements, are, are, um, those that um, are given, to you. That means the intrinsic reinforcements are derived from the exercise. Intrinsic reinforcements are the ones that we’re going to talk about today. And a while back the, we talked about different reinforcements that are brought about through exercise. And I said that there were about, um, what, um, seven intrinsic reinforcements or reasons to exercise. Can you tell me what one would be?

Student: No

Eric: Oh, come one how about an, a guess?

Student: No

Eric: How about somebody else?

Student: Getting stronger

Eric: Right, getting stronger, which is fitness. Another would be competition. Then how about the social reasons to exercise?

Student: Being with your friends?

Social continuation like, ah, you just said is good for the desire to be with your current friends more often. I mean, you know, a lot of times we get to a point where it is hard to make time to be around people we like. During this times, exercise, could be a, ah, way of getting together. I mean if you were to call up a friend and say, lets go out and do something. And that something was like exercise you could make the time.

Social growth. A lot of people like to expand the number of people that they know. In other words, it is sometimes nice to get to know new people. Especially as your interest change. Usually it is real hard to get a chance to get to know new people. I mean where are you going to go? That's why a lot of people call the health clubs to be the single meeting place of the decade. Cause this is were everybody can get together and meet new people. And exercise, uh, is the method of getting, everybody together.

Competition. Ah, this is one that some, some people like to do. This is the one that athletes may fall into. They like to get together and compete in order to determine who is the best, most skillful. Now not everybody likes this but it is really good for some people. Ask a few people who are on the teams around here and you will probably hear them say that they like to exercise within a competitive environment. Even look at dance competition, this is a place that people try to decide who is the best dancer, but all of them like to dance, they just use the mechanism of dance to compete. And so we spend a lot of time in our culture bringing about competition.

Fitness, now here is, uh, certainly, ah, one intrinsic reinforcement, that, ah, everybody seems to dwell a lot on. Look at the number of times people tell you that if you want to become more fit, you need to exercise more. This is really desirable in our culture. Certainly regular exercise will bring about changes in fitness, and increasing fitness will improve many thing that you will like. Ah, this, makes, the fitness gain an intrinsic reinforcement of exercise. And exercise is the way that, ah, we can bring it about. So you may like to exercise in order to bring it about. Right?

Another intrinsic reinforcement that is getting a lot of play right now is the thrill associated with exercise. Like I have said a few times already, look at the X-games. This is a whole group of games patterned after the Olympics that center around thrilling types of exercise. Like look at the down hill bike riding. I don't know about you but this will certainly bring me a thrill. Also look at the whole skateboarding thing lately. It seems that wherever I go I see skateboarding or rollarblading. Both activities could certainly bring about a certain thrill, and a lot of people are finding them to be enjoyable as a way of bringing thrills. I would not think that these people are looking for the fitness gains associated with skateboarding, just the thrill.

Beautiful movement is one intrinsic reinforcement of exercise that many people really are interested in. Look right where you are, there is a dance program here. If you tell me that the students in the program are not excited by the precise, communicative movements that they create I wouldn't believe you. People spend a lot of energy in perfecting their ability to create the most beautiful movements. Also as I said before if you look at a professional athlete in basketball you would see beautiful movement, its just that the main reinforcement the professional basketball player would be gaining would be the competition, while the dancer, or diver might be enjoying the beautiful movement as well as the competition.
Ah, finally, exercise can bring about the desirable condition of relaxation. I don't know how many of you get real anxious or stress out. But many people tend to get a little stressed by living. And as a way of getting rid of the stress, or feeling better about a bad situation exercise can be used. Exercise is pretty good at getting this done. In fact a lot of people say when asked that the intrinsic reinforcement they get from exercise is a stress reduction or an uplifting feel.

Just remember, ah, that, that it would be good if you are very clear, with, ah, the specific reason you have for exercise. Because when you do this you can tailor the exercise, the location in your exercise goal so that it reflects this reason. Also it would be best if you found a couple or, ah, a few of these reasons to be desirable. The more you enjoy the products of exercise the more utility it has for you, that is the more things it can bring about for you, the more likely you will be to continue the exercise program.

Now what I want you to do is look at the worksheet, reasons to exercise.

**Student:** Is this the one?

**Eric:** Yes. Now see the blanks beside each of the statements, I want you to list your favorite reasons to exercise. So what you should have is a number from 1, 2, 3, 4, 5, 6, 7. One and only one of each should be placed beside the statement. The number 1 is the biggest reason why you would find exercise to be enjoyable. And the number 7 would be that reason you really don't like.

**Student:** Wha?

**Eric:** Really, just put the number between 1 and 7 beside each statement. Beside the one you like best put the number 1, and beside the statement you like least put a number 7.

**Student:** So we should only do two?

**Eric:** No, you will continue to do the same with each of the numbers. So you should have a number beside each of the statements.

**Students:** Commotion from doing the work or something like work

**Eric:** Ok, has everybody gotten the work done? It really should not be taking a great deal of time. So, um, when you have, I want you to consider your numbering in respect to your exercise goal statement. Does the goal statement reflect your intrinsic reinforcement for exercise?

**Student:** Which exercise goal?

**Eric:** The one that you did last week and will continue to be working with. If you don't have one you better write one out. But if your goal is not a close match with the major reason why you exercise you should really try to change the goal statement so that it is.
Eric: If you have completed your exercise contract two make certain that after our discussion here, you turn in your spiral notebook so that I can check you off, and get you your reinforcement for this week. As of this week we will begin working on exercise contract three ok? We'll do the same thing. Specify an exercise. Make certain that it's meeting the requirement minimum number of days a week. Ok, that would be two. And make certain that your going to exercise long enough which is like 15 minutes. And then uh make certain that your going to do at least moderate exercise. Ok? If you do that and you fill in all those uh, those uh, days monitoring um, and have a parent sign it or have an adult sign it then uh, then we can uh, turn that in next week for something, you know along these same lines.

Student: Where is the social supporters activity?

Eric: Ok, its almost toward the very back. Like three, there you go, two more after that. Ok? Good.

Eric: Ok, now what we're talking about. If you'll remember that we started talking about self-regulation. And self-regulation remember has five components to it. Last week we were talking about the intrinsic reinforcements. That is why do you want to exercise? What are the motivating factors for you to exercise? And remember we said that there was like social continuation and social growth. As well as thrills, competition, fitness, anybody? We got uh, one more.

Student: Relaxing

Eric: Relaxation, ok, those are the intrinsic reasons why reinforcing, uh, uh, reinforcements that you might choose to exercise. We also talked about extrinsic reinforcements, and that's the things that I can give you if you're exercising. And so that's why we're doing the exercise contract. Today we're going to talk about social support, which is the third step in self-regulation. Why is self-regulation necessary for self-regulation? Because we end up having a lot of needs that have to be met. And those needs can be met by other individuals. Without having other individuals available to us, it makes our exercise program more complicated, more difficult to achieve. Ok? Also understand that if you uh, find social continuation, or social growth to be important, you have to have other people involved. Now, now as I go through this you, you'll see that uh, all your answers will uh, given, uh, for the homework assignment.

There's two general classifications of types of social support. Ok? The first is instrumental, anybody what to hazard a guess as to what instrumental social support would involve?

Student: Having enough things to exercise.
Eric: It has to be people remember for social support. So what can a person do to be instrumental in helping you exercise?

Eric: Yes

Student: Remind ya

Eric: Ok, remind you. In other words, you know sometimes uh, sometimes we may forget, or sometimes we may be sitting at home and we don't want to do anything necessarily, but if somebody calls us up and says hey let's go out and do something. Then their instrumental in helping you exercise.

Eric: And you were going to say something?

Student: They might encourage you.

Eric: Encouragement, you know, anytime you exercise there's going to be times like I said that you're getting discouraged. Maybe you're not achieving the things that you wanted to achieve. And if you have another person who's encouraging you to keep going then uh, then that would be instrumental in helping you. Anybody else have uh, a way, that uh, an individual could help you exercise. How about if you uh, need a tennis racquet in order to play tennis? Maybe somebody buys you a tennis racquet, like a parent might buy you a tennis racquet. Those are all instrumental ways in which a person can help you exercise. That's called instrumental social support. The first general classification of social support. Ok?

Number two, it got erased up here but I can, I can name it for you. The second general classification of social support is authoritative, a-u-t-h-o-r-i-t-a-t-i-v-e. Authoritative, what would be an example of an authoritative social support for exercise? First of all who might provide it?

Student: Mom

Eric: A parent, and in what way would a parent provide authoritative social support?

Student: Something Unintelligible

Eric: Ya, right? Your parents might come in the house and they might say, hay you know, get off your duff go out and exercise, go do something. Right? In other words you have to have somebody might simply tell you, you're going to go out and exercise. Ok?

Eric: What's another form of, uh, authoritative social support?

Student: Walking in gym
Eric: Gym class, right, in other words, what we're doing in, what, what, Ms. Pine is doing in this class is, is, is teaching you the skills necessary to be an exerciser. Right? Teaching you the skills necessary to play soccer, teaching you the skills necessary to walk, to run, to do that sort of thing. Teaching you the rules of the game so that you can choose to go out and play that game later on. So a teacher might provide you authoritative social support. Who else?

Student: Something unintelligible

Eric: No, I was thinking like along the lines of maybe a coach. You know if you play on an organized team. A coach is going to organize the structure of the practice, and, and, give you the drills to participate in. So when it comes to authoritative social support, if you keep that concept in your mind, somebody telling you to do something, somebody helping you to develop the skills necessary, or somebody who is actually going to organize a uh, a uh, an exercise program for you, Ok, those would all be forms of authoritative social support. Ok,

Now if you'll notice on your homework sheet, the first question is, name the two general classification of social support. Those are,

Student: Instrumental

Eric: Instrumental

Student: Authoritative

Eric: And authoritative, right?

Student: Uh mm

Eric: The second question is to identify two individuals, and you have two blanks, so let's identify one person first. Ok? Name an individual who will provide you with social support? I don't know, I'm going to give you an example, how about this, a mother. Right? And what type of social support might she provide? Let's say instrumental. How might a mother provide instrumental social support? That's the third thing you have to fill out. How might she? What specific ways might a mother provide instrumental social support?

Student: Go out with you to exercise
Eric: There you go. Actually your mom, mom might go out and exercise with you. You know, your dad might go out and toss the ball with you. Something like that. So that would be one individual. Your task is to provide another individual, and then identify what type of social support, and in what specific ways does this person reflect that type of social support?

Now you'll notice the next question is, what are some negative social supporting activities that you might keep your eye open for? So far we've only talked about positive social support. Those ways that other individuals might help you exercise. But you have to realize just as soon as you say that while there might be positive social supporters, there's also distractors. Individuals who will help you not exercise and in what ways might a person, uh, provide negative social support?

Student: *Something unintelligible*

Eric: You know if you share your exercise goal, or somebody knows your goals are in regard to exercise, and they basically discount it, basically you know, tell you that it's not worthy or something like that. Their basically trying to knock out from underneath you the motivation to exercise.

You might also have a friend who just doesn't like exercise in general, so every time you're around that person, you end up just sitting around. Ok? Both of those ways a person is providing negative social support for exercise. And the concept here is to identify those individuals and to try to overcome that negative social support. Ok?

Eric: Now if you completed exercise contract two raise your hand. Anyone? It has to be signed and filled out. I would encourage you, I don't know I encourage you just to do it. It's not a lot of work and you get some reinforcement for it. Here let me just go and collect them.

Student: Do I have to do it?

Eric: No you don't have to, but, I don't know why you wouldn't want to.

Student: I did the first one but I didn't do this one.

Student: *Something Unintelligible*

Eric: Did you have a parent sign it? Or, somebody to sign it?

Student: I can sign it.

Eric: You got to have, you got to have an adult sign it.

Student: Oh, why an adult?

Eric: Because it has to have sort of like, reflection that it actually happened.
**Student:** But my parents don't know where I walked.

**Eric:** Well, you just have to talk about it. With an adult. Remember the reason why it's necessary also is because social support. I'm trying to get you to interact with people in regard to your exercise.

**Student:** But some people really don't care.

**Eric:** And those would be people that you wouldn't want to interact with around exercise. But you can find people you do. Like Ms. Pine. She would help you.

**Teacher:** Ok people we're going to go ahead and walk.
Eric: What are the five components of self-regulation?

Student: Goals

Eric: Goal Setting

Student: Values

Eric: No, but something like that though. You got intrinsic and extrinsic reinforcements, so you got reinforcements.

Student: Goal Setting, Self-monitoring, gaining social support, reinforcements, planning to overcome barriers.

Eric: Planning to overcome barriers. And that's what we're going to talk about real briefly. Alright, there are two things that you have to learn, when it comes to exercise there's, you have barriers that come up, and if you uh, don't plan on overcoming these barriers, if you don't anticipate these barriers, or some of these barriers, when they do come up your going to have an awfully difficult time engaging in your exercise regularly. Alright? So the idea here is to become familiar with four of the general barriers your going to come up against. Alright? Anticipate them and come up with some overcoming actions which are going to enable you to get over those barriers. OK? The idea is that if you do that, you continue the exercise, you achieve your goals, and hopefully your going to gain some reinforcement, either an extrinsic reinforcement which can be provided by me, or an intrinsic reinforcement which your going to come across. And remember what those intrinsic reinforcements are, thrills, competition, fitness, what else?

Student: Social continuation


Student: Social growth

Eric: Social growth. Ok. So you've got, you've got a lot of those reinforcements. You've got to stop thinking about exercise for competitive, and only being for health. There's a lot of reasons for you to exercise.

Now the barriers we're going to come across. The general barriers. One, too little time. Alright, a lot of people are going to say I don't have enough time to exercise. So the idea is that as we continue with our exercise program, you want to continue to monitor where those, uh, those open time spots are in your daily schedule. So too little time.
**Student:** Poor weather

**Eric:** Poor weather, in fact look outside, we got poor weather today, its what, dreary, rainy. And if your anticipating exercising outside today, you may not be able to unless you want to like run or walk or do something in the rain. Probably not the best environment. So poor weather would be a barrier.

The third one fatigue. I don’t know, I know myself, that uh, a lot of times I get fatigued, run down, you know don’t want to get up and get the energy to go out and do something. Uh, it could be you know, might be my laziness. Its generally my fatigue, you know I don’t feel like it. Ok? So that’s another barrier you might come across.

**Students:** Unintelligible talk

**Eric:** And then fourth, you just simply find the exercise to boring to engage in. You don’t like it, you don’t want to do it, alright. That would certainly be a barrier

**Eric:** Now what your going to find, if you’ll take your uh, spiral notebook, and open it to barriers to exercise homework. Barriers to exercise homework, don’t be shy.

**Student:** Unintelligible

**Eric:** Alright, your going to see that you got a list of things. You just look angry today.

**Student:** A group of student say something

**Eric:** I feel for you. Uh, its toward the back. Its like two exercises to the end.

**Student:** Oh, It’s barriers to exercise homework?

**Eric:** It’s called barriers to exercise homework. You’re going to see at the top of that page, a list of statements, like there’s not enough time in the day, the weather is often bad. I want you to list in rank order the ones that are most problematic for you personally. OK? Those are the general barriers, I want you to identify which ones are most problematic for you.

**Student:** Wha, Wha, Wha

**Eric:** I want you, right at the top of the page, there are seven slots with statements beside them.

**Student:** Right here?

**Eric:** Yep, I want you, in those slots that are open I want you to list from one to seven, the most problematic barrier, I want you to put a one. The least problematic barrier for you, I want you to put a seven. OK? And then you got 2, 3, 4, 5, 6.
Student: What's a problematic barrier?

Eric: Well there's not enough time in the day, that's a general barrier isn't it. Ok, so just put in if that's real problematic, little problematic, or not so problematic. OK?

Eric: So, once you've listed from one through seven, each one of those barriers, were ready to move on to the next step. And that is, identifying the general classification of barriers to exercise. And once you've identified each one of the four general barriers, I want to introduce you to the general overcoming action. In other words once you've identified a barrier, you can take some action to counteract it, to counteract that barrier. And so as we were talking about earlier, if you have too little time during the day, what you might want to do is consider time management. OK, identifying sections of your day, fifteen minute sections, thirty minute sections where you actually have free. And once you've done that you've found a spot to exercise. You might have to use on of those, uh, organizers, you know, so, so kind of chart your day out. You may want to do it mentally, charting your day out. OK, so time management.

If the weather is poor and your planning to exercising outside, your overcoming barrier might be changing of location. OK, so you might want to go from running on the track out there to running maybe inside or around uh,

Student: Around the gym

Eric: The gym. Ok, or if you have a health club that you're a member of or have access to, you can go run inside there.

Student: Or try running inside the, the,

Eric: Ok

Student: School hallway.

Eric: Yea, the school hallway. For instance if you have a problem with a, with a fatigue, that's your barrier that your finding most problematic the general overcoming action is going to be altering your exercise time, duration, or intensity. You don't have enough energy to exercise vigorously one day, exercise moderately. Exercise lightly, if you have to. Instead of exercising thirty minutes, exercise ten minutes.

Student: Or exercise twenty minutes.

Eric: Or twenty minutes. Your going to exercise differently. And then finally if your barriers that you just find the exercise that you have as a goal statement as being very boring, I want you ta, do number four which is find a new exercise. I want you to change you exercise goal, and get something that is exciting. So for instance if you have as your exercise goal running, and you just find that to be horribly boring change it to something else, maybe rollerblading.
Student: Or it might be bike riding.

Eric: Or it might be riding the bike. Ok, so you have the four barriers and you have four general overcoming actions. Now, we have two examples that were going to work through.

Alright, the first example, I give you as the exercise goal, I will jog for thirty minutes on Monday, Wednesday, and Friday. Now as ya'll remember that's an appropriate exercise goal, why? Because I've mentioned a specific exercise, which would be running or jogging. I've mentioned a specific duration which is thirty minutes. And I've mentioned a specific number of days, Monday, Wednesday, and Friday. Ok? The barrier that I give you is that the temperature outside is ten degrees. I want you to identify, in that example what the over or barrier is, the general barrier. What is it?

Student: Poor weather.

Eric: Poor weather, number two, ok. Now I want you to identify, for that general barrier, I want you to identify a general overcoming action. Which would that be for poor weather?

Student: Change of Location

Eric: A change of location, right. So go ahead and fill this in, alright. You can take notes and fill it in later, ok. Change of exercise location would be the general overcoming action. And then thirdly, I want you to mention specifically, where you going to change your exercise to? Ok, you going to change it to a gym? you going to change it to a health club?

Student: Field house?

Eric: Field house, you can change it to a lot of places. You'll also notice that there is a second example here, I want you to fill that out on your own, I want you to work through that on your own. Ok? And then finally, that's what I have for today. I want to do one more thing, and that is, we talked about social support last week. What are the two general classifications of social support?

Student: Uh, getting people to help you?

Eric: Instrumental,

Student: And like a teacher.

Eric: Authoritative

Eric: Right, so you have instrumental social support, and you have authoritative social support. Instrumental social support are those people that actually help you engage in
exercise. Authoritative social support are the people who either tell you to exercise or develop the skills for you to exercise. Ok? And remember that these things can also be negative, negative social support, in other words they keep you from exercising. And then finally, since nobody has their exercise contracts done, which I'm a little bit disappointed because I have my gift certificates all ready to divy, Uh.

Student: But you know I always have it!

Eric: So we won't be doing that, but I do encourage, one to do exercise contract number two this week. Two days a week, fifteen minutes minimum. Moderate exercise, we can all do that, not real hard. Alright? And I'll bring in some different types of reinforcements tomorrow, or next week. And then finally I encourage you to keep this, to keep your exercise spiral folder cause if you completed 80% of the exercises in this at the conclusion of the lectures, by the way, the conclusions next week will be the last time we meet. Uh for this. Ok, so if you've gotten 80% of the lessons done in here, then uh remember I'm going to give you gift certificates to the Easton movie theater, Ok?

Student: Ooh

Eric: So, and actually I just found out that the gift certificate is good for two movies, I thought that it was just one, but its...

Student: AAAAH! Mr. Winters

Student: So we can see two different movies

Eric: Ok, so with that, let me just make sure that we have everybody here. Chris, John, Stiven, 4, 5, 6, 7, 8, 9, 10. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Good, alright, you can go to the cafeteria. Alright.

Student: Bye

Student: Do you want to keep those?

Eric: No keep those, keep your spiral folders cause we're going to be doing it next week. Alright, so put it in your, uh, uh, locker if you want, just make sure you keep a hold of it.
Eric: Remember what we have been talking about all these weeks is to take ownership of our exercise activity. We want to decide what exercise we do on our own time, when we exercise, and take responsibility to continue to exercise. In order to do this we have talked about the different intensity of exercise that is possible, we've talked about the steps involved in self-regulation for exercise. Goal setting, overcoming barriers, social support, reinforcements both intrinsic and extrinsic, and now we're going to talk about the process of self-monitoring. Self-monitoring is a process by which we come fully aware of our exercise so that we are setting ourselves up for success. So open your spiral bound exercise workbooks to the self-monitoring exercise and uh we'll get started.

Eric: Now there uh are five things that you have to self-monitor, in regard to your exercise.

Student: unintelligible

Eric: Right, let's talk about the first one, achievement. What's that mean? To self-monitor for achievement?

Student: To uh, accomplish something, or uh getting your goals....

Student: What page are you on?

Eric: It's the last exercise. It looks, like this. Uh go back one. There you go, alright?

Student: It means that your accomplishing your goal.

Eric: Whether or not you're achieving your success. Right, in other words you set a goal, now the question is whether you're achieving that goal or not. If you're not achieving it then you have to think about some of the reasons why you might not be achieving it. And so we move to the second one, which is location, location, location. I mean if you're exercising next to a garbage dump you may not like the smell that happens at a garbage dump, so you don't want to exercise there. The location may be making it more difficult for you to achieve your goal.

Student: Should I be filling something in right now?

Eric: What's that? Just be uh looking at this cause I'll be explaining it here in a second. But there's nothing to fill in right now.
Eric: So location. If you're exercising outside and the weather's bad like now we're moving into winter. Location might be a problem, you have to think about how your location outside is effecting your exercise. It's cold and you don't want to exercise, which of course is one of the barriers to exercise that we talked about.

Eric: The third one, your social support, remember social support might be for the positive or for the negative. Right?

Student: Right

Eric: So what you ought to do is you want to pay attention to how your friends are interacting with your uh exercise. You know, sometimes your friends might be helping you exercise, sometimes friends can be hurting your exercise. If you're not paying attention to how your friends are affecting you, then you just keep doing what you're doing and it might not be leading to success. Alright? Social support, how much help are you getting from people.

Eric: You always have a sucker in your mouth.

Student: Unintelligible

Eric: Number four, what about your feelings? Remember how we talked about last week, one of the common barriers to exercise is that you found a boring exercise. You no longer like the exercise, it's, no, it has no value to you. And if it has no value to you, you have poor feelings toward your exercise, and if ya have bad...

Student: Unintelligible

Eric: What's that?

Student: If you have to change it.

Eric: There you go which is going to be leading up to number five. If you have,

Student: Ooof

Eric: Poor feelings, you don't like it, you don't enjoy it. Than you have to know about that. You have to pay attention to it, because the fifth and the final thing, which I always come back to, its, if, if you're having trouble, if you don't like your exercise goal change it. Right? There is no rule against changing your exercise goal, there's no rule against changing any goal. If you can't achieve your level of success as you set it,

Student: Than you're not going to be able to keep it.
Eric: Than you're not going to be able to achieve it, and so what we want to sometimes is to recognize that it's not in our control, or it's not no longer desirable. And therefore we're going to come to number five, which is changing it. The whole purpose of self-regulation, the purpose of taking ownership of your exercise patterns, is to set yourself up so that you can have some success. And by having success, hopefully you'll find something reinforcing about it, either intrinsically, or extrinsically. And by doing that, by having that type of reinforcement you'll perpetuate your exercise patterns. And then you'll become healthier, more energetic, that sort of thing, the whole ball of wax that comes with exercise benefits. Ok? So keep in mind self-monitoring.

The five things: Whether or not your having success. The type of location you're exercising in and then how it effects you. Your social support, the people that are around you the things that they are doing for you and whether or not it's helping or hurting. Your feelings toward your exercise. Whether or not you like it, hate it, find it completely innocuous. And then finally given those pieces of information, is it time to change your exercise goal?

So the exercise I have for you this week. Is on this page, and of course the first thing that I want you to do, is to write your exercise goal statement. And you know the components of an exercise goal statement, right, what are they?

Student: Unintelligible

Eric: What would the ex, what are the components, there's three components to an appropriately set exercise goal? What, woul.......what's that, I hear somebody. What is the first component to an exercise goal? What's that?

Student: Discussion among students

Eric: The first one, look at the first one on that page. I think you're on the right page. Yea, read the first one.

Student: To list a specific exercise.

Eric: First step is to state a specific exercise. What's the second thing?

Student: Say the time

Eric: The amount of time. How long you going to do the exercise when you do it? What's the third thing?

Student: On which day.

405
Eric: And on which days. If you have those three components to an exercise goal. And remember it meets the criteria of whether or not you enjoy it, what are the fitness gains, and three whether or not it's in your control. You have an appropriate exercise goal statement. So I want you to write that exercise goal statement in sentence form in that blank. The next thing that I want you to do, after you've done that is I want you to think about the intrinsic reasons why you're exercising. The intrinsic reinforcements that you're hoping to gain. Is it social continuation, if you want to be with your friends more. If you want to meet new friends, social growth. Do you want to have some thrills? Competition? Uh beautiful movement? Achieve some relaxation, or acquire some level of fitness. Those are the seven intrinsic reinforcements that we talked about. The seven reasons why people find exercise desirable. After you've done that, all we're going to do is on each day, I want you to write the day down, just like in the example I've given you. Let's say Monday, what's the exercise I wanted to do?

Student: Running

Eric: Running. How long did I do it? Twenty minutes. What was my social support?

Student: My little sister.

Eric: Your sister. Maybe your sister is doing some chores for you so you can get out of the house so that can do some running. Alright? And whether or not she did that effectively. Maybe she said no you got to do some chores for me, and it killed ya in terms of time. And then three, was the location? If you're exercising in a busy street, that might kind of adversely effect whether or not you're going to achieve your goal. We're going to do that for each day, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. And then after you've done that, I want you to think about how you feel about your exercise goal, and whether or not you need to make some changes. If you need to make some changes, you have that slot at the very end, ok, what's the new exercise goal. The concept here is that every time you do this, self-monitor your exercise, you're probably going to come up with some change in your exercise goal till the point that you're achieving success regularly and then that might remain stable for a little bit, alright. And with that, I conclude.

Eric: Anybody that came in late. Did anybody finish their exercise contract four?

Student: What?

Eric: Did anybody finish their exercise contract four? Anybody, anybody, anybody?

Student: This?

Eric: Yep, exercise contract four, did you do it?

Student: Yea

Eric: Do you want me to take it? I'll give it back to you.
APPENDIX B

EXPERIMENTAL CURRICULUM
Lesson 1

Heart Rate Monitoring
During Moderate and Hard Exercise

Purpose: At the conclusion of this lesson students will be able to identify how the heart rate changes during light, moderate, and hard exercise. They will also be able to identify their moderate exercise heart rate, and hard exercise heart rate.

Learning Objectives

LO1: Students will calculate target heart range and calculate heart rate during moderate and vigorous aerobic exercise.

LO2: Students will name a specific exercise which represents moderate and hard aerobic exercise.

LO3: Students will engage in exercise for the day.

Teacher Will

1. Discuss the purpose and structure of this curricular component, “Active Youth Program”.

2. Define aerobic exercise as, “physical movement which causes you to have an increased heart rate, increased breathing rate, and lasts for at least 15 continuous minutes”.

3. Present target heart ranges for common student ages.

4. Have students take a resting pulse, light exercise pulse, moderate exercise pulse, hard exercise pulse.

5. Have students complete exercise pulse worksheet.

6. Explain homework.

Things the teacher will need for class:

1. Heart rate charting worksheet
2. Stopwatch
3. Jump ropes
4. Basketball

Total Time: 44 minutes

Homework: Parent’s heart rate calculation worksheet
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
</table>
| 5 min. | Teacher Lecture   | Role call / Purpose of class section

“During this semester you will develop a portfolio for this physical education class. This portfolio will demonstrate what you have learned, and will be used to calculate your grade. Today we will begin to add some worksheets to this portfolio. Each of these worksheets will increase your ability to maintain regular physical exercise.”

| 1 min. | Teacher summarizes | Aerobic Exercise is exercise which causes you to increase your breathing and heart rate and is done for at least 15 minutes. |

| 3 min. | Using Poster Board | Calculation of target heart range for the most common ages in the class. Teacher tells student to complete the target heart range task on “Heart rate charting worksheet” |

| 5 min. | Teacher Lecture   | Students are taught how to take a pulse using the neck. |


<p>| 1 min. | Student activity    | Students chart resting heart rate on worksheet |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher has students do light exercise.</td>
<td>Walking around</td>
</tr>
<tr>
<td>1 min.</td>
<td>Measurement of light exercise heart rate.</td>
<td>Students records and charts pulse on Heart Rate Worksheet.</td>
</tr>
<tr>
<td>5 min.</td>
<td>Teacher has students do Moderate aerobic exercise.</td>
<td>Basketball 3 on 3.</td>
</tr>
<tr>
<td>1 min.</td>
<td>Measurement of moderate aerobic exercise heart rate</td>
<td>Students records and charts pulse on Heart Rate Worksheet</td>
</tr>
<tr>
<td>5 min.</td>
<td>Teacher has students do vigorous aerobic exercise.</td>
<td>Jump rope</td>
</tr>
<tr>
<td>1 min.</td>
<td>Measurement of vigorous aerobic exercise heart rate</td>
<td>Students record and chart pulse on Heart Rate Worksheet</td>
</tr>
<tr>
<td>2 min.</td>
<td>Teacher lectures</td>
<td>As exercise intensity increases so does our pulse rate.</td>
</tr>
<tr>
<td>1 min.</td>
<td>Student activity</td>
<td>Students are to fill out the exercise which represents moderate and vigorous exercise.</td>
</tr>
<tr>
<td>5 min.</td>
<td>Teacher explains homework on</td>
<td>You are to work with your parents calculating their target heart range.</td>
</tr>
</tbody>
</table>
Heart Rate Worksheet

Name: ___________________________ Date: __________

1. My age is: _______

2. My target heart range is between _______ and _______ heart beats each minute.

3. How will you determine if the exercise in which you participate is aerobic in nature? ____________________________________________

4. Identify the exercise which was moderate aerobic exercise ________________________________

5. Identify the exercise which was vigorous aerobic exercise. ________________________________
Heart Rate Calculation

Student’s Name: ___________________________  Date: __________

Adult’s Name: ___________________________  Date: __________

Adult’s relationship with the student: ___________________________

**Adult’s Target Heart Range Measures**

Thank you for participating in this exercise with this student. Having you do this exercise along side them will allow the student to see the flexibility of target heart range. Also it will reinforce the importance of aerobic exercise at all ages.

**Calculate Target Heart Range**

A. \(220 - \text{(age)}\) ________ = __________ which is your Maximum Heart Rate

B. Maximum Heart Rate ____________ X .60 = ___________ This is the lower bound of your target heart range. This number will also indicate moderate exercise intensity.

C. Maximum Heart Rate ____________ X .90 = ___________ This is the upper bound of your target heart range. This number will also indicate vigorous exercise intensity.

D. Adult’s Target Heart Range is from ________________ to ________________

E. Think of three moderate exercises which might be fun to do.

________________________________________

________________________________________

________________________________________

F. Think of one vigorous exercise which might be fun to do.

________________________________________
Lesson Number 2

Workbook #1 Completion

Purpose: Following this class each student will be able to recall and record their daily activities from the previous day. This is important because a common reason students find it difficult to exercise is because they can’t identify adequate time to work it in. Therefore today students will complete seven consecutive days of their out of school activities so that they can visually locate sufficient time. During this recall activity please help students to find time when they are doing unnecessary sedentary activities and suggest that they exercise during these times.

Students will also complete a series of questionnaires which will indicate the degree to which they self-regulate exercise, their beliefs in exercise, amount of social support offered to them for exercise, and their confidence to overcome common barriers to exercise. These questionnaires are the basis for this curriculum.

Learning Objectives

LO1: Students will complete the seven days of daily activities.
LO2: Students will complete the educational questionnaires.

Teacher will:

___ 1. Discuss that today’s class is to help you recall your own exercise activities.
___ 2. Discuss with students the importance of the educational questionnaires to understanding their personal perceptions of regular exercise.
___ 3. Review with students the content of the workbook
   A. Name Page
   A. Page 1 = Activities Scale
   B. Page 2 = Activity List
   D. Page 3 - 9 = Activity Log Pages
   E. Pages 10 – 21 Questionnaire
___ 4. Provide example to students on how to complete daily activity recall.
___ 5. Have students complete exercise self-report.
___ 6. Have students complete educational questionnaires.
___ 7. Collect each student’s workbook

Teacher will need for class:

Workbook for each student.

Total Time: 45 minutes on lesson.
00 minutes on exercise.
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher Lecture</td>
<td>Role call / Purpose of class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“The purpose of today’s class is to get you to pay attention to the amount of exercise you get in each day. We are going to fill out 7 exercise daily logs. When you fill these out pay attention also to the times open to you to get exercise in</td>
</tr>
<tr>
<td>3 min.</td>
<td>Teacher Instruction</td>
<td>Open your books to the example for Daily Activity Logs</td>
</tr>
<tr>
<td>1 min.</td>
<td>Using example in book</td>
<td>Notice on the first page are examples of light moderate and hard forms of exercise. On the second page is a listing of most every type of exercise you will engage throughout your day. And on the third page is your self-report grid.</td>
</tr>
<tr>
<td>5 min.</td>
<td>Using Book Example</td>
<td>First I drove home at 4:00 pm. In order to record this activity I would look on the activity page, find the number for driving, 7, and enter it onto the Log page.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Now driving is light activity so I will place an X for this activity within the light column at 4:00 pm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continue this for a couple of activities within the example.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>20 min.</td>
<td>Student Activity</td>
<td>Students complete 7 daily exercise logs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teacher available to answer questions.</td>
</tr>
<tr>
<td>10 min.</td>
<td>Teacher Announces</td>
<td>No continue with the workbook and complete the questionnaires. When you have finished turn the workbook into me.</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher collects Workbook #1</td>
<td></td>
</tr>
</tbody>
</table>
Lesson Number 3

Exercise Stage of Change

Purpose: Following this class students will be able to identify where they are on the exercise continuum. Students will recognize how exercise rates drop across the lifespan and realize that physical education is designed to maintain people as exercisers.

Learning Objectives

LO1: Students will complete the exercise stage of change worksheet and identify their current exercise stage of change.

LO2: Students will identify their current stage of exercise change.

LO3: Students will complete the exercise stage of change homework.

LO4: Students will engage in class exercise activity for the day.

Teacher will:

___ 1. Present the frequency of physical exercise throughout the lifetime.

___ 2. Present the purpose of this curricular component as an effort to increase frequency of physical exercise outside of the classroom.

___ 3. Have students complete the exercise stage of change worksheet.

___ 4. Discuss the meaning of each stage within the exercise stage of change worksheet.

___ 5. Assign and Explain homework.

Teacher will need for class:
1. Poster board with rate of exercise participation across lifetime.

Homework:
1. Exercise stage of change worksheet for parents
2. Description of parental beliefs about importance of regular exercise

Time: 21 minutes on lesson
24 minutes on exercise
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher lecture</td>
<td>Role call / Purpose of class section. “Today we are going to examine our own level of exercise. Mainly what we want to accomplish is a belief that all persons are exercisers, we just differ on our frequency of exercise activities. The goal for today is to identify where we are on the continuum of exercise, and identify how it may change for the better or worse in the future.”</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher distribute</td>
<td>The exercise stage of change worksheet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Directions: On this sheet simply read the question and answer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record your answer in the space provided.</td>
</tr>
<tr>
<td>2 min.</td>
<td>Student activity</td>
<td>Students complete the classroom worksheet.</td>
</tr>
<tr>
<td>2 min.</td>
<td>Teacher Lecture</td>
<td>Every person is on a continuum for exercise. Specifically there are 5 stages, precontemplation, contemplation, planning, action, and maintenance. What we want to do is find out what each of these mean and where you fit in as an exerciser.</td>
</tr>
<tr>
<td>2 min.</td>
<td>Poster board</td>
<td>On the poster board is a table containing each stage and the definition.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
</tr>
<tr>
<td>----------</td>
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<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2 min.</td>
<td>Student activity</td>
<td>Students will identify their stage of exercise change.</td>
</tr>
<tr>
<td>5 min.</td>
<td>Using Poster board</td>
<td>Notice that exercise rates decline quite a bit during adolescents especially during the onset of high school. Also just following high school. And about the time we take our first job. Other than during these times people gradually remove themselves from exercise.</td>
</tr>
<tr>
<td>1 min.</td>
<td>Using poster board</td>
<td>The goal of physical education is to</td>
</tr>
<tr>
<td></td>
<td>Teacher describes the</td>
<td>1. Maintain Exercise rates</td>
</tr>
<tr>
<td></td>
<td>role of physical education</td>
<td>2. Increase Exercise rates</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher assigns homework</td>
<td>Explain the student task on the homework exercise stage of change is to get an adult to complete the worksheet.</td>
</tr>
<tr>
<td>24 min.</td>
<td>Exercise</td>
<td>Teacher's choice</td>
</tr>
</tbody>
</table>
Exercise Stage of Change Homework

Student’s Name: ________________________________ Date: __________

Adult’s Name: ________________________________ Date: __________

Student’s relationship with adult: ________________________________
Purpose: In order to reinforce exercise activities outside of school, this program will reward students for meeting exercise goals. Following this lesson students will be able to identify the criteria by which they will receive these rewards. Rewards will be supplied to teachers to be distributed once each week. In order for a reward to be received by a student the exercise contracted must not be organized by the school, must be planned, and if accomplished result in fitness gains. Therefore the exercise can be either moderate or vigorous in intensity. Each week the frequency or duration of exercise will increase. A parent must sign off on the students claim of meeting their exercise goal for the week.

Learning Objectives

LO1: Students will complete the exercise contract for the week with appropriate exercise intensity, duration, and frequency.

Teachers Will

___ Instruct students that each week they will write an exercise contract.

___ Instruct students that qualifying goals must be signed by an adult in order to receive an award.

___ Explain to students the necessary levels for exercise intensity, duration, and frequency for an exercise contract.

___ Explain to student that completion of each exercise contract will effect their grade for this segment of the class.

___ Instruct students that school sponsored exercise activities will not qualify for rewards.

Teachers will need for class:
1. Poster board with each students name, and weeks in which exercise goal.
2. Poster board with incentive program rules.

Homework:
1. Out of school exercise which matches the student’s exercise contract.

Total Time: 16 minutes on lesson
            32 minutes on exercise
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher Lecture</td>
<td>Role Call / Introduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“For each of the next few weeks each of you will be given an opportunity to create an exercise contract. If you meet the requirements you will be given a reward such as a tee shirt, gift certificate for a compact disk, gift certificate for exercise equipment. The goal behind this is to reinforce with you that exercise is important and we want to help you move along the exercise stages of change.”</td>
</tr>
<tr>
<td></td>
<td>Use of Poster board</td>
<td>Rule #1: Each student must contract at the beginning of each week for an exercise.</td>
</tr>
<tr>
<td></td>
<td>Teacher Lecture</td>
<td>Rule #2: Each exercise contract must meet minimum requirements for intensity, duration, and frequency.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rule #3: Each exercise contract will be provided a reward only for successful completion with an adult’s signature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rule #4: No school organized exercise will qualify.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rule #5: Participation in this activity is considered homework. Completion of the exercise contract will therefore effect the student’s grade.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
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<tr>
<td>--------</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher instructs students</td>
<td>Open to Exercise Contract #1.</td>
</tr>
<tr>
<td>2 min.</td>
<td>Teacher lecture</td>
<td>On this form write an exercise goal. Then for each time you exercise record it within the grid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>At the end of the week bring your sheet back in with an adult’s signature.</td>
</tr>
<tr>
<td>3 min.</td>
<td>Student Work</td>
<td>Students complete exercise contract.</td>
</tr>
<tr>
<td>29 min.</td>
<td>Student exercise</td>
<td>Teacher’s choice</td>
</tr>
</tbody>
</table>
Exercise Contract #1

Student Name: ___________________________ Date: ________________

Specific Exercise to be completed: ___________________________

Number of times this week you will do the exercise: _________ (minimum 2 days)

How long will you exercise on the days you exercise: _________ (minimum 15 min)

Is this moderate or hard intensity exercise: _________________________ (minimum moderate)

<table>
<thead>
<tr>
<th>Monday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Tuesday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wednesday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Thursday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Friday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
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<table>
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<tr>
<th>Saturday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
</tr>
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<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Location</th>
<th>Time of Day</th>
<th>How long did you exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Adult's Signature indicating the accomplishment of this exercise goal: ___________________________

Relationship of adult to student ___________________________
Incentive Hand in Day 1

Should Occur on the Same Day of the Week as Incentive Program Kick off Day, One Week Apart

Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting an adult to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LO1: Students will turn in first weeks exercise contract.

Teachers Will:

_____ Collect student’s first week exercise contract.

_____ Allow time for students to complete exercise contract for week 2.

The teacher will need for class:

1. Nothing

Homework:

1. Out of school exercise which meets the exercise contract of the student.
Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting their parent to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LO1: Students will receive award for completing their exercise contract.

Teachers Will:

___ Distribute awards to those students completing their exercise contract.

The teacher will need for class:

1. Poster board with each students name, and weeks exercise goal is achieved.

2. Tee shirts

Process:

1. Teacher brings in the rewards for the student who met the incentive requirements.

2. Teacher displays the Poster Board grid with markings for these students.

3. Teacher distributes the rewards to the students.
Lesson 5

Self-regulation

Purpose: Following this class students will identify the importance of self-regulation on maintaining exercise behavior. Students will also identify the components of self-regulation which include self-monitoring, goal setting, gaining of social support, reinforcements, and planning to overcome exercise barriers.

Learning Objectives

LO1: Students will complete the Exercise Self-regulation Homework.

Teachers Will:

___ Present the 5 components of the self-regulation process.
    ___ Goal Setting    ___ Getting Social Support    ___ Self-monitoring
    ___ Reinforcement    ___ Planning to Overcome Exercise Barriers

___ Explains the importance of each of the 5 components of self-regulation.

___ Assign and Explain homework.

Teachers will need for class:

1. Poster board upon which is a description of each of the 5 components.

Homework:

1. Parts of self-regulation process.

Total Time: 13 minutes on lesson 32 minutes on exercise

427
<table>
<thead>
<tr>
<th><strong>Time</strong></th>
<th><strong>Modality</strong></th>
<th><strong>Content</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher lecture</td>
<td>Role Call / Purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Today we are going to discuss the components of exercise self-regulation and the importance of each component.”</td>
</tr>
<tr>
<td>5 min.</td>
<td>Using Poster board</td>
<td>There are 5 components to self-regulation.</td>
</tr>
<tr>
<td></td>
<td>Teacher lecture</td>
<td>1st Goal Setting: We must have a clear idea what exercise we want to do, how much, and how often. This way we have a criteria by which we can judge ourselves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd Self-monitor: We pay attention to what we are doing, how things effect our exercise so that we can have more success. Remember part of this process is how we feel about our goals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd Gaining Social Support: Everybody needs some degree of support from those around us. At times it is getting people to exercise with us, or even getting people to help us so that we can have time to exercise.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>4th Reinforcement: Identify what you hope to gain from the exercise. This may be fitness, social involvement, thrills, or some tangible object like those of you in the incentive program. You may also get multiple reinforcement from your exercise.</td>
<td></td>
</tr>
<tr>
<td>3 min.</td>
<td>Teacher instructs students</td>
<td>Open your books to the “Parts of the Self-regulation process”</td>
</tr>
<tr>
<td></td>
<td>Teacher lecture</td>
<td>This is your homework for the day. In this exercise you will be asked to identify each part of the self-regulation process, and identify why we need each part in order to maintain or begin our exercise.</td>
</tr>
<tr>
<td>26 min.</td>
<td>Student Exercise</td>
<td>Teacher’s choice</td>
</tr>
</tbody>
</table>


Parts of the Self-regulation Process

Student Name: ___________________________  Date: ______

Directions: In class we discussed the necessary parts of the self-regulation process. Within this activity you are asked to identify these parts, and explain specifically how you will use each in order to begin or continue your exercise program.

1. What is the first part of self-regulation? _________________________________

2. How will you use this part of the self-regulation in order to begin or continue your exercise program?

3. What is the second part of self-regulation? _________________________________

4. How will you use this part of the self-regulation in order to begin or continue your exercise program?

5. What is the third part of self-regulation? _________________________________

6. How will you use this part of the self-regulation in order to begin or continue your exercise program?

7. What is the fourth part of self-regulation? _________________________________

8. How will you use this part of the self-regulation in order to begin or continue your exercise program?

9. What is the fifth part of self-regulation? _________________________________

10. How will you use this part of the self-regulation in order to begin or continue your exercise program?

Adult’s Signature: __________________________________________

Relation of adult to the student: __________________________________
Incentive Hand in Day 2

Should Occur on the Same Day of the Week as Incentive Hand in Day 1, One Week Apart

**Purpose:** The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting an adult to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

**Learning Objectives:**

LO1: Students will turn in second weeks exercise contract.

**Teachers Will:**

___ Collect student’s second week exercise contract.
___ Allow time for students to complete exercise contract for week 3.

**The teacher will need for class:**

1. Nothing

**Homework:**

1. Out of school exercise which meets the exercise contract of the student.

**Process:**

1. Students hand in the exercise contract for last week. Over the night, the teacher reviews the contracts in order to determine who met requirements.
Incentive Distribution Day 2

Should Occur on the next day of the week as Incentive Hand In Day 2

Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting their parent to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LOI: Students will receive award for completing their exercise contract.

Teachers Will:

___ Distribute awards to those students completing their exercise contract.

The teacher will need for class:

1. Poster board with each students name, and weeks exercise goal is achieved.
2. Gift Certificate

Process:

1. Teacher brings in the rewards for the student who met the incentive requirements.
2. Teacher displays the Poster Board grid with markings for these students.

Teacher distributes the rewards to the students.
Lesson 6
Exercise Goal Setting

Purpose: Following this class, students will be able to write an appropriate exercise goal statement. Writing an exercise goal is the first step in the process of self-regulation because through this goal we become aware of what we want to achieve. If these goals are poorly written as they often are, it is difficult to determine if success is achieved, and how we can alter our actions so that we can have more success.

Learning Objectives

LO1: Students will identify the 3 components of a goal which are necessary.

LO2: Students will identify the 3 criteria by which we determine the appropriateness of an exercise goal.

LO3: Students will complete Exercise Goal Worksheet during class.

LO4: Students will complete Exercise Goal Statement Homework.

Teachers Will:

___ Present the three necessary components of an exercise goal.
    ___ What exercise
    ___ How long will you exercise each time you exercise.
    ___ On which days will you exercise.

___ Present the three criteria by which an exercise goal is judged appropriate.
    1. What is the fitness benefit
    2. Do you enjoy the exercise
    3. Is the exercise possible for you

___ Provide opportunity for students to complete the Exercise Goal Worksheet.

___ Explain to students the Exercise Goal Statement Homework

Teacher will need for class:
    1. Poster board with the necessary components of an exercise goal and the three criteria against which it will be judged.

Homework
    1. Exercise Goal Statement Homework

Total Time: 16 minutes on lesson
    29 minutes on exercise
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher lecture</td>
<td>Role call / purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Following this class you will be able to write an appropriate exercise goal. Remember that this goal statement is the first step in the self-regulation process because it will make clear what we want from exercise. Also if we write this goal well we will be able to determine if we are having successes or not.”</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher instruction</td>
<td>Open your books to the “Exercise Goal Worksheet”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Your worksheet for class today is to write one appropriate exercise goal. Therefore you may want to take notes on the sheet so that you will not have any problems later on.</td>
</tr>
</tbody>
</table>
### Content

In every good goal statement there must be the following:

**#1: Specific Exercise:** You must identify one specific exercise which you will accomplish.

**#2: How Long:** How many minutes will you do this exercise every time you plan to do it.

**#3: Which Days:** On which days of the week will you do the exercise.

Also we must have a criteria by which we judge the value of the goals to us. For this we have three specific criteria.

**#1: Is there a fitness benefit?**

**#2: Do we enjoy the exercise?**

**#3: Is the goal within your control to accomplish.** By this I mean if you plan to play tennis, you must have a tennis court, a partner, tennis racquet, and tennis balls. If you do not have these things, your goal is not within your control, and you should not use this goal statement.

What I want you to do now is to complete the worksheet.
Time | Modality | Content
---|---|---
5 min. | Student Activity | Complete, “Exercise Goal worksheet”.
Teacher while students work | Now for tonight you have a similar task. I want you to go through the process again, identify what each component and criteria mean, then write another exercise goal. This can not be the same goal you just wrote.
29 min. | Student Exercise | Teacher’s Choice
Exercise Goal Worksheet

Student’s Name: ___________________________ Date: ______

1. What is the specific exercise you want to accomplish this week?

2. How long will you do the exercise each time you do it?

3. On which days of the week do you plan to do the exercise?

4. Write your exercise goal statement into a sentence form.

5. What will be the fitness benefit if you accomplish this goal?

6. Do you enjoy the exercise you plan on doing this week?

7. How is your exercise goal within your control?
Exercise Goal Statement Homework

Student’s Name: ______________________________ Date: ________________

Adult’s Signature: ______________________________ Date: ________________
Relationship of Adult to the Student: ______________________________

Directions: You are to identify why each component of an exercise goal statement must be included. Next please explain how you will judge the value of your exercise goal statement using each of the goal criteria identified. You will receive extra credit if your parent’s discuss this project with you and sign your homework sheet.

Components of a Goal

What exercise:

How Long:

On Which Days:

Write out in a sentence your exercise goal: ______________________________

Criteria of a Valuable goal Statement:

Fitness Benefit:

Enjoyment:

Within Your Control:
Incentive Hand in Day 3

Should Occur on the Same Day of the Week as Incentive Hand in Day 2, One Week Apart

**Purpose:** The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting an adult to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

**Learning Objectives:**

**LO1:** Students will turn in third weeks exercise contract.

**Teachers Will:**

___ Collect student’s third week exercise contract.

___ Allow time for students to complete exercise contract for week 4.

**The teacher will need for class:**

1. Nothing

**Homework:**

1. Out of school exercise which meets the exercise contract of the student.

**Process:**

1. Students hand in the exercise contract for last week.
2. Over the night, the teacher reviews the contracts in order to determine who met requirements.
Incentive Distribution Day 3

Should Occur on the next day of the week as
Incentive Hand In Day 3

Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting their parent to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LO1: Students will receive award for completing their exercise contract.

Teachers Will:

___ Distribute awards to those students completing their exercise contract.

The teacher will need for class:

1. Poster board with each students name, and weeks exercise goal is achieved.

2. Gift Certificate

Process:

1. Teacher brings in the rewards for the student who met the incentive requirements.

2. Teacher displays the Poster Board grid with markings for these students.

3. Teacher distributes the rewards to the students.
Lesson 7

Reasons to Exercise

Purpose: Following this lesson students will be able to identify the seven reasons most people like to exercise. Students will also begin to identify several barriers to their exercise behavior. Students must begin to learn that exercise is fun for many reasons which include, social growth, social continuation, competition, relaxation, thrills, beautiful movement, and fitness. Successful exercisers plan to take advantage of many of these reasons, and make plans to overcome common barriers. Both of these aspects are a part of the self-regulation process.

Learning Objectives

LO1: Students will complete the Why Exercise worksheet.

LO2: Students will engage in the class exercise.

Teachers Will:

___ Present the seven reasons why people enjoy exercise.
   7. Relaxation

___ Allow time for students to complete the Why Exercise worksheet.

Things teachers need for class:

1. Poster board depicting the seven reasons to exercise.

Total Time: 15 minutes on lesson
             30 minutes on exercise
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<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
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<tbody>
<tr>
<td>5 min.</td>
<td>Teacher Lecture</td>
<td>Role Call / Purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Today we will introduce the many reasons why people exercise. While we do this keep in mind why you may be interested in maintaining or beginning an exercise program.”</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher instructions</td>
<td>Open your book to the “Why Exercise” worksheet</td>
</tr>
<tr>
<td>5 min</td>
<td>Using Poster board</td>
<td>As I was saying, people find exercise to be a way of bringing about many benefits.</td>
</tr>
<tr>
<td></td>
<td>Teacher lecture</td>
<td>#1: Social continuation: An opportunity to get together with your current friends.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2: Social growth: An opportunity to get to know new people, and expand your circle of friends.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#3: Thrills: An opportunity to lose some control of your body, or live on the edge. An example would be In Line Skates in the half pipe.</td>
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<td></td>
<td>#4: Beautiful movement: An opportunity to gain mastery of your movement in order to create emotion or enable communication.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
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<tr>
<td>1 min.</td>
<td>Teacher lecture</td>
<td>#5: Fitness: Improvements in our physical capability. This may be muscular strength, flexibility, or aerobic ability.</td>
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<td></td>
<td>#6: Competition: Attempts to beat another person in sports.</td>
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<tr>
<td></td>
<td></td>
<td>#7: Relaxation: To unwind or escape from daily stress.</td>
</tr>
<tr>
<td>3 min.</td>
<td>Student Activity</td>
<td>People who exercise for years know why they exercise and they plan their exercise so it is they accomplish their reason.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Since our goal is to become or begin a regular exercise program we must do the same. Therefore our next exercise will ask you to consider these things.</td>
</tr>
<tr>
<td>22 min.</td>
<td>Student exercise</td>
<td>Think of your own reasons to exercise. Then rank order the list of reasons.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teacher’s choice</td>
</tr>
</tbody>
</table>
Why Exercise?

Name: _______________________________ Date: ________________

There are many reasons why you may find exercise enjoyable. Remember we all have our own interests and goals for exercise. The key is to find out why you may want to engage in exercise and then focus on that reason. Remember you may want to exercise at a very intense level, or you may rather exercise at a walking pace. Whatever the reason and intensity you find enjoyable, stick with it.

**Directions:** For this worksheet you are to rank, in order of importance to you, the listed reasons to exercise. Place a number “1” in the space beside your most important reason to exercise. Place a number “2” in the space beside your next most important reason to exercise. Continue in the way until you have ranked each reason.

Exercise is fun when,

_____ my friends and I can be together. _____ we compete.

_____ I get to be around new people. _____ it releases my stress.

_____ I become more physically fit. _____ it allows me to create beautiful movement.

____ there is a physical thrill.
Incentive Hand in Day 4

Should Occur on the Same Day of the Week as Incentive Hand in Day 3, One Week Apart

Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting an adult to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LOI: Students will turn in fourth weeks exercise contract.

Teachers Will:

___ Collect student’s fourth week exercise contract.

___ Allow time for students to complete exercise contract for week 5.

The teacher will need for class:

1. Nothing

Homework:

1. Out of school exercise which meets the exercise contract of the student.

Process:

1. Students hand in the exercise contract for last week.
2. Over the night, the teacher reviews the contracts in order to determine who met requirements.
Incentive Distribution Day 4

Should Occur on the next day of the week as Incentive Hand In Day 4

**Purpose:** The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting their parent to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

**Learning Objectives:**

LO1: Students will receive award for completing their exercise contract.

**Teachers Will:**

___ Distribute awards to those students completing their exercise contract.

**The teacher will need for class:**

1. Poster board with each students name, and weeks exercise goal is achieved.

2. Gift Certificate

**Process:**

1. Teacher brings in the rewards for the student who met the incentive requirements.

2. Teacher displays the Poster Board grid with markings for these students.

3. Teacher distributes the rewards to the students.
Lesson 8

Social Support for Exercise

**Purpose:** Following this class students will understand the importance that other people have on our exercise plans. Parents and friends play a very important role in how often we exercise. Therefore in order to maintain or begin our exercise programs we must go out and secure social support from these people.

**Learning Objectives**

LO1: Students will complete “Social Supporters” homework

LO2: Students will engage in the class exercise.

**Teachers Will:**

___ Present the two general classifications of exercise social supporters

1. Instrumental 
2. Authoritative

___ Explain the “Social Supporters” homework

**Teachers will need for class:**

1. Poster board which depicts the general classifications of exercise social supporters and the roles that may be important to our exercise plans.

**Homework:**

1. Exercise Social Supporters homework

**Total Time:** 14 minutes on lesson
31 minutes on exercise
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher Lecture</td>
<td>Role call / Purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Today we are going to discuss the importance of social support to our exercise plans. People who are influential in our exercise include, parents, friends, and brothers or sisters. Also these people play many roles that will be discussed today.</td>
</tr>
<tr>
<td>5 min.</td>
<td>Using Poster board</td>
<td>There are many types of social support which could help your exercise.</td>
</tr>
<tr>
<td></td>
<td>Teacher lecture</td>
<td>1. Instrumental: A friend that exercises with you. Or a parent that gets you to where you can exercise. A family member who buys you exercise equipment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Authoritative: A coach that helps you develop skill. A Physical Education teacher that teaches you the skills and rules of many games.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If you consider the question, you can come up with many people from each of these categories that could help you continue your exercise program.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2 min.</td>
<td>Teacher lecture</td>
<td>As you continue to exercise, consider where you can gain social support, and what types of social support you need.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Also consider the bad types of social support you may find. Such as a friend that does not want to help you exercise. Or one that would rather not exercise themselves. How will this effect your exercise plans.</td>
</tr>
<tr>
<td>2 min.</td>
<td>Teacher instructs</td>
<td>Open your book to the “Exercise Social Supporters” Homework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This is your homework for the night.</td>
</tr>
<tr>
<td>28 min.</td>
<td>Student Exercise</td>
<td>Teacher’s Choice.</td>
</tr>
</tbody>
</table>
Exercise Social Supporters Homework

Student’s Name: _________________________________ Date: _________________

Directions: As we discussed in class, the amount and quality of social support we receive for our exercise activities will help determine how often we exercise. In this homework you are to identify the two general classifications of exercise social support, and then identify two people that may provide you social support. Next you are to identify one type of negative social support you will keep your eyes open for.

1. Identify the two general types of exercise social support.
   A. __________________________________________
   B. __________________________________________

2. Identify two people that could provide you with exercise social support.
   Person #1: __________________________________________
   General classification of exercise social support they can provide:
   __________________
   Specifically how might this person provide you with social support?

   Person #2: __________________________________________
   General classification of exercise social support they can provide:
   __________________
   Specifically how might this person provide you with social support?

3. Identify one type of negative social support you will keep your eyes open for.
Incentive Hand in Day 5

Should Occur on the Same Day of the Week as Incentive Hand in Day 4, One Week Apart

Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting an adult to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LO1: Students will turn in fifth weeks exercise contract.

Teachers Will:

___ Collect student’s fifth week exercise contract.

The teacher will need for class:

1. Nothing

Homework:

1. None

Process:

1. Students hand in the exercise contract for last week.
2. Over the night, the teacher reviews the contracts in order to determine who met requirements.
Incentive Distribution Day 5

Should Occur on the next day of the week as
Incentive Hand In Day 5

Purpose: The purpose of this incentive program is to reward students for setting an exercise goal, following through on the self-monitoring requirement, and getting their parent to acknowledge their effort. Remember this program is in place in order to assist students to become regular exercisers, and these incentives are a powerful way to encourage this to happen.

Learning Objectives:

LO1: Students will receive award for completing their exercise contract.

Teachers Will:

___ Distribute awards to those students completing their exercise contract.

The teacher will need for class:

1. Poster board with each students name, and weeks exercise goal is achieved.

2. Gift Certificate

Process:

1. Teacher brings in the rewards for the student who met the incentive requirements.

2. Teacher displays the Poster Board grid with markings for these students.

3. Teacher distributes the rewards to the students.
Lesson 9

Overcoming Barriers

Purpose: Following this class students will be able to identify a strategy which will overcome a specific barrier to a specific exercise goal. Keep in mind that planning to overcome barriers is the third step in the self-regulation process. This skill is important because unless students are able to overcome exercise barriers, there is little chance for them to continue to exercise on a regular basis. In other words they will move down the exercise continuum, becoming more sedentary.

Learning Objectives:

LO1: Students will complete the “Barriers to Exercise Homework.

LO2: Students will take part in class exercise.

Teachers Will:

___ Present the four general classifications of exercise barriers.
   1. Too little time 2. Poor weather 3. Fatigue
   4. Boring exercise

___ Present the four general classifications of overcoming actions.
   1. Time management
   2. Change exercise location
   3. Alter exercise time, duration, intensity
   4. Find new exercise

___ Assign and Explain homework

Teachers will need for class:
   1. Poster board with each of the four general classifications of exercise barriers.
   2. Poster board with each of the four general classifications of overcoming activities.

Homework:
   1. “Overcoming Barriers to Exercise” homework

Total Time: 19 minutes on lesson
            26 minutes on exercise
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min</td>
<td>Teacher Lecture</td>
<td>Role Call / Purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Today we are going to discuss the methods by which we overcome barriers to our exercise plans. Remember the making of plans to overcome these barriers is the third step in the self-regulation process.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The first two were what?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Goal Setting, and Social Support. If we keep this self-regulation process in mind and make use of these strategies we will have a much better chance to maintain our exercise program.&quot;</td>
</tr>
<tr>
<td></td>
<td>Using Poster board</td>
<td>While there are endless barriers which may come up, our task is to condense each of these barriers into a general category which can be identified so that a general overcoming action can be identified.</td>
</tr>
<tr>
<td></td>
<td>Teacher Lecture</td>
<td></td>
</tr>
<tr>
<td>5 min</td>
<td></td>
<td>#1: Too Little Time: The general overcoming strategy for this barrier classification is time management.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2: Poor Weather: Rain, Snow, Cold, Hot. General overcoming strategy is alternate exercise location.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
</tr>
<tr>
<td>-------</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher lecture</td>
<td>#3: Fatigue: Too tired, or stressed. General overcoming strategy is to alternate exercise time, duration, or intensity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#4: Boring: Don't like to exercise, or exercise time is no fun. General overcoming strategy is to identify the reason you want to exercise, and find a new exercise.</td>
</tr>
<tr>
<td>5 min.</td>
<td>Teacher use of Poster Board</td>
<td>For each of these general classifications of exercise barriers there are general classifications of overcoming activities.</td>
</tr>
</tbody>
</table>

Teacher Lecture

#1: Time Management:
Often people have more time than they realize for exercise, we just don't use that time well. If we start to organize our time better often we will find large sections of the day in which exercise could fit.
#2: Change of Location:
Sometimes when the weather is bad we will have to change our location of exercise. So for instance if it is raining outside, we may want to exercise indoors. Or if the exercise becomes boring a change of location may be just what we need.

#3: Alter exercise time, duration, intensity:
If you find that exercise is making you really tired, you may need to change the time that you workout or you may need to change the intensity, duration, or frequency of your exercise.

#4: New exercise:
If you are bored with your exercise you may just want to pitch it and start a new kind of exercise. Also if the weather is bad you may need to change your exercise so that it can be done indoors.

3 min Teacher instruction
Open your book to the “Barriers to Exercise Homework”

Tonight you are to read the goal statement, and the presented barrier. Then you are to identify the general overcoming strategy, and specific overcoming strategy.

29 min Student exercise
Teacher’s Choice

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Barriers to Exercise Homework

Student's Name: ___________________________ Date: _____________

Adult's Signature: ___________________________________________ Date: _____________

Relationship of Adult to the Student: __________________________

Directions: Rank order the main reasons you are unable to exercise. Place a number 1 in the space beside your biggest barrier to exercise. Place a number 2 in the space beside your next biggest barrier to exercise. Continue in this way until you have ranked each barrier.

_____ There is not enough time in the day _____ I am too tired
______ The weather is often bad ______ Exercise is really boring
______ My friends don’t want me to exercise ______ I’m no good at exercising
______ My parents don’t think that exercise is important

General Exercise Barriers General Overcoming Actions
1. Too little time 1. Time management
2. Poor weather 2. Change exercise location
3. Fatigue 3. Alter exercise, time, duration, intensity

Exercise goal: I will jog for 30 minutes on Monday, Wednesday, Friday.

Barrier: The temperature is 10 degrees outside

Which general exercise barrier does this represent: __________________________

What is the general overcoming action for this barrier: _________________________

What is the specific overcoming action you would choose: _______________________

Exercise goal: I will ride an exercise bike for 20 minutes on Monday and Friday.

Barrier: My legs cramp up when I ride an exercise bike.

Which general exercise barrier does this represent: __________________________

What is the general overcoming action for this barrier: _________________________

What is the specific overcoming action you would choose: _______________________

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Lesson 10

Self-monitoring

**Purpose:** Following this lesson students will understand the importance of the self-monitoring process. Students will identify the specific components such as, environmental support, social support, and feelings toward the goal. Remember that self-monitoring is the fourth step in the self-regulation process and is necessary because it allows us to identify how we are doing at our exercise program, and ways we can change in order to experience more success.

**Learning Objective**

LO1: Students will self-monitor for their exercise behavior over a continuous seven days using each of the self-monitoring components.

LO2: Students will take part in the class exercise.

**Teacher Will:**

___ Remind the students what the first three steps in the self-regulation process are
1. Goal setting 2. Getting social support 3. Overcoming barrier

___ Present the importance of the self-monitoring process to self-regulation.

___ Present the five targets of the self-monitoring process.

___ Assign and Explain homework.

**Teacher will need for class:**
1. Poster board with each self-monitoring target identified.

**Homework:**

**Total Time:** 15 minutes on lesson
31 minutes on exercise

458
<table>
<thead>
<tr>
<th>Time</th>
<th>Modality</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher Lecture</td>
<td>&quot;Following this class you will understand the fourth step in the self-regulation process, that is self-monitoring. Can anybody identify the first three self-regulation steps? Goal Setting, Social Support, Planning to Overcome Barriers. Remember in order to have a real good chance to continue our exercise plans, we must take advantage of each of these self-regulation steps.&quot;</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher lecture</td>
<td>Goals are of no use unless we actively interact with them. The active interaction is called Self-monitoring. Self-monitoring process allows us to change our goals to better reflect our desires, find people who could provide us with social support, locate places where we can exercise, and determine when we have achieved success.</td>
</tr>
<tr>
<td>Time</td>
<td>Modality</td>
<td>Content</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 5 min. | Using Poster board Teacher Lecture | Necessary components of self-monitoring include,  
|        |                   | #1: Achievement of goal: Did we exercise today in the way we have planned.  
|        |                   | #2: Location of exercise: Where did we exercise, and how did it effect our exercise.  
|        |                   | #3: Exercise Partner: Did we exercise with anybody? If no, how did the lack of an exercise partner effect us. If yes, how did our exercise partner effect us.  
|        |                   | #4: Feelings after Exercise: If we did exercise how did it make us feel. If we did not exercise, how did it make us feel.  
|        |                   | #5: Changes in Exercise Goal  

| 2 min. | Teacher instructs | Open your book to the "Weekly Self-monitoring" homework  

| 2 min. | Teacher lecture | On this sheet you are to record your self-monitoring process. You are to answer each question everyday even if you did not exercise. Just follow the examples provided.  
|        |                   | You will hand this in next week on this day.  

| 31 min. | Student Exercise | Teacher’s Choice  

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What is your Exercise Goal for this week: ________________________________

What is the main reason you exercise: Social Continuation  Social Growth
Thrills  Competition  Beautiful Movement  Relaxation
fitness

Example

<table>
<thead>
<tr>
<th>Day</th>
<th>Exercise</th>
<th>How long</th>
<th>Social support</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Running</td>
<td>20 min.</td>
<td>brother. did my chores</td>
<td>Street. busy</td>
</tr>
<tr>
<td>Tuesday</td>
<td>None</td>
<td>0 min.</td>
<td>brother. no help</td>
<td>none</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Running</td>
<td>30 min.</td>
<td>Father, ran with me</td>
<td>Outdoor Track</td>
</tr>
<tr>
<td>Thursday</td>
<td>Bike</td>
<td>60 min.</td>
<td>Friends, bike with me</td>
<td>Street. cold</td>
</tr>
</tbody>
</table>

Your Turn

<table>
<thead>
<tr>
<th>Day</th>
<th>Exercise</th>
<th>How long</th>
<th>Social support</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
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After this week how do you feel about your goal? ________________________________
New exercise goal: ____________________________________________________________
End of the Semester Day

Posttest measurement on

Self-regulation
Social Support
Reasons to Exercise
Overcoming Barriers to Exercise

Purpose: During this class period, students will complete each of the worksheets again. This process will enable us to determine the degree to which they developed as exercisers. Students are also given an opportunity to complete the first of the seven days of physical activity self-report sheets. Once these exercises are complete the student learning objectives will have been accomplished.

Teacher will need for class:
1. One testing booklet for each student:
2. One previous day physical activity recall booklet for each student.

Homework:
1. Begin doing exercise self-reports

Total Time: 45 minutes on lesson
<table>
<thead>
<tr>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>5 min.</td>
<td>Teacher lecture</td>
<td>Role Call / Purpose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Today we will take a second look at each of the worksheets we completed at the beginning of the semester. This will give you an opportunity to see how far you have come as an exerciser.&quot;</td>
</tr>
<tr>
<td>2 min.</td>
<td>Teacher distribution</td>
<td>Workbook #2</td>
</tr>
<tr>
<td>10 min.</td>
<td>Student Activity</td>
<td>Students report day 1 of PA.</td>
</tr>
<tr>
<td>20 min.</td>
<td>Student Activity</td>
<td>Students complete the questionnaires</td>
</tr>
<tr>
<td>1 min.</td>
<td>Teacher</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C

INCENTIVE PROGRAM REINFORCEMENTS
Week 1: $5.00 Gift Certificate to McDonald's Restaurant.

Week 2: $5.00 Gift Certificate to Blockbuster Video Store.

Week 3: $10.00 Gift Certificate to Target Department Store.

Week 4: $5.00 Tee-shirt with Physical Activity Logo.

80% Completion of the Student Workbook: $10.00 Gift Certificate to Movie Theater.

Total: $35.00 for each student.
APPENDIX D

APPROVAL FROM THE OHIO STATE UNIVERSITY HUMAN SUBJECTS IN RESEARCH COMMITTEE
THE OHIO STATE UNIVERSITY

APPLICATION FOR EXEMPTION FROM THE HUMAN SUBJECTS INSTITUTIONAL REVIEW BOARD

All research activities that will involve human beings as research subjects must be reviewed and approved by the appropriate human subjects office, or receive exempt status, prior to implementation of the research.

Principal Investigator: Patricia Kich A.
[Signature]

Academic Title: Associate Professor
Phone No. 292-3545, Fax No. 688-3532

Department: College of Education, School of PEAS

Campus Address: 342 Lantern Hall

Co-Investigator(s):
Winters Eric A.
[Signature]

Department: College of Education, School of PEAS

PROTOCOL TITLE:
Use of Social Cognitive Theory to Promote the Increase in Physical Activity among Adolescents

CATEGORY:
[Check one or more]

SOURCE OF FUNDING FOR PROPOSED RESEARCH:
A. OUSRP: [Specify]
[Signature]

Date: 3/2/99

** Principal Investigator must submit a proposal to the appropriate Human Subjects Review Committee.

IMPORTANT NOTICE TO INVESTIGATORS: Exempting an activity from review DOES NOT relieve the investigators of the activity from ensuring that the welfare of human subjects in the activity is protected and that methods used, and information provided, to gain subject consent are appropriate to the subject.**
APPENDIX E

LISTING OF ITEM ABBREVIATIONS USED IN TO ENTER DATA
Listing of Variable Abbreviations

**Behavioral Dependent Variables**
prmpe = pretest moderate physical exercise  
ptmpe = posttest moderate physical exercise  
prvpe = pretest vigorous physical exercise  
ptvpe = posttest vigorous physical exercise

**Social Cognitive Theory Dependent Variables**
prscsm1 = pretest self-control self-monitoring first item  
ptscsm1 = posttest self-control self-monitoring first item  
prscsm2 = pretest self-control self-monitoring second item  
ptscsm2 = posttest self-control self-monitoring second item  
prscsm3 = pretest self-control self-monitoring third item  
ptscsm3 = posttest self-control self-monitoring third item  
prscsm4 = pretest self-control self-monitoring fourth item  
ptscsm4 = posttest self-control self-monitoring fourth item  
prscsm5 = pretest self-control self-monitoring fifth item  
ptscsm5 = posttest self-control self-monitoring fifth item  
prscsm6 = pretest self-control self-monitoring sixth item  
ptscsm6 = posttest self-control self-monitoring sixth item  
prscsm7 = pretest self-control self-monitoring seventh item  
ptscsm7 = posttest self-control self-monitoring seventh item

prscgs1 = pretest self-control goal setting first item  
ptscgs1 = posttest self-control goal setting first item  
prscgs2 = pretest self-control goal setting second item  
ptscgs2 = posttest self-control goal setting second item  
prscgs3 = pretest self-control goal setting third item  
ptscgs3 = posttest self-control goal setting third item  
prscgs4 = pretest self-control goal setting fourth item  
ptscgs4 = posttest self-control goal setting fourth item  
prscgs5 = pretest self-control goal setting fifth item  
ptscgs5 = posttest self-control goal setting fifth item  
prscgs6 = pretest self-control goal setting sixth item  
ptscgs6 = posttest self-control goal setting sixth item  
prscgs7 = pretest self-control goal setting seventh item  
ptscgs7 = posttest self-control goal setting seventh item

prscss1 = pretest self-control social support first item  
ptscss1 = posttest self-control social support first item  
prscss2 = pretest self-control social support second item  
ptscss2 = posttest self-control social support second item
Social Cognitive Theory Dependent Variables Continued

\[
\begin{align*}
\text{prscss3} &= \text{pretest self-control social support third item} \\
\text{ptscss3} &= \text{posttest self-control social support third item} \\
\text{prscss4} &= \text{pretest self-control social support fourth item} \\
\text{ptscss4} &= \text{posttest self-control social support fourth item} \\
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\text{ptscss5} &= \text{posttest self-control social support fifth item} \\
\text{prscss6} &= \text{pretest self-control social support sixth item} \\
\text{ptscss6} &= \text{posttest self-control social support sixth item} \\
\text{prscss7} &= \text{pretest self-control social support seventh item} \\
\text{ptscss7} &= \text{posttest self-control social support seventh item} \\
\text{prscss8} &= \text{pretest self-control social support eighth item} \\
\text{ptscss8} &= \text{posttest self-control social support eighth item} \\
\text{prscss9} &= \text{pretest self-control social support ninth item} \\
\text{ptscss9} &= \text{posttest self-control social support ninth item} \\
\text{prscss10} &= \text{pretest self-control social support tenth item} \\
\text{ptscss10} &= \text{posttest self-control social support tenth item} \\
\text{prscss11} &= \text{pretest self-control social support eleventh item} \\
\text{ptscss11} &= \text{posttest self-control social support eleventh item} \\
\text{prscss12} &= \text{pretest self-control social support twelfth item} \\
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\end{align*}
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\begin{align*}
\text{prscr1} &= \text{pretest self-control rewards first item} \\
\text{ptscr1} &= \text{posttest self-control rewards first item} \\
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\text{prscr4} &= \text{pretest self-control rewards fourth item} \\
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\[
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\text{prscob1} &= \text{pretest self-control overcoming barriers first item} \\
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\end{align*}
\]

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Social Cognitive Theory Dependent Variables Continued

ptscob5 = posttest self-control overcoming barriers fifth item
prscob6 = pretest self-control overcoming barriers sixth item
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prscsmt = pretest self-control self-monitoring total
ptcsmt = posttest self-control self-monitoring total

prscgst = pretest self-control goal setting total
ptcgsst = posttest self-control goal setting total

prscsst = pretest self-control social support total
ptcssst = posttest self-control social support total

prscrt = pretest self-control rewards total
ptcrt = posttest self-control rewards total

prscobt = pretest self-control overcoming barriers total
ptscobt = posttest self-control overcoming barriers total

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ptscct = posttest self-control total

proer1 = pretest outcome expectations relaxation first item
ptoer1 = posttest outcome expectations relaxation first item
proer2 = pretest outcome expectations relaxation second item
ptoer2 = posttest outcome expectations relaxation second item
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ptoer3 = posttest outcome expectations relaxation third item
proer4 = pretest outcome expectations relaxation fourth item
ptoer4 = posttest outcome expectations relaxation fourth item
proer5 = pretest outcome expectations relaxation fifth item
ptoer5 = posttest outcome expectations relaxation fifth item

proef1 = pretest outcome expectations fitness first item
ptoef1 = posttest outcome expectations fitness first item
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ptoef2 = posttest outcome expectations fitness second item
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ptoef3 = posttest outcome expectations fitness third item
proef4 = pretest outcome expectations fitness fourth item
ptoef4 = posttest outcome expectations fitness fourth item
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ptoef5 = posttest outcome expectations fitness fifth item
Social Cognitive Theory Dependent Variables Continued

proebm1 = pretest outcome expectations beautiful movement first item
ptoebm1 = posttest outcome expectations beautiful movement first item
proebm2 = pretest outcome expectations beautiful movement second item
ptoebm2 = posttest outcome expectations beautiful movement second item
proebm3 = pretest outcome expectations beautiful movement third item
ptoebm3 = posttest outcome expectations beautiful movement third item
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ptoebm4 = posttest outcome expectations beautiful movement fourth item
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ptoebm5 = posttest outcome expectation beautiful movement fifth item

proet1 = pretest outcome expectations thrills first item
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ptoet3 = posttest outcome expectations thrills third item
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ptoet4 = posttest outcome expectations thrills fourth item
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ptoet5 = posttest outcome expectations thrills fifth item

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proescl = pretest outcome expectation social continuation first item
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Social Cognitive Theory Dependent Variables Continued

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toestg5 = posttest outcome expectation social growth fifth item

proert = pretest outcome expectation relaxation total
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ptoesc = posttest outcome expectation social continuation total

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ptoestg = posttest outcome expectation social growth total

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ptoet = posttest outcome expectations total

prss1 = pretest social situation first item
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prss3 = pretest social situation third item
ptss3 = posttest social situation third item
prss4 = pretest social situation fourth item
ptss4 = posttest social situation fourth item
prss5 = pretest social situation fifth item
ptss5 = posttest social situation fifth item
Social Cognitive Theory Dependent Variables Continued

ptss5 = posttest social situation fifth item
prss6 = pretest social situation sixth item
ptss6 = posttest social situation sixth item
prss7 = pretest social situation seventh item
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prsst = pretest social situation total
ptsst = posttest social situation total

prsse1 = pretest strength of self-efficacy first item
ptsse1 = posttest strength of self-efficacy first item
prsse2 = pretest strength of self-efficacy second item
ptsse2 = posttest strength of self-efficacy second item
prsse3 = pretest strength of self-efficacy third item
ptsse3 = posttest strength of self-efficacy third item
prsse4 = pretest strength of self-efficacy fourth item
ptsse4 = posttest strength of self-efficacy fourth item

prses5 = pretest strength of self-efficacy total
ptsset = posttest strength of self-efficacy total
LIST OF REFERENCES


