CONSTRUCT VALIDATION OF A PHYSICAL ACTIVITY INTERVENTION TO INCREASE SELF-REGULATION FOR PHYSICAL ACTIVITY IN ADOLESCENTS

THESIS

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By

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ABSTRACT

Physical activity rates have been shown to decline over the lifespan. In an attempt to combat this decline, researchers have been completing several types of studies in order to understand why this trend has been occurring. Descriptive studies attempt to understand more about the determinants of physical activity. The results of these studies have shown only weak to moderate correlations with physical activity. Intervention studies have also been completed to try to change behavior – many of which claim to use theory-based interventions. Although these studies may produce modestly successful results immediately post-intervention, long-term success has not been reported. Since many intervention studies claim to be theory-based but do not measure theoretical constructs, it is difficult to determine if the short-term change in behavior is due to the intervention or some other factor. It seems that an intermediate step between descriptive studies and intervention studies is lacking. Therefore, the purpose of this study is to complete a construct validation of a physical activity intervention on the subjects' knowledge and use of 8 self-regulation strategies: self-monitoring for PA, goal setting for PA, social support for PA, environmental aid for PA, self-reinforcement for PA, time-management for PA, self-efficacy for PA, and tailoring for PA.

Using a one group pre-test post-test design, a physical education instructor delivered A 5-week intervention during physical education to all sixth (n=20), seventh (n=28) and eighth (n=24) graders at a private school in Pittsburgh, Pennsylvania. Seventeen lessons were developed in an attempt to change the students' knowledge and use of self-regulation for physical activity strategies. Eight subscales were measured and provided the basis for the 17 lessons: self-monitoring for physical activity, goal setting for physical activity, social support for physical activity, environmental aid for physical activity, self-reinforcement for physical activity, time-management for physical activity, self-efficacy for physical activity, and tailoring for physical activity. A knowledge test, based on the lessons, was constructed to measure acquired knowledge at the end of the intervention. This test was given to the seventh and eighth graders during the last class session. The self-control for physical activity instrument was administered during the first and last class sessions. A dependant t-test was used to assess change in self-regulation scores on each of the eight subscales.

Using a dependent t-test for each subscale on the self-control instrument, seven of the subscales as well as global self regulation for physical activity were found to be significantly changed from pre-test to post-test ($p<..006$). The tailoring subscale was not significantly changed from pre-test to post-test. Of students that completed the knowledge test, the mean score was 17.5 out of 22 points. This was considered sufficient to conclude that the students did acquire some knowledge regarding the targeted constructs during the intervention.

Since the study was completed in a school setting, there was no opportunity for random selection or assignment. Also, since the school was a small private school, there was no opportunity for use of a comparison group. Even with these limitations, this study still has its place in the literature. The study was completed in response to a paucity of studies looking to investigate the affect of an intervention on mediating variables. If this intervention is further developed and used in a behavior change intervention, it may help provide evidence that the behavior changed in response to the treatment. This intermediate step is a logical progression in moving from descriptive to intervention research.

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Chapter 1 Overview

This chapter will include two sections. The first section will discuss the public health significance of physical activity and will summarize the literature on the rates of physical activity, the tracking of physical activity over the lifespan, and interventions aimed at promoting physical activity in schools. The second section will describe Social Cognitive Theory and its use in this study.

In the past few decades, there has been a general increase in sedentary behaviors such as television viewing and videogame playing, accompanying a decrease in physical activity rates.(Bar-Or et al., 1998; Bradley, 2000; Gordon-Larsen, 1999; McMurray et al., 2000) As the population ages, physical activity rates have been shown to decline over the lifespan and rates of inactivity have been shown to increase.(Caspersen, 2000)

Public Health Significance of Physical Activity

Lack of physical activity has been identified by the Centers for Disease Control as a risk factor for heart disease, diabetes, and colon cancer, as well as a contributor to high blood pressure, obesity, osteoporosis, and muscle and joint disorders.(CDC, 1999) Cardiovascular diseases accounted for almost half of deaths in the United States in 1996, and cost the United States 286 billion dollars in health care costs and lost wages in 1999.(CDC, 1999) Of total cardiovascular diseases,

almost half of the deaths are due to coronary heart disease. Ohio ranked eighth in all states in 1999 for deaths due to coronary heart disease. Diabetes is also a costly disease. About 16 million Americans have the disease, and it costs the United States about 98 billion dollars each year in medical costs and lost wages. To emphasize the importance of physical activity in the prevention of these major diseases, Grundy (1999) reports that the "direct costs" of a lack of leisure-time physical activity are about 24 billion dollars.(Grundy, 1999) This equates to about 2.4% of health care expenditures in the United States. Since almost 30% of U.S. adults are sedentary, there is an opportunity to change these figures.

Adolescent participation in physical activity is much greater than adult participation. The Youth Risk Behavior Survey in 1999 reported that about 64% of adolescents were regularly vigorously physically active. This number is inclusive of all ages, races, and genders. Rates of vigorous activity among females and adolescents that are African American or Hispanic American typically have lower rates of vigorous activity than those of white male adolescents.(Kann et al., 1998; Kann, 2000; Pratt, 1999) In 1997, a study conducted by Pratt et al. showed that white males had the highest rates of activity (73.4%) followed by Hispanic males (69.2%), black males (67.1%), white females (58.4%), Hispanic females (49.9%), and black females (41.3%)(Pratt, 1999). What the above information does not include is the dramatic decrease in physical activity from early to late adolescence.(Pratt, 1999) Combining all students, the rates of vigorous activity dropped from about 73% to about 58%. In a cross-sectional study, Caspersen et al. (2000) found that regular, sustained vigorous physical activity decreased from 76% to 42% in males from 14

years to 21 years of age. In females, 66% of 12 year olds engaged in vigorous activity, where only 28% of 20 year olds were regularly vigorously active. Caspersen et al. also found that physical activity behaviors decreased as the adolescent aged from 14 to 20, and levels of leisure-time inactivity increased. In defining leisure-time physical activity as "no participation in physical activity", Caspersen found that from 14 to 20 years of age, levels of inactivity increased from 6% to 24%.

One limitation of the studies cited above is the variation in measurement of physical activity. In the Youth Risk Behavior survey, vigorous physical activity was measured using a question asking if the student engaged in physical activity that made them sweat and breath hard for at least 20 minutes, three or more times in the last seven days. Moderate activity was assessed by asking if the student had participated in physical activity that did not make them sweat or breathe hard for thirty or more minutes, five or more times in the last seven days.(Pratt, 1999) Both of these questions are vague, which may lead students to over report their activity. Both of these questions are included on a longer instrument with questions regarding a host of different health issues – they may misunderstand and answer what they normally do instead of what they actually did in the past week. Evidence of a misunderstanding in interpretation can be seen in the results comparing 1990 data to 1999 data. Between these surveys, the question wording had changed. The 1990 version of the instrument assessed frequency of participation in vigorous activity by asking how many of the past 14 days preceding the study that the students had engaged in 20 minutes of hard exercise that made them breathe hard and made their heart beat fast. Only 37% engaged in vigorous activity three or more times per

week.(1992) It is unlikely that levels of vigorous activity increased two fold in a span of 10 years. No validation of either version of the physical activity questions is available. Self-report measures are widely used in population-based studies because of their low cost and ease of administration. The drawback to these measures is their questionable validity and reliability. As pointed out in an article concerning validity and reliability issues regarding physical activity surveillance, Washburn et al. (2000) argue that "moderately reliable instruments of physical activity could lead to large numbers of misclassifications of individuals into various health-related categories of physical activity behavior" (p. 111).

Tracking of Physical Activity

There is evidence that both physical activity and inactivity levels may track from adolescence to adulthood in the United States. What this means, in a simplified version, is that those that are active as adolescents tend to remain active as adults. Adolescents that are inactive tend to remain inactive as adults. Unfortunately, since few studies have attempted to track behaviors longitudinally in the United States, the evidence is inconsistent.

Kelder et al. reported results of the Class of 1989 study, a longitudinal study of 6th through 12th grade students. The measurement of physical activity in this study was a self-reported number of hours per week that subjects participated in regular physical activity. The total number of hours per week was then grouped into four categories: less than one, 2-3, 4-5, 6+. In girls, Kelder et al. (1994) showed that the highly active girls (6+ hours per week) tended to stay more active than the inactive

girls (less than one hour per week).(Kelder, 1993) There was, however, a steep decrease in hours per week of physical activity among all groups. From a graph showing tracking of hours per week (with no clear label on the Y axis) it appears that the highly active girls in both the reference and intervention communities reported decreased levels of activity at year 6 that are similar to the initial activity levels of the inactive girls. Since there is no clear label on the Y-axis, it is unclear if this is the case.

In the CARDIA study, Anderssen et al. (1996) collected initial and seven year follow-up data on young adults.(Anderssen et al., 1996) Physical activity was considered the sum of moderate and vigorous activities reported for one year. Moderate activities included walking, bowling, golf, chores, and nonstrenuous sports. Vigorous activity included racket sports, biking, jogging, weight lifting, vigorous job activities, and strenuous sports. The equation used to calculate physical activity involved the frequency and intensity of each activity. The researchers found that young adult subjects (ages 18-30 at baseline) tended to remain close to their initial level of activity as they progressed through the seven-year period. The method of measuring physical activity for this study was slightly different than others typically used in studies regarding physical activity. First, the physical activity measure consisted of total physical activity. In this measure, sports, work-related physical activity, and activities such as bowling were included. Although work-related physical activity is important, there is little that researchers can do to change the amount of physical activity being completed as part of a job. They can, however, try to modify leisure-time physical activity. For this reason, other instruments that have

been used in the past do not include work-related physical activity. Their examples of moderate and vigorous activity were also a bit unique. Typically, bowling does not meet the requirements for moderate activity, since there is more sedentary behavior than activity occurring during a typical game. Also, weight lifting was considered a vigorous activity in this study. Generally, weight training has been considered moderate in intensity.

In the Muscatine study, Janz et al. (2000) followed 126 students (mean age of 10 at baseline) for five years.(Janz, 2000) Physical activity was measured using a three-day sweat recall every three months. In this instrument, students are asked to report how many episodes in the past 3 days that they sweat and breathed hard for at least 20 minutes. They also employed a previous day recall of minutes spent watching television or playing videogames every three months. The researchers found that inactivity tended to track in boys but not in girls. The Spearman correlation coefficients comparing the three-day sweat recall values from year five and preceding years decreased over time in both boys (.52 - .32) and girls (.65 - .43) Since only a small number of tracking studies have been completed in the United States, there is a desperate need for more longitudinal data in this area before the research community can fully understand the strength of the relationship between initial levels of physical activity and levels at five, ten, or fifteen years in the future.

Intervention Studies

School-based interventions to increase physical activity typically have been large-scale, multidisciplinary approaches to change behavior. The CATCH program

resulted in statistically significant differences in self-reported moderate to vigorous physical activity (MVPA) as well as MET weighted physical activity in the intervention groups as compared to the control group.(McKenzie, 1996) The SPARK program compared control, teacher, and physical education specialist groups in the promotion of physical activity in physical education.(McKenzie, 1997) An observational method was used to assess the time spent in moderate to vigorous physical activity in physical education. At post-test, the physical education specialist group spent significantly more time in MVPA than the other groups. At a second follow-up, the trained teacher group spent significantly more time in MVPA than the other groups. In the CHIC study, Harrell et al. (1996) found no significant differences in the physical activity scores of the classroom-based, risk-based, or control group. Although the Go for Health program did show statistically significant differences in time spent in MVPA during physical education, they reported that at post-test, students spent 10-16 minutes in MVPA.(Simmons-Morton, 1991) This range does not even meet the guidelines set by the American College of Sports Medicine regarding physical activity.

Of the interventions summarized above, many have differing measures of physical activity. Some studies use self-report data, where others use observational, converted scores, or physiological data to measure physical activity. Furthermore, some of the studies measured total physical activity, where others measured time in MVPA in physical education. If the concept behind physical education in to promote adherence, then it is necessary to focus on different types of physical activity. Studies

are needed that look similarities and differences of participation in physical education, organized sports, and leisure-time physical activity.

Purpose

The purpose of the study is to complete a construct validation of a five-week school-based intervention during physical education for sixth, seventh, and eighth graders in a private school to increase scores on the eight subscales of the self-regulation instrument: self-monitoring for physical activity, goal setting for physical activity, social support for physical activity, environmental aid for physical activity, self-reinforcement for physical activity, time-management for physical activity, Self-efficacy for physical activity, and tailoring for physical activity.

Chapter 2

This chapter will be divided into three main sections. The first section will describe current rates of physical activity in adolescents. The second section will discuss determinants of physical activity in adolescents. The last section will review theory-based interventions aimed at increasing physical activity in adolescents.

Rates of Physical Activity

In the United States, it has been well documented that rates of physical activity drop precipitously from adolescence through adulthood.(Brady, 1998; Caspersen, 2000; Kann, 2000; Pratt, 1999) Most of this data has come from the Youth Risk Behavior Survey (YRBS). The YRBS is a system that was set-up by the Centers for Disease Control in 1990, in which they attempt to monitor health-risk behaviors among youth in grades 9-12. Participation in physical activity is a component of the YRBS, where questions regarding vigorous and moderate exercise are included. In the first years of the YRBS, frequency of participation in vigorous activity was assessed by asking how many of the past 14 days preceding the study that the students had engaged in 20 minutes of hard exercise that made them breathe hard and made their heart beat fast. According to the Morbidity and Mortality Weekly report, only 37% of all students were vigorously active three or more days per week.(MMWR, 1992) In 1999, however, the question wording changed. In order to assess vigorous physical activity in 1999, the section contains a question asking if the student engaged in physical activity that made them sweat and breath hard for at least 20 minutes, three or more times in the last seven days. Rates of vigorous

activity increased dramatically to 64% in 1999, which most likely was not indicative of an increase in physical activity. Moderate activity was assessed by asking if the student had participated in physical activity that did not make them sweat or breathe hard for thirty or more minutes, five or more times in the last seven days.(Pratt, 1999) Reliability of these questions has been established, but no attempt has been made to validate the instrument. Although overall rates of participation in vigorous physical activity among youth have remained relatively stable at approximately 64%, there has been a consistent drop in vigorous physical activity from ninth to twelfth grades. Looking at both males and females of all races, 72.7% of students are vigorously active in ninth grade, where 57.5% are active in twelfth grade.(MMWR, 1992; Pratt, 1999) Results of the YRBS over the past decade have also shown that males are more likely to participate in vigorous activity than females, and that white students are more likely to participate in vigorous activity than black or Hispanic students.(Kann et al., 1998; Kann, 2000; Pratt, 1999)

Inactivity has also been studied to discover the link between inactivity and physical activity. Typically, the number of hours of television viewing or videogame playing per day has been used as a measure of inactivity. In the National Health and Nutrition Examination III (NHANES III), students were asked to recall how many hours of television they watched the previous day. In the YRBS, a question asks if the student watches television less than or equal to 2 hours per day in a normal school day. In the National Health and Nutrition Examination III, 26% of students watched television 4 or more hours per day, with black students (43% of both genders) reporting this behavior more than white (15% females, 24% males) or Mexican (28%

females, 33% males) students.(Andersen, 1998) However, in the YRBS in 1999, 57.2% watched equal or less than 2 hours per day. Kann et al. found that television viewing increased from grade nine through grade twelve in both males and females.(Kann, 2000)

Andersen et al looked at the NHANES III to examine vigorous physical activity and television viewing rates, to see if they were related to body weight and body fatness.(Andersen, 1998) The NHANES III was conducted via interview in the student's home, and included 4056 students ages 8-16. During the interview, a question asking how many days per week the children "played or exercised enough to make them sweat or breathe hard" (p. 939). This measure of physical activity included physical education as part of the child's physical activity for the day. Of the 4056 students, 80% reported engaging in vigorous exercise 3 or more times per week. There were variations by gender, with boys of all races exercising more than girls of similar race. White students reported more vigorous activity than black or Hispanic students.

Caspersen et al. (2000) examined the gender and age related changes in physical activity patterns. Data was obtained from 10,645 students ages 12-21 who were involved in the 1992 National Health Interview Survey - Youth Risk Behavior Survey (NHIS-YRBS). The researchers also looked at data from 43,732 respondents of the National Health Interview Survey Health Promotion/Disease Prevention (NHIS-HPDP), all of whom were over 18 years of age. Researchers looked at five activity categories, using the Healthy People 2000 objectives as a basis. The first category was no leisure time physical activity (inactivity). The second category was

regular sustained light to moderate physical activity, including walking or biking at least five days per week, for at least 30 minutes per bout. The third category was regular, vigorous physical activity that consisted of running, jogging, or swimming at least three days per week for at least 20 minutes, at 50% of their maximal capacity. The fourth and fifth categories dealt with strength training and stretching, both of which only had to occur one or more times per week. The specific exercises named in the above definitions were not included on the NHIS-HDPD. This instrument was administered in an interview format where subjects gave the frequency and duration of their participation in 19 common activities. Subjects were also permitted to list two other activities that they had engaged in. In the cohort of adolescents, inactivity was shown to increase from age 14 (6%) to age 20 (24%). Vigorous activity decreased 29% in males and 36% in females ages 12-21. Regular vigorous activity peaked at age 14 for males, where 76% reported engaging in this type of activity. For females, the peak occurred at age 12, where 66% reported being vigorously active. Moderate exercise also declined from ages 12 – 17 in both males and females, where males decreased 16%, and females decreased by 10%. In looking at their results, the authors concluded that interventions aimed at students ages 15-18 are sorely needed.

Simmons-Morton et al (1990) conducted a study to assess the type and frequency of participation in moderate and vigorous physical activity among third and fourth grade children. Their sample consisted of 812 complete data sets from children in four Texas City schools. Of the initial 870 students, 60% were Anglo-American, 20% were Mexican American, 15% were Black American, and 2% were either Asian American or American Indian. A self-report measure, modified from

Baranowski et al. (1984) was used to assess physical activity. Students were given ten activity categories with pictures and were asked how often they participated in these activities that day. Two time categories were assessed, one being before or after school, and the other being during school. Students responded by picking one of three choices: none, less than ten minutes, and more than ten minutes for each time period. These questionnaires were administered on five consecutive days; the first day's data was used only as a familiarization tool, and was not used in the data analysis. Validity was assessed by checking the level of agreement of the reported activity against direct observation of the behavior. A sample of students from this study was observed, and the observations had an 86.3% level of agreement with the self-report data. A repeated measures ANOVA was used to detect if there were differences in reported activities lasting 10 or less minutes and activities lasting 10 or more minutes. The effects of grade and gender between subjects were analyzed, as well as effects of the two time periods within subjects. Both boys and girls were more likely to engage in activities longer than 10 minutes either before or after school as compared with during school. Twelve percent of boys, and 13% of girls reported zero bouts of moderate or vigorous activity over ten minutes. Only 47% of students reported one or more bout of physical activity over ten minutes. There was a significant interaction between gender and grade, as older boys tended to participate less in activities over 10 minutes. Although the researchers used ten minutes as a cut-off because they wanted to distinguish recess from other physical activity, they categorized their data instead of leaving it continuous. It may have been more beneficial if they had reported actual lengths of bouts, or total number of minutes per

day. However, it may be that third and fourth graders do not have a realistic concept of time to recall actual time spent participating in physical activity.

Savage and Scott looked to investigate the level, frequency, and type of physical activity in three rural Mid-western communities. They sampled 822 students in seventh, eighth, and ninth grades, where 229 of these students were males, and 593 were females. This disparity in gender of the sample is representative of the disparity in gender in the schools. Ninety three percent of the sample was Caucasian, 2% were African American, 1.5% were Hispanic, and 3% were Native American. The Personal Wellness Profile, a 20-item questionnaire was administered to the students. Physical activity was assessed in several ways. Frequency was assessed with a single question, and answers were then categorized and coded into three categories: sedentary (0-2 days per week), active (3 days per week), and very active (four +). Students were also asked to list their preferred activities in an open-ended question. Last they were asked if they "engaged in any regular activity long enough to work-up a sweat" (p. 250).(Savage & Scott, 1998) The researchers reported that males were more likely to exercise, including stretching and strength training, than females. The researchers reported that 94% of students participated in activity at least 1 day per week. However, since they separated the data into three categories, one would think that this data should have been reported in one of the three categories that they created. The authors did not report how many students exercised three or more days per week. The other statistical analysis also did not have numerical values reported – only significance levels were reported. With a sample this large, it is necessary for the reader to know the actual values to assess the practical significance of the results.

In a study of college students, Lowry et al. used a 2-stage cluster design to first select 2 and 4 year colleges, and second, to randomly select students from these institutions. A total of 7,442 students were sampled. To measure physical activity, three questions were included on the questionnaire. The first question asked how many days of the past seven the students participated in exercise or sports that made them "sweat or breathe hard, such as basketball, jogging, swimming laps, tennis, fast bicycling, or similar aerobic activities" (p. 20)(Lowry, 2000). The second question asked how many days in the past seven that the student participated in strength training. Moderate activity was assessed in the last question, where students were asked how many days of the past seven that they walked or bicycled for at least 30 minutes. Duration was not included in the questions. In all of the undergraduates combined, only 37.6% reported participating in physical activity three or more days per week. About 30% reported engaging in strength training three or more days per week, and about 20% reported walking or biking five or more days per week. The results also showed that males were more likely to engage in physical activity than females. These low percentages show the continued decline in physical activity through adolescence.

Garcia et al. completed a longitudinal study to investigate the gender specific changes in physical activity behaviors and beliefs. During the 1992 school year, the investigators took a cohort of 132 youth from 5^{th}, 6^{th}, and 8^{th} grades from a larger cross-sectional study. Their primary focus was on the transition from elementary through junior high school. Physical activity was assessed using a Child/Adolescent Activity Log (CAAL), which collected activity data for seven days. Students

completed the log for the prior day on Tuesday through Friday, and on Monday for Friday, Saturday, and Sunday. The test-retest reliability of this instrument was .94. The results showed no significant changes in physical activity from 6th to 7th grades. The researchers point out that students were exposed to more physical education in seventh and eighth grades than they were in sixth, which may have caused the elevated activity levels in these grades.

Taylor et al. (1999) used a retrospective design to see if physical activity in childhood and adolescence had an effect on adult physical activity.(Taylor, 1999) Male volunteers from the Cooper Clinic, mean age 45 ± 7.5 served as the subjects for the study. Preteen and teenage physical activity was assessed by asking the subjects to recall their frequency (none, infrequently, frequently) of participation in physical education, youth sport, and informal activities. Since the physical activity data was categorized, it is hard to make comparisons to other studies. The authors did find that youth physical activity was weakly correlated to adult physical activity.

Summary

Even in large, population-based studies, there are discrepancies in rates of physical activity. Although there may be several contributing factors, it is likely that physical activity measurement is to blame. There is the inherent problem with self-report measures. In a review of population-based measures of physical activity, Washburn et al. (2000) concluded that population measures, however useful, still have inherent problems. With an instrument that is "moderately reliable, instruments of physical activity could lead to large numbers of misclassification" of subjects (p.

111).(Washburn, 2000) Washburn suggests that self-report questionnaires used in these population-based studies would have improved reliability and validity if further attempts to validate the questionnaires are conducted. He suggests that fitness measures as well as activity diaries may be one way to accomplish this. In the YRBS, there is an immense disparity in the rates of physical activity from 1990-1999. It is highly unlikely that physical activity rates among high school students increased from 37% to 64% in nine years. Instead, it may be the change in question wording that is to blame. In another population-based study, the NHANES, it was reported that 80% of students aged 8-16 exercised vigorously 3 or more days per week. Again, questions of the validity and reliability of the measure of rates of physical activity arise. What is generally supported in the literature is that physical activity decreases from youth to adolescence to young adulthood.

Longitudinal Changes

Kimm et al. (2000) looked to develop two self-report measures of physical activity, and validate both against each other as well as against the Caltrac accelerometer. (Kimm, 1999) A secondary purpose of the study was to examine longitudinal changes in physical activity of a biracial cohort. A cohort of 2322 adolescent girls (51% black, 49% white) was followed for 10 years in California, Ohio, and Washington. The two self-report measures used to assess physical activity were a Habitual Activity Questionnaire (HAQ), and an activity diary. The HAQ was assessed via interview in years 1, 3, 5, and was self-reported in years 7-10. Subjects were asked about the type and frequency of physical activity outside of school in the

past year. The answers were then converted to METS, and weekly scores were summed. The activity diary was given on two consecutive weekdays, and one weekend day in years 1-5, 7, 8, and 10. Summary scores were also converted to METS. The Caltrac accelerometer was worn for three days (concurrent with the activity diary) in years 3, 4, and 5. The study showed a decrease in both races from years 1-10 of the study. Daily physical activity decreased 35% from ages 9-10 to 18-19, and habitual activity decreased 83% in the same span. The steepest decrease in physical activity occurred during years 5-7 in the Habitual physical activity questionnaire, which was approximately the time that the girls transitioned from elementary to junior high school. In year seven, 35% of the total sample reported no habitual physical activity, as compared to year 5, when 1.7% reported no physical activity. This dramatic decrease in physical activity is relatively consistent with existing literature.

Bradley et al (2000) examined the change in activity levels of subjects from childhood to adolescence.(Bradley, 2000) The sample consisted of 656 subjects, who were taken from the control group from the CHIC study. The sample was half male, half female, with 83.4% being Caucasian, 20.6% being African American, and 6% being of other ethnicities. Students were asked to recall the three things that they engaged in most; this included both physical activities and sedentary activities. MET levels were assigned to the recalled activities to create sedentary and active categories. If students reported two or three activities that were at a MET level of two or three, they were considered sedentary. If they reported two or three activities at a MET level of 5 or 8, they were considered active. Boys, at all grade levels,

reported more vigorous activities than their female counterparts. The most alarming statistic reported was that 77% of African American females were classified as sedentary. The overall rate of sedentary behavior was 43%. The rate of sedentary behavior increased from grades three and four to grades nine and ten in both genders. Caution should be used in both the interpretation of these data and the comparison of these data with other studies. The method of categorizing students into activity categories is a less vigorous method than others used in the literature.

In sampling the second wave (n=13,157) of the National Longitudinal Study of Adolescent Health, Gordon-Larsen et al. (1999) wished to see if there was an ethnic difference in physical activity across age groups.(Gordon-Larsen, 1999) The questionnaire used in the study assessed physical activity by asking students to recall how many times per week they engaged in physical activity. The activities were then assigned MET values. Students reporting activities that were five to eight METS were considered active. Inactivity was also measured using a seven-day recall of television or video viewing as well as video or computer game playing. These activities were assigned one MET. Black males and females reported more inactivity than the other ethnic groups. The number of students that reported five or more days per week of vigorous activity decreased dramatically in both genders from ages 12-15 to ages 18-22; from 52.6% to 25.9% in males, and from 35% to 11.9% in females. About one-third of the sample did not exercise three times per week. The number of students that reported 0-2 days per week more than doubled from the 12-15 cohort to the 18-22 cohort. Males of all ethnicities reported similar bouts of physical activity (greater than or equal to 5 days per week). White females reported more physical

activity (27.6%) than black (17.1%), Hispanic (19.5%) and Asian (14.3%) females. Although this study is another way to study longitudinal changes, it would be preferable to follow a single cohort over a period of time to try to discover what happens to physical activity behaviors of the cohort over time.

Janz et al (2000) reported five-year changes in sedentary and vigorous activity in 61 boys and 62 girls.(Janz, 2000) Every three months sedentary and physical activity measures were taken. Vigorous physical activity was assessed using a three-day sweat recall, which asked students to recall the number of episodes that they sweat or breathed hard in the last three days for at least 20 minutes. The authors showed that inactivity tracked in males while physical activity tracked in females. Students reported increasing levels of physical activity from years one through five. Both boys and girls increased the number of episodes from baseline to 5-year follow-up. Sedentary behavior also showed a decrease from year one through five. This study shows conflicting results with the rest of the literature. Other tracking studies show that physical activity decreases over the lifespan, especially in this life-stage.

Anderssen et al (1996) investigated the longitudinal changes in physical activity of young adults over seven years.(Anderssen et al., 1996) At baseline, the sample included 2,328 men and 2,787 women (52% black) from Alabama, Illinois, Minnesota, and California. The fourth follow-up at seven years had a promising retention of subjects, with 80.6% completing the study. Physical activity was assessed using the CARDIA physical activity history, which included thirteen types of activities. Vigorous activity included jogging, racket sports, biking, swimming, vigorous exercise/dance, weight lifting, vigorous job activities, and other strenuous

sports. Moderate physical activity included activities such as non-strenuous sports, walks/hikes, bowling/golf, home exercise, and home maintenance. Students were asked to recall performing at least one hour during any one month of the last year. The number of months and level of activity were used to calculate a physical activity score. To meet the recommendations of the ACSM, students had to report six months of regular activity in the past 12. In this study, physical activity level tended to track from year one to year seven. Overall, physical activities decreased 27% in black men, 32% in black women, 22% in white men, and 33% in white women. The results from the study showed that black men had the highest levels of activity as compared to white males, white females, and black females. A limitation of the measurement of physical activity was that the researchers included weight lifting as vigorous activity, and had other ambiguous categories such as "other strenuous sports" and "home exercise". The researchers also included bowling as a moderate activity. It is questionable as to whether or not this activity should be included as an activity.

Kelder et al (1994) investigated changes in physical activity during childhood and adolescence in a cohort of sixth through twelfth graders (n=2376) from the Minnesota Heart Health Program.(Kelder, Perry, Klepp, & Lytle, 1994) Self-report physical activity was recorded as hours per week. Researchers then divided these frequencies into categories (less than one, 2-3, 4-5, and 6+). A physical activity score was calculated using the frequency and intensity of regular physical activity. Females and males showed a general decrease in their physical activity behaviors from seventh to twelfth grades. In females, physical activity and inactivity both tended to track, in

that those that were initially inactive remained relatively inactive, and those that were highly active, remained relatively highly active.

Summary

Although the Janz et al. study showed an increase in physical activity over time, it is generally accepted that physical activity decreases over time. Differential measurement issues may be to blame for the disparity. To date, there is no one standard instrument to assess physical activity. Studies are continually being completed to try to find a measure of physical activity that is superior to all others, but the "gold standard" has yet to be discovered. Looking at rates of physical activity over the lifespan, it is clear that something needs to be done to deter the continual increase in inactivity and concurrent decrease in physical activity.

Determinants

This review of literature was conducted using medline, psychinfo, and ERIC. Articles published after 1985 were reviewed and considered for this review. The term determinant, for the purpose of this paper, is defined as a factor that may influence participation in physical activity. Studies that did not include theory-based determinants were excluded from the review.

Sallis et al. (1992) reviewed the literature on determinants of physical activity in youth, as well as interventions aimed at this group.(Sallis, 1992) They found that achievement motivation, stress tolerance, social adequacy, movement satisfaction, self-confidence, and independence all had little or no correlation with physical activity. Attitudes toward physical activity had weak to moderate correlations. The determinants that were strongly associated with physical activity were self-efficacy and intentions involving exercise. This review grouped both children and adolescents together under one heading entitled "youth". It may be more beneficial to keep children and adolescents separate, since psychosocial development is quite different in these two groups.

Reynolds et al (1990) looked at the determinants of physical activity in adolescents. (Reynolds et al., 1990) A convenience sample was taken from 2 northern California high schools. The sample consisted of tenth graders, of which 388 were male and 355 were female. There was a problem with attrition, as 16-month measures included only 233 males and 141 females. Self-administered and physical measures were taken at baseline, 4 months, and 16 months. Physical activity and psychosocial measures were self-reported on a Likert scale. Physical activity was

measured by having students report their participation in 19 different activities on a scale of 1 (never) to 7 (everyday). Cronbach's alphas for the intention, self-efficacy and social influences variables were calculated, with values of .68, .89, and .55, respectively. Reynolds et al. found low to moderate correlations between the determinants and activity levels 4 months and 16 months later. Baseline activity and follow-up activity produced the highest correlation at 4 months (r = .47) and at 6 months (r = .41). At four and sixteen months, intention (r = -.20, r = -.31), social influence (r = -.18, r = -.15), and self-efficacy (r = -.28, r = -.29) were significantly correlated with activity. The regression models for both males and females included baseline activity, self-efficacy, intention, stress, social influence, and intercept. With 4-month physical activity as the dependant variable, total R^2 for males was .24, and total R^2 for females was .45. (Reynolds et al., 1990) The model for females explained almost half of the variance – much more than other literature on determinants. This may have been attributed to the high regression coefficient for intention (-.92), which is not included in models derived from Social Cognitive theory. With 16-month physical activity as the dependant variable total R^2 for males was .24, and total R^2 for females was .28. The male regression model was consistent from four to sixteen months, but the female model decreased by almost half.

Craig et al. looked to further investigate correlates of physical activity, namely vigorous activity, to determine if perceived behavioral control, based on the Theory of Planned Behavior, predicted intent to participate in vigorous physical activity.(Craig, 1996) Subjects were chosen from fifth and eighth grades from schools in Cambridge, Massachusetts. A total of 305 students consisted of 154 fifth,

and 151 eighth graders, of which 53% were male, 44% white, 20% were African American, 12% were Hispanic, 8% were Asian, and 16% were another ethnicity. A questionnaire was constructed using the Theory of Planned Behavior. On the questionnaire, vigorous exercise was defined as and "play, sports, or other activities in which the participant tended to be so active that his/her heart beat fast and s/he breathed hard for 20 minutes or more at a time". (Craig, 1996) The questions included were based on the Theory of Reasoned Action, which measured intent to participate in physical activity, attitude toward engaging in vigorous activity, subjective norm, perceived behavioral control, control factors that might relate to behavioral control, demographic variables, and self-reported vigorous physical activity. Respondents decided their level of agreement to the items. The responses were then ranked from –2 to 2. Test-retest reliabilities for the instruments assessing intent (.8), perceived behavioral control (.9), and subjective norm (1.0), were established in a pilot test. A regression model that included attitude and perceived behavioral control explained 37% of the variance in intent to participate in vigorous physical activity. The variance explained in this study is different from much of the other literature; intent to participate in physical activity, rather than actual physical activity behavior was used as the dependant variable in the regression model. This may be why the regression model has a relatively high amount of explained variance as compared to literature looking at predication of actual behavior.

Sallis et al. (1999) sought to explain change in physical activity over two years. (Sallis, 1999) Subjects included in the study were fourth graders from seven suburban public schools. Baseline measures were taken from 1384 students, of which

82% were European American, 12% Asian, 4% Hispanic, and 2% African American. Of these original students, only 53% had complete data (362 boys, 370 girls). Physical activity was measured using a one-day recall, in which students reported whether they participated in any of the 20 common activities listed for at least 15 minutes. Parents also reported their child's physical activity in the same manner. The students, to show their activities outside of school, wore a Caltrac Accelerometer. These measures were then used to determine a physical activity change index, with each activity measure having a different loading. Predictors measured were skinfolds, psychological variables reported by the student, parental physical activity and other variables reported by the parents. The triceps and calf skinfolds were assessed using Lange skinfold calipers. The child-reported psychological variables assessed were physical activity attitude (test-retest reliability = .82, coefficient alpha = .75), physical education attitude (test-retest = .27, alpha = .53), sweat attitude (test-retest = .3, alpha = .76), after-school activity attitude (test-retest = .48, alpha = .82), physical activity preferences (test-retest = .67, alpha = .67), physical activity competence (test-retest = .85, alpha = .72), self-concept (test-retest = .29, alpha = .74), body image (test-retest = .65, inter item correlation = .58), and behavioral intentions (no reliability reported). Parent-reported variables used were parent physical activity, child TV viewing, neighborhood safety, parent encouragement, parent plays with child, parent transport child, and parent paid fee. Reliability measures for the parent-reported variables were not reported. The researchers found that overall physical activity decreased from fourth to fifth grades. Using multiple regression for girls, 5.5% of the variance was explained by skinfold, activity

preference baseline and change, transported child change, and activity preference baseline interaction with skinfold. For the boys, 12.5% of the variance was accounted for by skinfold, physical education attitude change, activity competence change, activity preference baseline, parent activity change, physical education attitude change interaction with skinfold, and parental activity change interaction with skinfold.

Garcia et al looked to discover if gender differences existed in exercise behavior and beliefs, as well as examine if there was a relationship between behavior, background variables, and beliefs. (Garcia, 1995) Two cohorts were selected for a convenience sample of fifth to sixth and eighth graders. Of the original 399 students, 286 provided usable data. The sample composition was 51.7% female, 48.3% male, of which 30.4% were African American, 62.6% were European American, and 7% were other ethnicities. The Health Promotion Model, which is based on Social Cognitive Theory, was used to create a model for this study. General background variables were collected (age, gender, race, SES, pubertal stage, developmental stage), as were behavior specific (self-efficacy, exercise self-schema, exercise benefits/barrier differential, perceived barriers, prior related behavior, interpersonal variables, and situational variables) and health related (definition of health and perceived health status). Physical activity behavior data was collected using the Child/Adolescent Exercise Log for seven days, which had been previously validated against the Caltrac accelerometer (r=. 48). Several different instruments were used to measure the different variables, all with established reliability (range.72-.85). An analysis of variance was conducted to determine if there were any gender or age

differences. Females reported lower self-esteem, poorer perceived health status, less previous exercise, and lower exercise self-schema than males. Older youth reported less social support for exercise than their younger counterparts. Including general background, health-related, and behavior specific variables in a regression model to explain exercise behavior, the r^2 was .193 (adjusted r^2 = .151). In this model gender, benefits/barriers differential, and access to facilities or programs were significant.

Lindquist et al looked to identify the sociocultural determinants of physical activity in children.(Lindquist, 1999) Data was used from a longitudinal study of childhood obesity in Alabama. The majority of children were in their second or third year of the study (mean=10 years). Independent variables for the study included: gender, age, single parent home, pubertal development and social class. Gender, age, and single parent home status were all categorical variables. Pubertal development was measured using a physical exam as described by Tanner stages. Social class was measured using the Hollingshead four-factor index of social class, which uses a combination of educational achievement and occupation of parents. Values range from 8 – 66, where higher values suggest higher socioeconomic status. No validity or reliability information was given for any of the measures. Dependant variables included in the study were television viewing, physical fitness (max VO_2), hours per week of exercise, days per week of exercise, physical education exercise hours per week, and sports team participation. Television viewing, reported by parents, was measured in hours per day. Physical fitness was assessed using a maximal treadmill test, where endpoint criteria included one or more of the following criteria: heart rate above 195, RER of greater than one, or a plateau of VO_2. Hours per week of exercise

were assessed using an interview technique, where the interviewer listed physical activities, and the parents and children informed the interviewer how many months, weeks, days, and minutes of exercise were completed by the child during the last year. The scores were than averaged to assess the child's physical activity. Physical education participation was assessed using methods similar to the Youth Risk behavior survey, where they were asked how many days in the past week they engaged in physical activity that made them sweat or breathe hard for at least 20 minutes(Lindquist, 1999) This number was then multiplied by the number of days that they reported having physical education class. Correlations between the variables of television viewing, hour/week of exercise, days/week of exercise, physical education exercise, sports teams, maximal oxygen consumption, and adjusted oxygen consumption were low to moderate. Regression analysis was completed using sociocultural and physiological variables on each physical activity measure. Sociocultural factors explained 12% of the variance in television viewing, and they explained 13% of the variance in exercise. Sociocultural factors explained 14% of the variance in physical education exercise, 11% of the variance in sports team participation, and 85% of the variance in max VO_2. Measurement of key variables was questionable in this study. No validity or reliability information was given, and some of the measures, such as the way they measured physical education exercise, have questionable validity. A small percentage of students actually vigorously exercise in physical education. The researchers here looked at how many days per week that the students exercised, and assumed that it had occurred in physical education class.

Anderssen et al. looked to ascertain if parents and peers influenced levels of leisure time physical activity. (Anderssen & Wold, 1992) The sample consisted of 904 seventh graders (498 boys, 406 girls) in western Norway. All measures were self-report in nature. One-week test-retest reliability for the question, "Outside of school hours, how often do you do sports or exercise until you are out of breath or sweat?" was reported as .78. The predictor variables measured were leisure-time physical activity of significant others, direct support of physical activity from significant others, direct help from parents, and value of physical activity or significant others. Predictor variables were measured using multiple-choice answers, ranging from "4 days or more" to "never". Results showed that boys exercised more than girls. Activity of best friend was moderately correlated with physical activity for boys and girls, $r = .23$ and $r = .31$, respectively. Direct help in exercising vigorously was also correlated moderately with physical activity ($r = .33$). Direct support for physical activity also had low to moderate correlations ($r = .13$ - $.30$). Multiple regression analysis using direct help, leisure-time physical activity of others, and direct support for physical activity on the adolescent's activity showed that 14% of the variance in adolescent activity was accounted for in boys, and 16% of the variance in physical activity was accounted for in girls. Although the explained variance was moderately low, it is important to consider that this variance is explained by social support alone. Other studies using multiple variable models explain similar amounts of variance in activity. Therefore, this study provides evidence that social support may be a strong influential factor for adolescent physical activity behavior.

Vilhjalmsson, et al. examined a large sample of adolescents to measure determinants of physical activity. (Vilhjalmsson & Thorlindsson, 1998). A random sample was drawn from all adolescents in Iceland. Of this sample, 94% returned the questionnaire, yielding 1131 in the total sample. Of these 1131, 49% were female, and 39% were lower class, 27% were middle class, and 34% were upper class. Numerous variables were measured, including others' physical activity, school experiences, attitudes and beliefs, sociability, emotional support, other activities, medical condition, and physical activity. Physical activity was measured using a two-item summary scale that asked how often the children participated in "sports, gymnastics, swimming, or other physical activities." (Vilhjalmsson & Thorlindsson, 1998) Others' physical activity was measured using a three-point scale, which ranged from never to at least once a week. School experiences were assessed by asking if the student had received health and sport behavior instructions, and whether the "value of sport and exercise" had been emphasized. Attitudes and beliefs were uncovered by ranking one's perceived importance of variables such as sport, improving health, control over health, etc. on a three-point scale. Sociability was found by asking the students how easy or hard it was to make friends. Emotional support, broken into five categories, was found by one question asking how hard it was to talk to a support person. The strongest correlations came from best friend's physical activity ($r = .384$) and importance of sport ($r = .223$). A multiple regression analysis of sex, importance of sport, importance of health improvement, father's physical activity, older brother's physical activity, satisfaction with gym class, sociability, friend's emotional support, paid work, TV-viewing, and interaction between friend's physical activity and

friend's emotional support accounted for 25% of the variance in physical activity. In comparison with other literature, this seems to be a high amount of variance explained by the variables used in the study. This may be due to the fact that the researchers included sex in the regression model. Other studies instead separate the sample into genders, and analyze the data that way. Since gender is not a modifiable variable, it may not be a pertinent part of a model for aiding researchers to develop interventions for this age group. Separating the data, however, is useful in that a researcher can develop different interventions for males and females. Another limitation of the study is that it was completed in Iceland, and youth in Iceland may be different from youth in the United States.

Douthitt et al. wanted to look at psychological variables to determine if they had an effect on exercise behavior. (Douthitt, 1994) The researchers collected data in May 1990 and in September 1990. The first data collection asked to students to answer the questions in relation to their physical education experiences. The second asked for students to relate the questions to their physical activity over summer break. Ninth, tenth, and eleventh grade students (94 male, 38 female) in a suburban high school in Denver, Colorado were recruited for the first data collection. At the second data collection, 110 of the original sample were available, 77 males, 33 females. The criterion measure was adolescent exercise adherence, measured by the Habitual physical activity questionnaire as well as the Sport Index. Dependant variables measured were self-perception, self-motivation, perceived control, and personality/sport congruence, measured by the Adolescent Self-Perception Profile, Self-Motivation Inventory, Perceived control at School Scale, and the Psychosocial

Activity Dimensions Profile, respectively. Neither validity nor reliability information was reported in the study. Data were separated into structured and unstructured activity settings (physical education versus summer activity), as well as competitive versus noncompetitive groups (answering yes to a question about involvement in competitive athletics). For females, perceived athletic competency accounted for 26% of the variance in exercise adherence in the physical education setting. For males in the physical education setting, perceived romantic appeal accounted for 8% of the variance. In unstructured settings, perceived global self-worth (18%) and perceived physical appearance (14%) were significant for females. As a complete group, the unstructured data showed that personality/sport congruence accounted for 29% of the variance in exercise adherence. In the noncompetitive group, perceived romantic appeal accounted for 10% of the variance in exercise adherence. This study was unique, in that they looked at personality/sport congruence, which accounted for a moderate amount of variance in the unstructured group.

Cardina, in an unpublished dissertation, used Social Cognitive Theory to try to explain variance in physical activity in high school students. (Cardina, 1994) Subjects from the ninth and twelfth grades at Newark High School in Ohio completed self-report measures. Of the original 349 subjects, 256 completed the study. The independent variables included in the study were: social situation, self-efficacy for skill/ability, self efficacy for barriers, physical appearance outcome expectations, general health outcome expectations, negative outcome expectations, social outcome expectations, and self-regulation. Test-retest reliability was conducted in a pilot study, and values ranged from .64 - .86. In all subjects, the model consisting of self-

regulation, social outcome expectancies, and self-efficacy explained 31% of the variance. The same model applied only to ninth grade females showed that 43% of the variance in physical activity was explained. In ninth grade males, using self-efficacy, social situation, and physical appearance, the model explained 29% of the variance in physical activity. In the twelfth grade, 37% of the variance was explained by self-regulation in females, 13% in males. This study included self-regulation, a variable that has been absent from most studies. A paper based on this dissertation has been submitted for publication.

Trost et al. (Trost, 1997) completed a one year prospective study on rural fifth grade students. Psychosocial variables, such as support seeking self-efficacy, self-efficacy to overcome barriers, competing activities, social influences regarding physical activity, and beliefs about the outcomes of physical activity and environmental variables, such as perceived physical activity of parents and peers, attitude toward physical education, access to facilities and equipment, participation in school and community sports and activities were assessed. For self-efficacy and social influences, Trost modified scales used by Reynolds et al (1990). Physical activity was assessed using a previous day physical activity recall, which measured after-school activity. This instrument has been previously validated against motion sensors and heart rate monitors, with concurrent validity values of .77 and .63, respectively. (Weston, Petosa, & Pate, 1997) Physical activity measures were taken on three consecutive days during school. Follow-up measures were taken one year later. Results showed that boys were more active than girls in both moderate to vigorous physical activity and vigorous physical activity. Both boys and girls scored

similarly on the determinant measures, with only outcome beliefs being significantly higher for girls than boys. The significant regression model for girls in predicting vigorous physical activity included participation in community sports, self-efficacy for overcoming barriers, enjoyment of physical education, race/ethnicity, and mother's physical activity, accounting for 26% of the variance. For boys, only the barriers subscale of self-efficacy was significant, accounting for 5% of the variance in vigorous physical activity. For moderate and vigorous physical activity, only community sports participation and the barriers subscale for self-efficacy were significant for girls, accounting for about 17% of the variance. For boys, outcome beliefs and community sport participation were significant predictors of moderate and vigorous physical activity, accounting for 17% of the variance. A strength of this study was the use of a prospective design. Many other studies look at concurrent physical activity behavior, and fail to attempt to predict behavior. This study looked at predicting future exercise behavior from determinants measured at baseline.

In summary, the literature looking to predict physical activity from theory-based determinants has produced modest results. Both Social Cognitive theory and the theory of planned behavior have been utilized most often in descriptive research, and seem to be the most promising theories to use with physical activity behavior. Much of the conflict in the determinant literature comes from measurement of the outcome variable. Many large-scale studies use self-report measures, while some of the mid-size studies use either physiological or objective measures of physical activity. Also, in using the Theory of Planned Behavior, intention, not physical activity, is often the outcome measure; this often leads to inflated regression analysis

results. With different instruments being used to measure the same construct, and different names and definitions being assigned to the constructs, it is not surprising that it is difficult to compare one study to the next. This problem is not likely to abate in the near future, as no standards exist for determinant and physical activity measurement.

Although studies include variables such as gender, race, and SES, this study will not. Although important, these variables are not modifiable predictors of physical activity. Therefore, only potentially modifiable variables will be used in the study.

Interventions

This section of the chapter will review interventions aimed at increasing physical activity. The first portion of this section will review school-based interventions that look to modify physical education to increase physical activity. The second portion of this section will review interventions that attempt to modify physical activity outside of physical education.

Classroom-based interventions

McKenzie et al. (1996) reported the results of the Child and Adolescent Trial for Cardiovascular Health (CATCH) program, aimed at increasing time spent in moderate to vigorous activity in physical education.(McKenzie, 1996) CATCH was a large-scale intervention that took place at various sites in 4 cities: Minneapolis, San Diego, New Orleans, and Austin. In a total of 96 elementary schools, students were followed from third through fifth grades. Twenty-four of these schools were randomly assigned to either the control or intervention groups. This review will focus only on the CATCH Physical Education program since the entire program involved many topics. Physical education teachers were trained and given curriculum materials to employ in their classrooms. The criterion, moderate to vigorous physical activity, was measured using the System for Observing Fitness Instruction Time (SOFIT). SOFIT considers not only how much time the student spends engaging in activity, but also the lesson content. Intra-observer reliabilities ranged from .94-.99. Fitness measures, such as the nine-minute run, were also taken. Previous day physical activity was self-reported by students via SAPAC, which has been shown to

be correlated with heart rate monitoring (r=0.60). Both the intervention (51.9%)and control (42.3%) groups increased in time spent in moderate and vigorous activity from baseline (about 40%). Looking at self-report data, the intervention group engaged in significantly more vigorous (58.6 intervention, 46.5 control) activity minutes as well as MET-weighted physical activity minutes (339.5 intervention, 270.3 control) than the control group.

McKenzie et al. (1997) reported two-year follow-up results of the Sports, Play, and Active Recreation for Kids (SPARK) program.(McKenzie, 1997) The program involved three groups: control, or usual physical education; trained teacher, or normal physical education teachers who were trained to implement the intervention; and physical education specialists, or outside individuals who were trained to implement the intervention. Seven elementary schools in California were randomized into one of the three conditions. Observation using SOFIT was conducted to assess the time spent by students in moderate to vigorous activity during physical education. Intra-observer reliability over the duration of the intervention ranged from 88.7% to 93.4%. In examining mean number of minutes spend in moderate to vigorous activity, it appeared that physical education specialist condition (43.1) was superior to both the trained teacher condition (32.7) and the control (17.8) condition. However, looking at two-year follow-up data, the trained teacher group maintained the increase in moderate to vigorous activity (29.8 minutes), where the physical education specialist groups decreased dramatically from 43.1 minutes to 17.5 minutes. This result would seem to be a logical outcome, since physical education specialists were replaced by untrained teachers after the intervention ended. These

results suggest that teacher training is much more beneficial for increasing moderate to vigorous activity during physical education in the long-term.

Harrell et al. (1999) reported the results of the Cardiovascular Health in Children (CHIC) study in a sample of 1,274 third and fourth graders in North Carolina.(Harrell, 1999) The intervention consisted of classroom-based and risk-based portions. The risk-based portion was comprised of three elements: nutrition courses, smoking prevention courses, and physical activity courses. Once risk factors for cardiovascular disease were assessed in each child, they were placed in groups according to their risk factor needs. Self-report physical activity was measured using a modified version of the Know Your Body Health Habits Survey. The questionnaire consisted of 25 physical activity-related items, and was deemed content valid. In comparing all groups from pre-test to post-test, no significant differences were found in physical activity scores from pre-test to post-test.

Simmons-Morton, et al. (1991) examined the effects of a comprehensive intervention on third and fourth graders in four Texas schools.(Simmons-Morton, 1991) Two schools served as the control group, and two served as the intervention group. The intervention was comprised of three elements: the Go for Health Curriculum, which covered knowledge and skill needed for maintenance of health behaviors, the Children's Active Physical Education (CAPE), where students engaged in enjoyable cardiovascular activities, and New School Lunch (NSL), which was provided by the school. The CAPE program emphasized enjoyment of moderate to vigorous activity, and included activities such as running, games, and dancing. Physical activity during physical education was observed and recorded as minutes in

moderate to vigorous physical activity. Inter-observer reliability for the physical activity measures was .97. In the four schools, pre-test time spent in MVPA ranged from 0.3 – 2.4 minutes. At post-test, the intervention group had significant increases in MVPA minutes, with the post-test time ranging from 10.5-16 minutes. The control group also increased, but only by two to three minutes. Although this change may have been considered statistically significant, it is questionable if the post-test time spent in MVPA was increased to an acceptable level. When considering that a typical class is thirty to forty minutes long, sixteen minutes of MVPA is inadequate. One important and unique finding of the study was that knowledge test scores increased significantly in the intervention group. Few studies have included this type of measure in their research design.

Walter (1989) described the longitudinal intervention and results of the "Know Your Body" program aimed at the reduction of cardiovascular disease risk factors in children.(Walter, 1989) Two separate populations were utilized in the study. One population consisted of fourth graders in 22 lower SES schools in New York, and one population consisted of fourth graders in 15 mid to high SES schools in New York. The physical activity portion of the program focused on the promotion and maintenance of endurance activities. The intervention included Social Cognitive Theory variables such as behavioral capability, behavior reinforcement, benefits-barriers differential, and self-efficacy. Self-report physical activity measures were obtained, but found to be unreliable. Instead a physiological variable, recovery index, was used to assess physical activity. At post-test, no significant differences were found either within groups or between groups on the physiological measure for

physical activity. It is difficult to assess whether this result occurred because of a flawed intervention or because of the measure used to assess physical activity. Since most other studies reviewed for this section have used either self-report or observational data, it is difficult to compare these types of measures to physiological ones.

Deal et al. (1993) tested a fitness-based module in a physical education curriculum in a sample of 374 fifth and 219 seventh grade students in 15 Indiana schools.(Deal, 1993) The schools were randomly assigned to one of three groups: the trained teacher intervention, untrained teacher intervention, or control conditions. The trained teacher group consisted of instructors who were both trained in the curricula and given the intervention materials. The untrained teacher group consisted of teachers who were not trained, but were given the intervention materials. The teachers in the control group were instructed to conduct their normal physical education curriculum. The intervention involved two types of activities: fitness activities, which included activities aimed at increasing strength or endurance, and movement activities, which included sports such as gymnastics and tennis. Physiological measures were used for the criterion in this study. No significant differences were found in the run, sit-ups, sit-and-reach, or bent arm hang scores. Again, as mentioned in the previous study, it is difficult to assess if the lack of significance was due to the intervention or the measure of physical activity.

Gortmaker et al. (1999) assessed the effectiveness of a multidisciplinary program, "Eat Well and Keep Moving", on diet and physical activity behaviors of fourth and fifth grade students in 6 intervention and 8 control schools. Longitudinal

data was collected from 1995 to 1997. The intervention used multiple subjects (math, language arts, science, health, and social studies) to promote physical activity and healthy eating. Lessons used social cognitive theory by enhancing behavioral skills, providing support, and increasing perceived competence of the students. The physical education portion of the intervention included five lessons. Physical activity levels were assessed by using a 24-hour recall, which grouped physical activity into one of 6 categories: sleep, sit, stand, sit and watch television, sit and watch videos or play video games, walk, or other activity. All reported activities were assigned a MET equivalent. There was no difference statistically in vigorous physical activity or television and videogame time from baseline to follow-up. There was also no statistically significant difference between the intervention and control groups on these two variables. Interestingly, the authors promoted this program to 50 other schools in the Baltimore area based on the "successful implementation" of the program.

Non-classroom based interventions

Johnson et al. (1991) sought to modify cardiovascular disease risk factors of 19 third and fourth grade students and their families through the Heart Smart Program.(Johnson, 1991) The program consisted of sessions that included knowledge and skill-based components aimed at reducing risk for Coronary heart disease. The physical activity portion of the program progressed from ten to thirty minutes. Self-monitoring, self-efficacy, and social support were all targets for the intervention. Adult physical activity was assessed by self-report in biweekly logs. Adult physical

activity increased from sedentary levels (0-3 miles per week) to a mean of about 13 miles per week. Child physical activity was assessed physiologically, using one-minute run/walk times. The students decreased their total time by a mean of 1.5 minutes by the end of the program.

Kelder et al (1993) implemented the Minnesota Heart Health program, a community-wide health promotion program, in several north central states.(Kelder, 1993) The component geared toward eighth grade students was the Fargo/Moorhead-250, which was a peer-led physical activity program that took place outside of physical education courses. A competition was created outside of school, where students could try to attain the equivalent of 250 cycled miles to travel the distance from their city to Minneapolis. Those who attained the feat were mailed a postcard from the city. Social Cognitive theory variables such as self-efficacy, barriers, social support, and expectations, as well as other variables, such as intention, knowledge and skill were utilized. Leisure-time physical activity was assessed using weekly self-reported data and a physical activity score. The physical activity score assessed both the frequency and intensity of the exercise bout. In males, both the intervention and reference communities showed an overall decline in activity, with only 7^{th} and 11^{th} grade activity differing significantly between the two groups. In females, the same type of decline was apparent, but the intervention group maintained significantly higher levels of physical activity in 7^{th}, 8^{th}, 9^{th}, 10^{th}, and 12^{th} grades.

Epstein et al. (1985) looked to compare the differences in effects of three different modes of exercise on 35 obese children between the ages of 8 and 12 (Epstein, Wing, Koeske, & Valoski, 1985). All students were given the traffic light

diet, where they were to consume 1200 kcals of energy. The subjects were randomly assigned to one of three groups: aerobic, lifestyle and calisthenics. The aerobic group was instructed to walk, bike, run, or swim at least 3 days per week, where the intensity of the bout was modified by heart rate. The lifestyle group was given the opportunity to choose their activity and intensity. The calisthenics group was told to complete between 6 and 12 repetitions of the exercises three times per week. A behavioral component including Social Cognitive theory constructs such as self-monitoring, modeling, contingency contracting, and parent management was given to all groups. After twenty-four months, the aerobic group decreased their percent overweight from 47.8% to 41%. The calisthenics group also decreased 8%. The lifestyle group, however, decreased from 48.3% to 30.3% over the 24 months. Although this study involved obese subjects, it was included in this review for two reasons. First, the mode and intensities of different exercises were compared. Many times, researchers focus on one intensity or one mode – this study shows that there are several options that can be employed. Second, the use of the "lifestyle" activity group is tremendously important. It is logical that promotion of exercise adherence should begin with small lifestyle changes to incorporate physical activity into the day. Surprisingly, this concept has disappeared in the literature.

Summary

There is a lack of research involving physical activity interventions in middle and junior high school. Much of the literature focuses on elementary age children, and interventions are aimed at increasing physical activity in physical education class.

Interventions that include lifestyle activity versus strict exercise regimens seem promising, as shown by Epstein et al (1985). It is surprising, however, that there is little subsequent research using lifestyle activity. Therefore, it is the aim of this research study to design an intervention aimed at increasing total physical activity as well as leisure-time physical activity. The intervention designed for this study focuses on increasing knowledge and skills to facilitate students to become regularly physically active.

Chapter 3

Summary of intervention literature

Many interventions involving children are aimed at improving the time on task and instruction in physical education. Although this is important, it is not certain whether physical activity outside of physical education is affected. Another limitation of current intervention studies is that they include mostly children. The CATCH and SPARK studies were all completed on elementary-aged school children.(Harrell, 1999; McKenzie, 1997; McKenzie, 1996) Little research has been completed on interventions aimed at middle school and junior high school students. Theory-based interventions are lacking in the literature. Many interventions claim to use theory, but do not attempt to measure theoretical constructs. Without these measures, it is difficult to say if the intervention had any affect on mediating variables. The literature on mediating variables shows a modest relationship between predictor variables and physical activity. It is because of this modest relationship that Baranowski asserts that interventions are happening prematurely. (Baranowski, 1998) The problem is that large-scale interventions are based on constructs that have a moderate relationship to physical activity; this can lead to only modest changes in outcome behaviors. Funding sources tend to influence the type of research being

completed. If funding is available for large-scale intervention studies, they will continue regardless of the descriptive literature available. In a logical progression, descriptive studies would precede construct validation studies, which would be followed by smaller interventions studies. Only after all of these steps are completed is it pertinent to complete large-scale interventions. Although several theories have been used at various stages in designing physical activity interventions, the largest portion of mediating variable literature focuses on Social Cognitive Theory. For this reason, Social Cognitive Theory will be central to this intervention.

Purpose

The primary purpose of the study is to complete a construct validation of a new physical activity intervention to increase sixth, seventh, and eighth graders' knowledge and use of eight self-control strategies: self-monitoring for physical activity, goal setting for physical activity, social support for physical activity, environmental aid for physical activity, self-reinforcement for physical activity, time-management for physical activity, self-efficacy for physical activity, and tailoring for physical activity. This will be measured using a self-control for physical activity instrument as well as a knowledge test. A second purpose of the study is to field test the acceptability and practicality of the administration of the intervention, as assessed qualitatively through teacher feedback.

Setting /Subjects

The Falk school, a laboratory school for the University of Pittsburgh in Pennsylvania, is a small private school with a tuition of $6,000 per year. The school includes kindergarten through eighth grades, with only 30-35 students in each grade. There is one physical education teacher for all of the students. The students in grades 3 – 5 have physical education twice per week for the entire year. Students in grades 6, 7, and 8 see the physical education instructor twice each year, for 25 consecutive days. Each class period is approximately 40 minutes long. One of the cycles involves sport-based physical education. The other cycle was reserved for health instruction in the past, but has been recently changed to a fitness unit. The teacher felt that many of the health concepts taught in the health unit were being taught in other classes, and that the time would be more beneficially spent teaching students fitness concepts and skills. The school's director approved the plan. Fitness equipment, such as a treadmill, elliptical trainer, stationary bike, physioballs, and pedometers, was purchased for use in the new unit. The sixth grade class was split into two groups, so each class contained 12-15 students. The seventh and eighth grade classes were not split, and contained about 30 students in each. A total of 94 students were included in this study, with 72 providing complete data.

Social Cognitive Theory

Bandura's Social Cognitive Theory has been widely used in research on physical activity. Social Cognitive Theory states that cognitive factors, environmental factors, and behavior are reciprocally related.(Bandura, 1986)

Although Social Cognitive Theory is multifaceted, only one construct, self-control, will be targeted in this study. Self-control, as defined by Perry, is "personal regulation of a goal-directed behavior or performance" (p. 166).(Perry, 1990) In this study, the focus will be on eight subcomponents of self control: self-monitoring for physical activity, goal setting for physical activity, social support for physical activity, environmental aid for physical activity, self-reinforcement for physical activity, time-management for physical activity, self-efficacy for physical activity, and tailoring for physical activity.

Self-monitoring for physical activity is a sustained, consistent effort to track physical activity.(Bandura, 1986) Students were required to track their physical activity during the five-week intervention through the use of an activity log. They also created a fitness plan to help them become regularly active. The self-monitoring construct was operationally defined as the summated score on the self-monitoring subscale on the self-control instrument.

Goal setting for physical activity involves targeting a physical activity behavior, setting a behavioral target, and using internal incentives to reach the internally specified target.(Bandura, 1986) These internal incentive standards are small steps in which the person realizes their achievement of a portion of the goal. In the unit, students learned how to set long term goals as well as how to break their long-term goals into smaller steps (short-term goals). Near the end of the intervention, students were asked to reflect on their goals, and to modify them for the next several months. The goal-setting construct was operationally defined as the summated score on the goal-setting subscale of the self-control instrument.

Social support for physical activity comes in the form of praise, direct help, or involvement in a behavior that is exhibited by family, friends, teachers, or others. Positive support can aid the student in increasing a behavior, where negative support can become a barrier to the behavior. Newsletters were sent to parents to inform them of the new fitness unit as well as give them general ideas on ways to encourage their child to participate in physical activity. Students also completed a contractual assignment with a fitness buddy. Social support was operationally defined as the summated score on the social support subscale on the self-control instrument.

Environmental aid is the availability of facilities, equipment, or other resources that can aid a person in engaging in physical activity. Students completed an environmental resources worksheet to identify facilities and equipment available to them, as well as identify their feelings of safety in their neighborhood. Students also completed a fitness scavenger hunt to discover facilities and equipment that they can use to be physically active. Environmental aid was operationally defined as the summated score on the environmental aid subscale of the self-control instrument.

Self-reinforcement is a person's ability to internally evaluate and subsequently reward a behavior.(Bandura, 1986) Internal rewards involve things such as satisfaction, feelings of accomplishment, etc. External rewards include things such as money, gift certificates, gifts, and public praise. Students learned the differences between the two types of rewards and how to reward themselves as they worked toward both their short and long-term goals. The self-reinforcement construct will be operationally defined as the summated score on the self-reinforcement subscale of the self-control instrument.

Time-management for physical activity is the ability to find or create time to be physically active on a regular basis. Students completed a one-day physical activity recall to help them visualize how they spend their time each day. To accomplish this, students calculated how many hours they spend doing light activities as well as medium, hard and very hard activities. They were given a chance to reflect on and discuss their findings. Time-management for physical activity will be operationally defined as the summated score on the time-management subscale on the self-control instrument.

Self-efficacy for physical activity is the student's belief that they can engage in regular physical activity. It involves both knowledge and skills necessary to be physically active (e.g. knowledge of principles of fitness, skill in completing physical activities such as walking on the treadmill, using the physioballs, etc.) Lessons regarding use of the equipment, how to take heart rate, how to design a fitness program, how to identify and overcome barriers to physical activity, and basic principles of fitness were included in the intervention. The summated score on the self-efficacy subscale of the self-control instrument represented the barriers construct.

Tailoring for physical activity is the ability to identify comfortable intensities, durations, and activities to promote regular physical activity. Students completed different activities at incremental intensities, took their heart rate, and identified their comfort level with the activity, as well as their perceived ability to participate in the activity for at least 20 minutes. The students identified which intensities they felt most comfortable while exercising. Students also learned how to modify their physical activity programs if they became too easy or too difficult. Tailoring for

physical activity was operationally defined as the summated score on the tailoring subscale of the self-control instrument.

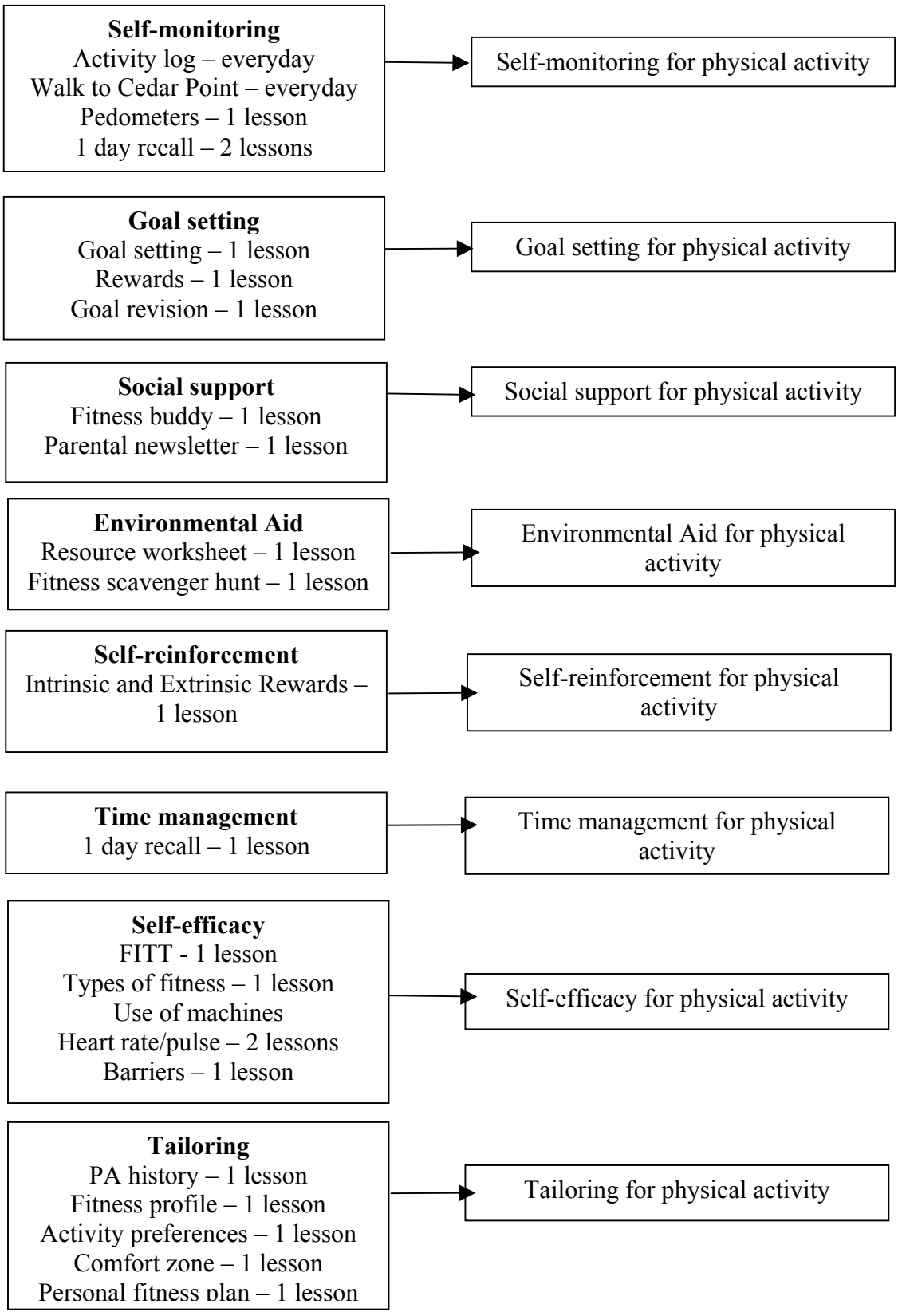
The study design was a one-group pre-test post-test design. Baseline measures and post-test measures (five weeks) were taken using the self-control for physical activity instrument. A knowledge test was completed by the students at the end of the unit.

Figure 1 on the next page presents the model used for the study. Each subscale is listed along with the lessons used to target the subscale. An arrow was inserted to show that the subscale scores should be affected by the intervention.

RESEARCH QUESTIONS

1. Does global self-control for physical activity change as a result of the intervention?
2. Do the subscale scores change from pre-test to post-test as a result of the intervention?

Figure 1 Research Model



Instrument

To measure self-control, a self-regulation for exercise scale was modified from a version used in an unpublished dissertation.(Petosa, 1995) Petosa used the instrument in a study completed at the worksite using adults. Predictive validity for the instrument's five subscales ranged from .22 (not significant) to .56 ($p<.001$). Test-retest reliabilities were also reported, and ranged from .62 to .92. The modified version of the instrument was sent to a panel of experts to assess face validity, content validity, and age-appropriate comprehension. The final scale consisted of 8 subscales: self-monitoring for physical activity, goal setting for physical activity, social support for physical activity, environmental aid for physical activity, self-reinforcement for physical activity, time-management for physical activity, self-efficacy for physical activity, and tailoring for physical activity. The total instrument consisted of 57 items that employed a five-point Likert scale. Subjects were asked how often in the past month that they used the techniques described for each of the items. They were asked to circle one of the following responses: never, one day per week, two to three days per week, four to five days per week, or six to seven days per week.

Methods

Permission from The Ohio State University's Institutional Review board was attained prior to the study. The Falk school is a laboratory school for the University of Pittsburgh, so parental permission for their child's participation in research studies

was required prior to students enrollment in the school. In a typical year, the physical education instructor would see each group of students twice – once for health and once for physical education. The fitness intervention took place during the time allotted for health, since the teacher felt that the material typically covered in health class was being taught in other subjects. Permission to replace the health unit with a new fitness unit was granted by the school's director. The 25-day unit consisted of 17 lessons. Fitness equipment, such as a treadmill, stationary bike, elliptical trainer, and physioballs, was incorporated into the lessons. At baseline, student height and weight were assessed, and the students completed the self-control instrument. If students did not understand the item, questions were addressed on an item-by-item basis. Follow-up data was assessed on the last day of the intervention.

Intervention Design

A total of 17 lessons were designed for the 25-day cycle. Several of the lessons required more than one class period, which filled the remaining 8 days. A teacher packet was provided to the teacher to outline each lesson's content and background, as well as to explain how each assignment was to be completed. Students received the intervention in the gymnasium. All students were assigned letters to sit on for attendance purposes. The teacher handed out the student notebooks and pencils at the beginning of each class, and collected them at the end of the class. All lessons began with a brief introduction to the topic and instructions were given on how to complete each assignment. Students completed a majority of the worksheets during class. An outline of the intervention follows.

Lesson 1: height, weight, and introduction to the walk to Cedar Point program, self-control instrument

Students filled out the self-control instrument (used at baseline and at the end of the unit). A copy of the instrument is provided in Appendix A. The instructor read the directions to the students, and asked if there were any questions. The teacher encouraged students to ask any questions they might have for each item as they filled out the instrument. The self-control instrument was then collected from the students.

The teacher informed the students that physical activity is not limited to competitive sports – they will have the opportunity to participate in other types of physical activities. The instructor informed the students of the benefits of physical activity – (that can affect kids NOW) increases energy, improves sleep, strengthens muscles and bones – and those that can affect them LATER (helps control weight, reduces stress, strengthens and helps keep the heart and lungs healthy). Students were briefly introduced to the new fitness equipment, and told that they would be trained on it at a later date. Height and weight measures were taken for descriptive purposes.

Students were told about the opportunity to participate in the "Walk to Cedar Point" program. The teacher emphasized that this was not a contest where they compete against each other, but an activity that they could participate in to challenge themselves. Students were told that they should pick up their workbooks (that they would get in the next class) and record their physical activity for the previous day in the activity log portion of the workbook. This record helped them fill in the Cedar

Point chart. The conversion used for the activity was every 20 minutes of activity that they did outside of school equaled 10 miles. For the activity, it was estimated that it was approximately 200 miles from Pittsburgh to Cedar Point.

Lesson 2: introduction to workbooks, physical activity history, stage of change

Students were introduced to the workbooks. Students were told to write their letter and age on the front of the workbook.

The first worksheet students completed was the physical activity history form located in their notebooks. A copy of all worksheets included in students workbooks are in Appendix B. Students were told to read each question, circle yes or no, and write in their sports or activities. The last question asked students to write how often they currently participate in activities or sports. The instructor emphasized that they should fill in both the number of days per week and the number or hours per day.

Students were instructed to turn to the second page of their workbooks. The instructions for the stage of change form were read to the students, as was each statement. Students were told to circle the statement that best described them.

Lesson 3: Equipment safety and procedures, newsletter distribution

Students were separated into three groups, and each group was sent to one of three stations: fitness equipment, physioballs, or basketball shooting. When students were at the fitness station, they were shown each piece of equipment separately. On the treadmill, students were told to straddle the belt when they got on the machine. They were then to press the start button and wait for the belt to start moving. They

were told to hold on to the bar in front of them, and slowly start walking on the belt. Students were shown that they could increase the speed and grade of the treadmill to challenge themselves, and that there was a special feature on the machine that allowed them to take their heart rate. Students were discouraged from going above 5 miles an hour on the first day.

The second piece of equipment shown to students was the elliptical trainer. Students were told to mount the machine slowly, making sure that they held onto the handrails. They were told to start pedaling slowly and to press the start button. Students were shown how to make the resistance harder or easier, and told that they could pedal either forward or backwards. Again, students were discouraged from going very fast on the first day.

The last machine the students could use in the fitness equipment station was a stationary recumbent bike. Students were instructed on how to adjust the seat so that their legs weren't completely straight when extended. They were told to start pedaling before pressing the start button. After instruction for all machines took place, students had an opportunity to try each piece of equipment.

Students at the basketball shooting station spent the rotations trying to make baskets. Those that were at the physioball station tried exercises on the physioball poster. Activities included abdominal exercises, lower back exercises, flexibility, and balance.

When five minutes were left in class, students were told to return to their letters. They were each given a newsletter to give their parents. The newsletter informed parents of the new unit, and cited several ways that parents could encourage

their child's participation in the unit. The newsletter also contained information about the Walk to Cedar Point program, and encouraged parents to join the fun.

Lesson 4: One-day recall

Students were told to turn to the physical activity recall in their workbooks. The recall contained three pages: Activities scale, Activity numbers (on the backside of the Activities scale), and the grid. Since there were several steps necessary in filling out the recall, the teacher used overheads of each page to help explain the steps. In explaining the first page, the instructor read the directions, and explained that there are several intensities of physical activity. The instructor pointed out to students that there were several activities that were shown in a progression. For example, in the far left column, walking, playing a game and running were in a vertical line. The instructor also pointed out that biking and swimming, depending on how hard it is, could fall into two different categories. The second page of the recall had a list of activities that the students might complete in a day. Activities from grooming to sport were included on the list.

The first step in filling out the activity recall was to complete the activity table. Students were told to fill in (in words) what activities they did for each of the time blocks for the PREVIOUS DAY. Students were reminded to fill in exactly what they did the previous day, and not what they may normally do. After students filled in their activities in words, they were told to look at the activity numbers, and find the number that corresponded to the activity that they wrote in each time block. If they

chose an item on the activity numbers scale that had a blank next to it, they were told to write in what activity they completed.

The last step in completing the recall was to have the students rate their intensity. Students were told to refer to the first page of the recall, and to rate the intensity of each of the activities that they had listed. They were told to mark an "X" under the corresponding column.

After students completed the recall, they summed the number of hours they spent sitting, talking on the phone, watching television, playing videogames, or using the computer. They were also told to add up the number of hours/minutes they spent being physically active. Students were asked which of the two categories they spent more time in. They were then told to look at their day and see where they could fit more physical activity into their day.

Lesson 5: Heart rate

Students were told that heart rate is a measure of how fast/slow the heart is beating at a given time. They were also told that maximum heart rate is an age-based estimation of how fast their heart can beat. Students were told that maximum heart rate is an estimate – some people can get their heart rate close to their maximum while engaging in physical activity, and others can not. They were also told that this number decreases as you get older. The teacher emphasized that heart rate was important because it can help you discover how hard you are working. Target heart rate is a way to discover if you are exercising at an acceptable intensity. The target heart rate range was defined as 60% – 90% of students' maximum heart rate. The

instructor pointed out that this was a good way to see if they were working hard enough or too hard when being physically active. Students were told to turn to their target heart rate worksheet. Students filled in their age and figured out their maximum heart rate. They then calculated their target heart rate range.

The teacher told the students that to monitor your heart rate during activity, they have to know how to take their pulse. They could find their pulse either at the wrist or neck. When the teacher told them to count, they started with zero and took their pulse for 6 seconds. After six seconds, the teacher told them to stop, and add a zero (6*10 = 60 seconds). They were told that this was their heart rate for one minute. Students were told that they could take their pulse for any amount of time (10 s, 30 s, 60 s). They were told the most accurate way was to take their pulse for one minute, but that a six second check was a good way to quickly monitor their intensity.

Students practiced taking each other's pulses for one minute. Students were then instructed to turn to their heart rate worksheet in their workbooks to record their heart rate at different intensities. The first part of the worksheet asked students to walk around the gym for 3 minutes and recorded their heart rate. They then jogged around the gym for 2 minutes and recorded their heart rates. Last, the students ran one lap very fast and recorded their heart rates. With the remaining time, students experimented with other activities and recorded their heart rates on the form.

Lesson 6: Pedometers

Students were told to take out the pedometer worksheet #1 from the front pocket of their wordbooks. Students were told that they would take this form home with them and bring it back the next class day. The instructions for the pedometers were as follows:

- clip it to their pants, shorts, belt, etc, and keep it in the front middle of their right leg.

- do not wear the pedometer when bathing, swimming, etc.

- do not fool with the buttons, or they will erase their steps.

- record their steps before they go to bed, reset the pedometer in the morning, and record their steps when they get to class

- add the two numbers to get their total steps, and turn the sheet in.

Lesson 7: Moderate v/s vigorous activity, comfort zone worksheets

Students were told that there are two intensities of activity: moderate and vigorous. They were told the following:

> Moderate activity is activity such as walking or doing chores that you can do while talking to someone, and should last at least 10 minutes. Moderate activity slightly elevates your heart rate and makes you breathe a little harder. Vigorous activity is activity such as running that makes you sweat and breathe hard, and is hard to do while talking to someone. Vigorous activity should last at least 15 minutes.

Students were instructed to walk for one minute at a brisk pace. They then were asked to jog at a brisk pace for 1 minute. Students were queried as to which activity was moderate and which was vigorous. Students were then asked to name other activities in each category as the instructor wrote the students' answers on the board.

Students turned to their comfort zone worksheets, and were broken into small groups. As the students rotated to the specific pieces of equipment, they followed the directions on the worksheets and record their answers. This activity was allotted two days so that all students could complete the assignment.

Lesson 8: Goal setting

Students were told:

> a goal is setting a target behavior that your want to reach. For example – being able to run one mile in 8 minutes by December. There are two types of goals: short and long term. Short term goals can be milestones that they feel will help them reach their long-term goal. Using the example above, a short-term goal may be to be to run an eleven-minute mile, three times per week for two weeks.
>
> There are three parts of a goal: the specific behavior, how often you do the activity, and how long you do the activity. In the example above, running an 11-minute mile is the specific behavior, three times per week is how often, and two weeks is how long you would do the behavior. The goal should also be realistic. For

example, if I can't run a mile, then setting a goal of running a marathon in 4 weeks is not realistic.

Students were told to turn to the goal setting worksheets in their workbooks. The worksheet required them to think of three long-term goals related to physical activity. Students were reminded to write the specific activity, how often they would do the activity, and how long they would do it.

Students chose one or two of the long-term goals to devise an action plan on how to accomplish the goal. They were instructed to set smaller, short-term goals to help them achieve their long-term goal. These short-term goals were to include how often they will do each activity, and for how long each time. The remainder of the class period was devoted to self-selected physical activity (machines, physioballs, basketball).

Lesson 9: Rewards

Students were told:

> There are two types of rewards: intrinsic and extrinsic. Extrinsic rewards are something that you can buy, eat, or get from someone else. For example, you could buy a CD, eat ice cream, or receive praise from someone for being physically active. Intrinsic rewards are rewards that you cannot touch, but are feelings inside of you. For example, after being physically active, you can feel more awake, feel proud of yourself for accomplishing a goal, or feel better in general.

Students were asked what they thought were proper rewards for physical activity goals. The teacher wrote each of the students' answers on the board. They then went through each goal and decided if it was a good reward for physical activity, and why they decided the way they did. Students were instructed to turn to their rewards worksheet in their workbooks. They were to decide what rewards they would use to reward their personal physical activity goals.

Lesson 10: FITT, fitness testing

The instructor wrote "FITT" on the board, and gave the students the following information:

The FITT principle: **F**requency – how often you do physical activity

Intensity – how hard the activity is

Time – how long you do the activity for

Type – what type of exercise it is (biking, running, etc)

All components of the FITT principle can and should be modified when designing an activity program. The reason for this is because your body adjusts to the amount of activity that you do. If you keep doing the same activity at the same intensity, for the same duration, and the same number of days, then you will not improve your health. Tell students that they can change the program if it gets too easy, or if it is too hard. For example, if it is easy for them to play

basketball for 20 minutes, three days per week, they can try to increase the time, or add another day of basketball in their schedules. If they try to play basketball for 20 minutes, three days per week and find it too hard, they can try to play for 10 to 15 minutes or to try it two days per week. They can then slowly work back up to 20 minutes, three times per week.

Students were then told that there were three components of fitness that would be focused on in the class: Cardiorespiratory endurance, muscular strength and endurance, and flexibility. They were told the follwing:

Just because you are strong in one of the components, it does not necessarily mean that you are strong in all of them. Cardio = heart, respiratory = lungs. Cardiorespiratory endurance is the ability of your heart and lungs to keep working efficiently while you are physically active. For example, a cross-country runner has good cardiorespiratory endurance. Muscular strength is the ability of your muscles to move heavy objects. Muscular endurance is the ability of your muscles to move some object over and over again. A cross-country runner also has muscular endurance in their legs, because they keep working to transport the runner to the finish line. A cross-country runner does not necessarily have a lot of muscular strength. An Olympic weightlifter has muscular strength, but may not have muscular endurance. Flexibility is the ability of your muscles to stretch. It is important to include flexibility in your program to help prevent injury.

Students were told to turn to the fitness trial worksheets. There were four fitness trials for the students to complete: cardiovascular endurance, muscular strength, muscular endurance, and flexibility. This was to be completed over two days. The teacher timed the students for the 12-minute walk/run. Students were told to walk in place when time was up so that the teacher could help then decide how many laps they completed. From this information, they could figure out the number of miles using the equation on the worksheet. The next day, students broke up into groups for the other assessments. They completed pull-ups, sit-ups (in one minute), and sit-and-reach.

Lesson 11: Limitations and Preferences

Students were told:

> Since every one of us is different, everyone may have different preferences, abilities, and limitations in regards to physical activity. Past experiences with physical activity can either be positive or negative, which may affect our current opinions about physical activity. We may also have limitations, such as asthma or a joint problem that prevents us from doing certain things. When thinking about a fitness program, it is important to consider these things. Students were told to complete their fitness profile worksheets in their notebooks. The rest of the class was reserved for physical activity.

Lesson 12: Personal Fitness Program

Students were told:

> A fitness plan is a way for them to map out how they will achieve their fitness goals. Since everyone's goals are different, their fitness plans are likely to be different. Fitness plans should always involve the FITT principle and be specific.

Examples – BAD – I will play basketball this week.

GOOD – I will play basketball at a fast pace (full court) on Monday, Wednesday, and Friday for one hour each day.

Students were asked why they think these are good behaviors. Students turned to their Personal Fitness Plan worksheets and recorded the following information on the first sheet: strengths and weaknesses from fitness trials, comfort zone heart rate, activity preferences, and limitations. On the second page, they recorded their long-term goal. They then began to fill out the fitness plan. Students were reminded to include the activity, frequency, time, intensity, (FITT) and component of fitness that this activity targets (muscular strength, endurance, cardiovascular endurance, flexibility).

Lesson 13: Parent's Physical Activity and Fitness Buddy Assignment

Students were told to retrieve the one-day recall from the front pocket of their workbooks. They were told that their assignment was to take this one-day recall home and have a parent/family member fill it out. Students were told that they should help their family member fill out the form. The students were told that they should remain

in the room while the family member filled the form out in case they had to answer questions. Students were told to have their family member add up the number of hours they spent doing light, moderate, hard, and very hard activities. The assignment was due the next class period.

Students were told that it is important to find someone to be physically active with them. If they plan on meeting the person everyday at 3:30 to be active, then they are more likely to do so. They could also spend quality time with someone while being physically active. Being active with someone also allows for encouragement from that person to help you be regularly physically active.

As a part of the course, students were required to find a fitness buddy to be physically active with. They were told that their fitness buddy could be a friend, family member, or pet, but they should find someone/thing that can be regularly active with them. Students were instructed to ask their fitness buddy that night, and were to fill out and sign the form the next class session. Students had the opportunity to participate in physical activity for remainder of the class.

Lesson 14: Barriers to physical activity

Students were told:

> Barriers to physical activity are things that prevent us from being active. Barriers can be internal (lack of motivation) or external (weather). Ask students to think of some barriers to physical activity, and write their answers on the board. However, there are ways to overcome each of the barriers listed on the board. For example, if they

typically like to walk outside and the weather is bad, then they should find an alternate location or alternate activity.

The teacher then asked students to name some barriers to physical activity, and wrote their answers on the board. They then decided how they could overcome each of these barriers. Students were instructed to fill out the barriers worksheet. Students were told to list their personal barriers to physical activity, not the class' list. The remainder of the class was reserved for physical activity.

Lesson 15: Fitness Resources

Students were told:

> Turn to the Resource worksheet. The first section includes what types of resources they have at home that will help them be physically active. They should circle either yes or no for **each** item. Make sure they answer the question below the table, asking which of the above that they actually use. The second section asks students to circle the answers that apply in their neighborhood. They should circle all that apply to them. The third and fourth sections involve their feelings regarding safety in their neighborhood as well as the type of neighborhood that they live in. They should only circle one answer in these two sections. The last section deals with the facilities that the student has access to. Like the first section, they were to circle either yes or no for **each** item. Again, students were to list each of the things in the table that they actually use.

Students were allowed to participate in activity for the rest of class. With five minutes remaining in class, students were told to return to their letters. They were instructed to get the fitness scavenger hunt worksheet from the front pocket of their workbooks. Their assignment was to take this home and find at least two things in their home for each of the categories. They were allowed to ask other family members for help. They were told to be creative, and to return the worksheet the next class period.

Lesson 16: Fitness Scavenger hunt

At the beginning of class, students were asked what types of resources they had available to them at home. The instructor listed all of them on the board. The instructor explained that there are many resources available to us, but many of us do not use these resources. The students were told to try to use at least one of the resources everyday.

Lesson 17: Goal Revision

Students were told that it is necessary to continue to monitor their goals. They should modify their goals if they find out that they are too easy or too difficult. They should also review if the goals that they have modified are still realistic. Last, they should modify their fitness plan to reflect their change in goals.

Students opened their workbooks to the Goal Tracking Worksheet. They wrote down their goals and whether or not they had achieved them. If they had not reached their activity goals, they wrote down why they thought that they did not meet their goals. Students modified their goals for the next several months for the time they would not be in physical education.

Analysis

Descriptive statistics were performed on all of the subscales, the knowledge test scores, and demographic data. A t-test for dependant groups was performed on the summated subscale scores from pretest to post-test.

Chapter 4

Students in sixth, seventh, and eighth grades in a private school received the 25-day intervention to increase self-regulatory knowledge and use of self-regulation skills. A self-regulation instrument, used to assess use of skills, was administered to students on the first and twenty-third day of the cycle. A knowledge test was administered on the last day of the cycle.

Results

Of the 94 students involved in the study, 72 provided usable data for the self-regulation subscales. Seven students did not fill out the questionnaire completely. If students left more than one answer per subscale blank, they were deleted from the data set. Data was also excluded if students failed to answer more than three questions on both the pre and post-tests. Of the seven students that were removed from the data set, 6 were excluded for skipping an entire page or subscale, and one was excluded for leaving more than three questions blank. The other 15 students did not provide usable data for one of the following reasons: they did not put their name or assigned letter on either the pre-test or the post-test, they were absent for one of the tests, came into the study late, or left the study early. Of the remaining 72 students, 19 students left one to three answers blank. Random substitution of values was used for these 19 students.

Beginning the study were 25 sixth, 37 seventh, and 32 eighth grade students with a mean age of 12 years (SD = .91). Of the 72 students included in the study, 20 were in sixth grade, 28 in seventh grade, and 24 in eighth grade. The mean height and weight of the students were 60.95 in (SD = 4.42) and 104.25 lbs (SD = 25.69), respectively.

Global Self-regulation for Physical Activity

Students completed the self-regulation instrument the first and last days of the cycle. Global self-regulation for physical activity was computed as the sum of the eight subscales. Since there were 57 questions and the item responses ranged from 0 to 4, the range of possible scores was from 0 to 228. Means and standard deviations for the non-weighted global self-regulation for physical activity variable are reported on table 1. The mean score on the pre-test was 51.29 (SD = 28.26). On the post-test, the mean score was 75.08 (SD = 75.08). The minimum score on the instrument for both the pre and post-test was 8, and the maximum on the pre-test and post-test were 126 and 158, respectively.

Table 1 Means and Standard deviations of pre-test and post-test

	N	Mean	Std. Deviation	Minimum	Maximum
Pre-test	72	51.29	28.26	8	126
Post-test	72	75.08	35.84	8	158

A dependant samples t-test was run to see if there was a significant difference between pre-test and post-test scores. The results are presented in table 2. With 71 degrees of freedom, the t statistic was –6.21 ($p<.001$).

Table 2 Non-weighted t-test on pre-test and post-test scores for global self-control for physical activity (n=72)

			95% Confidence Interval of the Difference				
Mean	Std. Deviation	Std. Error of Mean	Lower	Upper	t	df	p value
-23.79	32.5	3.83	-31.43	-16.16	-6.21	71	<.001

To weight each of the subscales equally, the number of questions on each subscale was multiplied by a number that would equal 10 (the highest number of questions on a subscale). For example, the tailoring subscale had 5 questions. The sum of the tailoring subscale was multiplied by 2 to provide an equal weight to reinforcement, which had 10 questions. The mean for the weighted global self control pre-test was 75.24 (SD = 38.99), and the mean for the weighted global self control post-test was 108.10 (SD = 49.79). The results of the dependant group t-test are presented in table 3. The result of the weighted global self-regulation t-test was also statistically significant, with a $t = -6.14$ ($p<.001$).

Table 3 T-test for weighted global self-regulation (n=72)

			95% Confidence Interval of the Difference				
Mean	Std. Deviation	Std. Error of Mean	Lower	Upper	t	df	p value
-32.86	45.42	5.35	-43.53	-22.18	-6.14	71	<.001

Descriptive Subscale Data

Scores for each of the subscales were calculated by summing the individual item scores for each subscale. The range of possible scores for each subscale is shown in table 4. Table 5 displays the actual range of summated scores on the pre-test and post-test. For each item five answer choices were coded 0 to 4. Tailoring for physical activity had two questions that were reverse coded, so the answer never was coded 4, and six to seven days per week was coded 0.

Table 4 Range of Possible Scores on Subscales

	Number of Questions	Minimum	Maximum
Self-monitoring	6	0	24
Goal Setting	7	0	28
Social Support	9	0	36
Environment	9	0	36
Reinforcement	10	0	40
Time-management	4	0	16
Self Efficacy	7	0	28
Tailoring	5	0	20

Table 5 Actual range for summated subscale scores

	Pre-test Minimum	Pre-test Maximum	Post-test Minimum	Post-test Maximum
Self-monit.	0	19	0	21
Goal setting	0	21	0	24
Social Support	0	28	0	27
Environmental	0	20	0	28
Reinforcement	0	33	0	35
Time Mgmt.	0	12	0	15
Self Efficacy	0	17	0	23
Tailoring	3	18	1	18

Table 6 displays means and standard deviations for the eight subscales on both the pre-test and post-test. On the pre-test, the mean score for self-monitoring was 6.67 (SD = 4.82). For goal setting, the pre-test mean score was 7.56 (SD = 6.10). The pre-test mean score for social support was 6.53 (SD = 6.25). For environmental aid, reinforcement, and time management, the pre-test means were 6.88 (SD = 4.88), 7.76 (SD = 7.20), and 2.6 (SD = 2.99), respectively. Finally, the pre-test means for self-efficacy and tailoring were 4.24 (SD = 4.49) and 9.07 (SD = 3.12), respectively.

On the post-test, the means for self-monitoring, goal setting, social support, and environmental aid were 8.92 (SD = 4.91), 11.79 (SD = 5.76), 9.29 (SD = 6.86), and 9.83 (SD = 6.09), respectively. For reinforcement, time management, self efficacy, and tailoring, the mean scores on the post-test were 12.99 (SD = 8.58), 4.31 (SD = 3.80), 7.96 (SD = 6.03), and 10.06 (SD = 3.06).

Table 6 Pre-test and Post-test Descriptive Statistics for subscales

	Pre-test mean	Pre-test SD	Post-test mean	Post-test SD
Self-monit.	6.67	4.82	8.92	4.91
Goal setting	7.56	6.10	11.79	5.76
Social Support	6.53	6.25	9.29	6.86
Environmental	6.88	4.88	9.83	6.09
Reinforcement	7.76	7.20	12.99	8.58
Time Mgmt.	2.6	2.99	4.31	3.80
Self Efficacy	4.24	4.49	7.96	6.03
Tailoring	9.07	3.12	10.06	3.06

Since it was hypothesized that the subscales under Self-Regulation Theory were related, they should also be correlated. Although not linked directly to the purpose of the study, correlations were run to see if constructs were related to each other. Correlations between subscales on the pre-test are reported in table 7.

Correlations between all subscales (self-monitoring, SM, goal setting, GS, social support, SS, environmental aid, EN, self-reinforcement, RE, time-management, TM, and self-efficacy, SE) were significant at $p<.01$ level with the exception of tailoring (TA) for physical activity. This subscale was not significantly correlated with any other subscale.

Table 7 Pearson Correlations for Pre-test Subscales (n=72)

	SM	GS	SS	EN	RE	TM	SE	TA
SM		.371*	.455*	.403*	.381*	.440*	.498*	.214
GS	.371*		.636*	.562*	.559*	.463*	.481*	.121
SS	.455*	.636*		.501*	.423*	.547*	.605*	.040
EN	.403*	.562*	.501*		.541*	.548*	.591*	.120
RE	.381*	.559*	.423*	.541*		.326*	.390*	.046
TM	.440*	.463*	.547*	.548*	.326*		.589*	.083
SE	.498*	.481*	.605*	.591*	.390*	.589*		.124
TA	.214	.121	.040	.120	.046	.083	.124	

*significant at p = .01

Table 8 shows correlations between subscales on the post-test. All subscales were significantly correlated at p = .01.

Table 8 Pearson Correlations for Post-test Subscales (n=72)

	SM	GS	SS	EN	RE	TM	SE	TA
SM		.580	.507	.428	.568	.548	.618	.320
GS	.580		.587	.496	.685	.480	.606	.471
SS	.507	.587		.662	.598	.675	.665	.370
EN	.428	.496	.662		.689	.484	.611	.326
RE	.568	.685	.598	.689		.576	.690	.437
TM	.548	.480	.675	.484	.576		.718	.340
SE	.618	.606	.665	.611	.690	.718		.535
TA	.320	.471	.370	.326	.437	.340	.535	

All correlations were significant at p = .01

Construct Validation of the Treatment

Results from the t-tests and knowledge test will be discussed first. Each unit will then addressed, including the number of lessons, t-test score for the subscale, and the items on the knowledge test related to the subscale.

Results of the subscale t-tests are displayed in table 10. To correct for an inflation of the alpha level due to multiple t-tests, a Bonferroni correction was used. An alpha of .006 was attained by taking the a priori alpha of .05, and dividing it by 8. Seven of the subscales, self-monitoring, goal setting, social support, environmental aid, reinforcement, time management, and self-efficacy were significant at $p < .006$. Tailoring ($p=.03$) was not significant.

Table 9 T-test for Dependant Groups on Subscales ($\alpha = .006$)

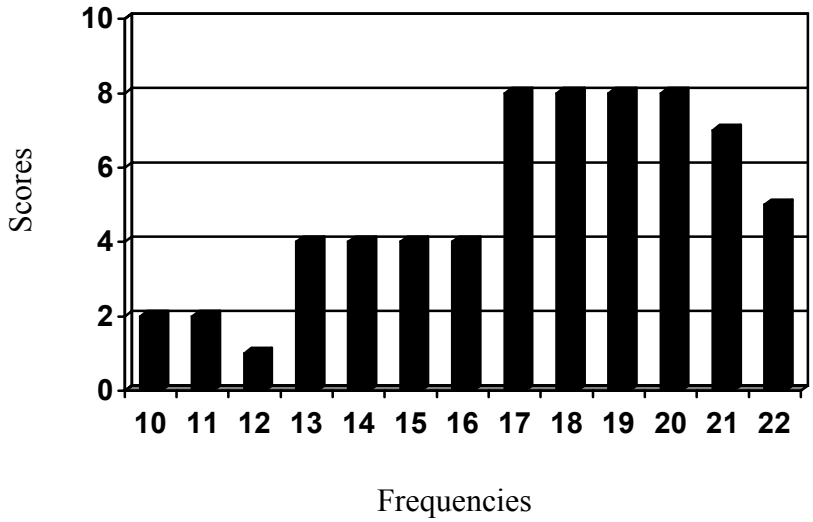
				95% Confidence Interval				
	Mean	Std. Deviation	Std. Error of Mean	Lower	Upper	t	df	P value
SM	-2.25	5.57	.66	-3.56	-.94	-3.43	71	<.001
GS	-4.24	6.10	.72	-5.67	-2.80	-5.89	71	<.001
SS	-2.76	6.72	.79	-4.34	-1.19	-3.49	71	<.001
EN	-2.96	5.79	.68	-4.32	-1.60	-4.34	71	<.001
RE	-5.22	8.81	1.04	-7.29	-3.15	-5.03	71	<.001
TM	-1.71	3.80	.45	-2.60	-.81	-3.812	71	<.001
SE	-3.67	5.59	.66	-4.98	-2.35	-5.56	71	<.001
TA	.986	.379	.45	-1.88	-.09	-2.20	71	.031

Knowledge test

A short-answer written test was given to the seventh and eighth graders at the end of the unit. The sixth grade students did not take the knowledge test. The

knowledge test measured how much the students knew about construct-related information at the end of the unit. Of the 65 students who took the test, the mean score was 17.5 out of 22. This is equivalent to a 79.5%. The median score was 18 out of 22. Figure 2 shows the frequencies of test scores. A passing score was considered a 70%, or 15.5. Since there were no half-points awarded, the passing score was considered a 16. Approximately 73% of students that took the exam got a score of 16 or above.

Figure 2 Frequencies of knowledge test scores



Construct Validation: Unit by Unit

The purpose of the construct validation was to assess if the intervention was sufficient to change reported use of construct-related skills from pre-test to post-test. To assess if use of skills increased, a t-test for dependant groups was completed on the Self-Regulation Instrument, with a priori alpha set at .006 (.05/8), since repeated

t-tests tend to inflate the alpha level. Scores on the knowledge test above a 70%, or 16 out of 22 were considered acceptable.

Self-monitoring

Three lessons were designed for this construct. Students were asked to write their physical activity in their activity logs on a daily basis. They used their activity logs to record their mileage for the walk to Cedar Point Program. The second lesson involved the use of pedometers. The last lesson used a one-day recall to assess their physical activity the previous day. The t-test between pre-test and post-test means for the self-regulation instrument was a –3.43, which was significant at $\alpha = .006$ level.

The knowledge test included two items for this construct. The first item asked students why it was important to keep track of their physical activity progress. Acceptable answers were: to keep track of their physical activity, intensity, how often they do the activity, or how long they do the activity so they know what they have done; to make sure that they are increasing the frequency, intensity, time, or changing the type of physical activity to challenge them; to help them see if they are reaching their goals, to help them plan for future activity frequency, intensity, time or type. The question was worth one point, and 78% of the students answered the question right. The second item asked students to give two examples of things they would write in their activity logs. Acceptable answers were (two of the following): type of activity (or an example of an activity), frequency (or an example of the frequency), intensity (or moderate or vigorous), or time. This question was worth two points. Two percent of students got zero points. The percent of students getting one

of the two answers right was 98%. Eighty-four percent of students got both answers right.

Goal Setting

Two lessons in the curriculum addressed goal setting. In the first lesson students learned about the three parts of a goal and set goals. In the second lesson, students revised their goals at the end of the cycle. On the self-regulation instrument, the summated mean scores were significantly different from pre-test to post-test ($t = -5.89$) at $\alpha = .006$.

The knowledge test included three items regarding goal setting. The first item asked students to identify the three parts of a goal. Students received one point for each of the parts of a goal. Acceptable answers were: the activity, how often they did the activity, and how long they did the activity. Half of the students (52%) correctly identified all three parts of a goal. Seventy-eight percent of students got at least two of the three parts correct. Eighty-eight percent got at least one point. Thirteen percent of students received zero points for their answers.

The second question asked students to write a physical activity goal, using the three parts of a goal. Answers varied, but had to include and example of a type of activity, how often they were going to do the activity, and how long they were going to do the activity for. The question was allotted one point, so answers including all three parts of a goal received a point. Answers that were missing one or more of the parts of a goal were awarded zero points. The percentage of students answering the question correctly was 58%.

The last question asked students why it was important to modify their physical activity goals. Acceptable answers were: if you reach you goal, you need to set new goals; if the goal was too easy or too hard, it is necessary to adjust it; to continually challenge themselves, etc. Sixty-three percent of students answered the question correctly.

Social Support

Two lessons were devoted to social support. A newsletter was sent to parents detailing different ways that they could support their child during this unit. The second lesson was a physical activity contract that involved a fitness buddy. The change from pre-test to post-test on the social support subscale of the self-regulation instrument ($t = -3.49$) was significant at $\alpha = .006$.

One question (one point) on the knowledge test asked students to identify how a fitness buddy could help them be physically active on a regular basis. Acceptable answers were: the buddy could encourage them to be active, they could set aside times to be active with their buddy, their buddy could help motive them (stay focused), exercising with a buddy is more fun than exercising alone, their buddy could remind them to workout, etc. Of those that completed the knowledge test, 97% answered the question correctly.

Environmental Aid

Two lessons addressed environmental resources for physical activity. In the first lesson students completed a worksheet, which asked what facilities and

equipment were available to them and if they used them. The second lesson was a fitness scavenger hunt, where students had to find resources in their home. On the environmental aid subscale of the instrument, the summated mean scores changed significantly from pre-test to post-test ($t = -4.34$) at $\alpha = .006$.

The knowledge test included one item asking students to name something they found at home that they could use to help them be regularly physically active. There were many acceptable answers. Answers given no credit were: their bed, their computer, or no answer. The television was acceptable as an answer if they said that they could lift weights or do some sort of cardiovascular activity while watching it. Ninety-four students answered the question correctly.

Self-reinforcement

One lesson, regarding intrinsic and extrinsic rewards, was designed for the curriculum. Students learned the difference between intrinsic and extrinsic rewards, and listed examples. The self-reinforcement subscale score changed significantly ($t = -5.03$, $\alpha = .006$)) from pre-test to post-test.

The knowledge test contained one item, where students were asked to list one example of an intrinsic reward and one example of an extrinsic reward. The question was valued at two points, one for each correct example. Acceptable answers varied, but may have included: (intrinsic) feel good, feel more awake, feel happy, feel proud, feel sense of accomplishment, feel better about self, feeling more healthy, etc; (extrinsic) get a CD, buy clothes, have a treat, get a trophy, looking better, etc. Six percent of students did not get any points for their answers. Ninety-four percent of

students got one or more points. Seventy-eight percent of students got both answers correct.

Time-management

One lesson addressed time-management. Students filled out a one-day physical activity recall, and added the minutes they spent in each intensity column. Students were told to look for a place in their day to fit physical activity in. Students also discussed different ways to add activity into their day. The change from pre-test to post-test on the time-management subscale ($t = -3.81$) was significant at $\alpha = .006$.

The knowledge test included one item asking students to name one way that they could add physical activity to their day. Acceptable answers were: walk the dog after school, walk to school instead of riding the bus, play outside instead of watching television/playing videogames, lift weights while watching television, set aside time to do physical activity, etc. Eighty-eight percent of students answered the question correctly.

Self-efficacy

Five lessons were developed for self-efficacy. The first four lessons gave the students background knowledge regarding fitness (use of machines, components of fitness, moderate versus vigorous activity, and FITT). The fifth lesson asked students to identify barriers to physical activity, and ways to overcome each barrier. The self-efficacy subscale score changed significantly ($t = -5.56$) at $\alpha = .006$.

The knowledge test included six items related to self-efficacy. The first question asked students to list one of the components of fitness measured in class. Acceptable answers were: cardiovascular endurance, muscular strength, muscular endurance, and flexibility. Eighty-eight percent of students included one of the above answers. The second and third questions asked students to give one example of a moderate and one example of a vigorous activity. Answers varied, but sample answers are: (moderate) walking, weight training, skateboarding, light jogging, etc; (vigorous) running, basketball, swimming laps, tennis, soccer, etc. Eighty-six percent of students correctly identified a moderate activity, and 97% correctly identified a vigorous activity. The fourth question asked students to define what a barrier to physical activity was. The acceptable answer was: something that keeps you from being physically active. Eighty-one percent of students got the answer correct. The last question asked students to list an example of a barrier to physical activity and one way to overcome the barrier (2 points). Acceptable answers varied, but included: (barriers) too tired, no time, weather, no energy, etc.; (ways to overcome) do short sessions of physical activity, set aside time, watch less television, work-out inside, take a short walk to wake-up, etc. Eight percent of students received zero points for their answers. Ninety-two percent of students got at least one point, and 72% of students got two points.

Tailoring

Three lessons addressed tailoring during the intervention. The first lesson asked students about their physical activity history and about their activity

preferences. The second lesson had students complete comfort zone activities, where they engaged in activity at different intensities and rated how they felt. The third lesson asked students to complete a fitness profile and a personal fitness plan. Changes in subscale scores were not significant ($t = -2.20$, $p=.031$) at $\alpha = .006$.

The knowledge test included three items for the tailoring construct. The first item asked students why it was important to take their pulse while they are exercising. Acceptable answers were: to see if you are working too hard, to see if you are not working hard enough, to stay in your comfort zone, to stay in your target heart rate zone, etc. Eighty-six percent of students wrote an acceptable answer. The second question asked students to give an example of how they could use the FITT principle to change their physical activity. Acceptable answers involved the following concepts: change the frequency, intensity, time, or type of activity to make the workout harder/easier. Only 38% of students gave an acceptable answer. The last question asked students how they could use comfort zones to increase how often they are physically active. Acceptable answers included the following concept: if you are comfortable and/or enjoy the activity, you can do it more often. Half (50%) of the students gave an acceptable answer.

Conclusions from Construct Validation

It appeared that the intervention, based on 8 constructs under Self-Regulation, was construct valid. All subscales were significantly changed from pre-test to post-test, with the exception of tailoring. It is likely that this lack of significant change in tailoring may be due to the new instrument used to measure the construct. An

existing instrument designed to measure tailoring was not available, so one was developed for this study. Modifications and more testing need to be completed on the instrument to assess its validity and reliability. The intervention did change the remaining constructs, and is acceptable to use in another study to assess if the intervention changes physical activity behavior.

Assessment of Acceptability and Practicality

The teacher was instructed to fill out a guided feedback form for each lesson. After the first group of students received the intervention (sixth grade), a few lessons were allotted more time, and some directions were rewritten with more detail to enhance student understanding. Each lesson is listed below along with comments from the teacher from the lesson.

Sixth grade

Lesson 1

For the sixth graders, the first lesson consisted of taking height and weight. This lesson was covered in the allotted time, and students were excited to begin the new unit. Several students did not wish to have their weight recorded.

Lesson 2

In lesson 2, students filled out the self-regulation instrument and the physical activity history worksheet. The lesson filled the entire class period. Students complained about the paperwork.

Lesson 3

Lesson three involved stations where students could try out different types of equipment such as physioballs, a treadmill, a stationary bike, and an elliptical trainer. At the treadmill, bike, and elliptical trainer station, students were given instructions

on how to use the equipment properly. Since the sixth grade was split into two classes, there was enough time to do this lesson in the time allotted. However, the seventh and eighth grade sections will need to have two days to complete this lesson. Overall, the students were extremely interested in using the new equipment.

Lesson 4

Lesson four consisted of filling out the Previous Day Physical Activity Recall. The sixth grade group took more time to fill this out than expected. Students had many questions and complained that they wanted to play basketball instead.

Lesson 5

This lesson included a heart rate activity and the first day with pedometers. The heart rate activity had to be cut short so that the teacher could introduce the students to the pedometers. Students expressed interest in both topics in this lesson, including the pedometer homework. The teacher suggested that the lesson be split into two days, one for the heart rate activity and one for the pedometer activity.

Lesson 6/7

These lessons included introducing the students to moderate and vigorous activity as well as completing the comfort zone activity. Students enjoyed working on the fitness equipment. However, since there was only one of each piece of equipment, the lesson took longer than expected. The amount of time spent at each speed on the fitness equipment had to be shortened so that all students could have a

turn. The teacher felt that students were a bit confused with the worksheets for comfort zones. When the seventh and eighth grade classes complete this lesson it was estimated that it would take twice as long. It will therefore be allotted more time.

Lesson 8

Lesson eight was the goal setting lesson. The teacher felt that the sixth graders had a tremendous amount of difficulty understanding the goal setting process, and they did not understand how they could apply goal setting to their lives. Since the teacher felt that the seventh and eighth graders would understand the process better, the lesson was not modified.

Lesson 9

The topic for lesson 9 was rewards. This lesson was completed in the correct time, and the students seemed to understand the topic. Since the students did not set realistic goals in the previous lesson, it was difficult to have them match rewards to their goals. The teacher commented that it would be helpful to check the students' goals before the reward lesson.

Lesson 10

In this lesson, students learned what the FITT principle was, and completed a fitness assessment. The lecture portion took longer than expected, so the fitness

assessments were pushed back one day. Even with the extra day, it was difficult to fit all of the assessments into one day. Therefore, the activity was allotted three days for the next two groups.

Lesson 11

Limitations and preferences were the topics of this lesson. The lesson was completed in the allotted time. Students were bored with the material and wanted to be more active.

Lesson 12

This lesson involved students developing personal fitness plans, and was completed in the allotted time. The teacher reported that students had mixed reactions to the lesson, but that the major complaint was that they wanted less paperwork and more activity.

Lesson 13

In this lesson, students were given 1-day recalls for their parents to fill out. This lesson was covered in the allotted time. However, the teacher commented that it was picture day, so the students were less attentive than usual. The students were excited that their parents had homework instead of them.

Lesson 14

The fitness buddy assignment was a short lesson, so students were happy that they had the chance to be active most of class. The lesson was completed in the time allotted.

Lesson 15/16

This lesson was a combination of the barriers and resource lessons. Both were completed in the time allotted. Students commented that they preferred to be more active.

Lesson 17

Since students did not understand goal setting, they also did not know how to revise goals. At this point in the cycle, the students were bored with their notebooks.

Grades 7 & 8

Lesson 1

Lesson one consisted of taking student height and weight. Again, some students did not want to have their weight recorded.

Lesson 2

Students filled out the self-regulation instrument. Students complained about the paperwork and wanted to engage in activity.

Lesson 3

Students were introduced to the fitness equipment. This lesson took longer than expected with a larger group. Students were interested in using the equipment and had few complaints.

Lesson 4

Students filled out the PDPAR. The seventh and eighth grade groups took less time to fill the instrument out, and did not have as many problems as the sixth graders. The teacher commented that the students who were primarily sedentary according to their recall were surprised at their inactivity.

Lesson 5

Students were introduced to the pedometers and given the pedometer homework. This lesson took longer than expected since there were more students in the seventh and eighth grade groups. Students were eager to wear the pedometers, but had trouble turning in their homework. The teacher suspected that some students may have "cheated" by shaking the pedometers.

Lesson 6/7

Students completed the comfort zone activity. Again, this lesson took longer than expected due to the large number of students. The teacher commented that the

students goofed around at the other fitness stations, but were attentive when using the treadmill, bike, and elliptical trainer.

Lesson 8/9

Students were introduced to goal setting and rewards. The seventh and eighth graders seemed to understand both topics better than the sixth grade group did. Students again complained about the paperwork and wished to be more active.

Lesson 10

Students completed the fitness assessments. The lesson took three days to complete because of the number of students in the class. Students did enjoy completing the tests, and enjoyed being able to see their results.

Lesson 11/12

This lesson combined limitations and preferences with the personal fitness plan. The combined lesson took the entire class session, and students complained about the paperwork.

Lesson 13/14

This lesson combined the parent PDPAR, buddy assignment, and barriers to physical activity. The above topics were covered in one class period. Students continued to complain about the paperwork.

Lesson 15/16

Barriers, fitness resources, and the scavenger hunt were covered in this lesson. Students did not enjoy working in their workbooks, and thought the fitness scavenger hunt was “goofy”.

Lesson 17

Students revised their goals in this lesson. As mentioned in prior lessons, the students complained about the paperwork and were happy to be done with the workbooks.

Summary of teacher feedback

As reported by the teacher, the largest problem with the lessons was the amount of time that it took to complete the activities. Since the seventh and eighth grade classes were large, it was difficult to finish activities involving the fitness equipment in the time allotted. The teacher felt that the intervention as a whole was useful, but that students were uncomfortable with the amount of paperwork that accompanied the lessons. The most common theme regarding student comments throughout the intervention was that students wanted less paperwork and more activity. In this school, it has been the physical education teacher’s experience that most students use physical education as a physical release in the school day. Students in junior high have also become accustom to the traditional sport-based model of physical education. The teacher suggested that younger children might be more accepting of the intervention, as they have not adopted the traditional physical

educational model as the norm. Since sixth graders seemed to have difficulty with some of the lessons, it will be necessary to modify the intervention lessons and instructions so that it is more age-appropriate.

Chapter 5

Conclusions

To date, few construct validations of physical activity interventions have been completed.(Calfas, 1997; Edmundson, Parcel, Feldman, & Elder, 1996) Many researchers skip from descriptive literature to large-scale studies to change physical activity. One intermediate step, construct validation, would help researchers decide if the results of the study were actually due to the intervention. A construct validation involves evaluating whether or not the intervention impacted theoretical constructs. If theoretical constructs are shown to change significantly in a construct validation, then next logical step would be to test if the intervention changes behavior.

Global self-regulation

The non-weighted maximum score on the global self-regulation instrument was 228. The means for both the pre-test (M=51.29, SD = 28.26) and post-test (M=75.08, SD = 35.84) were low in comparison with the maximum value. Since students are unlikely to have learned these skills and techniques prior to the intervention, it is expected that they would have low pre-test values. Although the post-test values increased by about 47%, the values are still low. A mean of 75 would average out to students saying that they do the skills or activities one-day per week. Since no standard exists for how often people should do these techniques, it is

unclear whether this change is sufficient to change physical activity behavior.

Weighting of each subscale was completed to see if the varying number of questions contained in each subscale had an affect on the significance of global self-regulation. If the weighted self-regulation scores were not significantly changed from pre-test to post-test, then the question arises whether one or two subscales were biasing the overall score. Since the weighted global self-regulation result was similar to the non-weighted self-regulation result, the conclusion can still be made that global self-regulation was significantly changed from pre-test to post-test.

Pearson Correlations

All subscales were significantly correlated (p=.01) on the pre-test except for tailoring. Since this scale is new, it may be that it has not been developed fully to date. It was, however, significantly correlated to all other subscales on the post-test. All subscales were significantly correlated on the post-test. Since all constructs are thought to be related in this theory, they should all be significantly correlated with each other. The correlations improved from the pre-test to the post-test. One possible reason for this is that adolescents may not have been experienced in thinking about and using self-regulatory skills. During the intervention, they were exposed to self-regulation, which may have played a part in the higher correlations at post-test.

Construct Validation of the Treatment

The first portion of this section will discuss the global self-regulation results. The following sections will provide a unit-by-unit discussion. Global self-regulation for physical activity and seven of the eight subscales used to measure global self-regulation for physical activity were significant at $p = .05$, or, for the subscales, $p = .006$. Since the intervention was fashioned around the self-regulation instrument, this is a logical outcome. It is fair to say, then, that the change in self-regulation scores from pre-test to post-test in this group was likely due to the intervention.

Self-monitoring

Three lessons targeted this construct. Out of a possible summated score of 24, the mean pre-test value was 6.67 (SD = 4.82) and the mean post-test value was 8.92 (SD = 4.91). The post-test value increased about 33% from pre-test. This change would roughly equate to increasing from never to one to two days per week on two items (out of the six). Although no standard exists for this instrument in an adolescent population, the mean scores seem low in comparison with the possible score. On the self-regulation instrument, the t statistic was –3.43 ($p<.001$). Of the two questions in the knowledge test, 78% got the first self-monitoring question right, and 84% got both parts of the second question right. It seems that students had sufficient knowledge at post-test, as shown by the percent of students that passed the item. It would seem that the three lessons taught were sufficient enough to increase

use of the techniques, as well as give students the proper knowledge answer the test items correctly.

Goal setting

Two lessons were used to address this construct. The means for pre-test (M = 7.56, SD = 6.10) and post-test (M = 11.79, SD = 5.76) on the self-regulation instrument were low in comparison with the maximum possible score of 28. However, the post-test score increased by 55%. The t statistic (t (71) = -5.89)For reference, this change could equate to either a one-point change in four items (increasing to one to two days per week), or a four-point change in one item (increasing from never to six to seven days per week). Of the three questions on the knowledge test addressing goal setting, 52% of students could name the three parts of a goal. Since many students could not do this, they also had trouble with the second question, where they had to write one example of a goal. Only 58% could do so. It is speculated that the difference between the first and second question percentages was due to students forgetting the exact terminology asked for in the first questions. The last question in the knowledge test involved goal revision – 63% of students got credit for their answers. It is interesting that the students' use of the skills increased 55% from pre-test to post-test, but that student knowledge was lacking at the end of the intervention. A possible explanation may be that students were forced to set goals in class, and they may have reported this on the instrument. In other words, the increase may or may not reflect their use of goal setting outside of class.

Social Support

Two lessons were developed to attempt to increase social support. Although the maximum score for the social support subscale was 36, student's pre-test (M = 6.53, SD = 6.25) and post-test (M = 9.29, SD = 6.86) scores were low. There was about a 48% increase in scores from pre-test to post-test. The t-statistic (t (71) = -3.49) was significant at $p<.001$. The knowledge test included one questions regarding fitness buddies. Ninety-seven percent of students answered the question correctly. It seems that the lessons gave the students sufficient knowledge to understand the purpose of having a workout buddy. Although it appears that the two lessons aimed at increasing social support may have been sufficient, it is impossible to say this with certainty, since there was no comparison group.

Environmental Aid

Two lessons were designed for this construct. Out of a maximum 36 on the self-regulation instrument, the mean score for the pre-test was 6.88 (SD = 4.88) and the score on the post-test was 9.83 (SD = 6.09). The t statistic (t (71) = -4.34) was significant at $p<.001$. This was a 42% increase in scores from pre-test to post-test though the mean score at post-test was still relatively low. This would roughly equate to student changing from never to four to five days per week for one item, or increase one point on three items. The knowledge test asked students to list one item that they found to help them be regularly physically active. Ninety-four percent provided acceptable answers. It would seem from change in environmental aid that the two lessons were sufficient to produce change in this self-regulation subscale. Students

also possessed an acceptable amount of knowledge, as found from the results of the knowledge test, about environmental aid. Again, without a comparison group, a level of uncertainty exists.

Self-reinforcement

One lesson was developed to teach the students the difference between intrinsic and extrinsic rewards. Mean scores from the self-reinforcement subscale on the pre-test (M = 7.76, SD = 7.2) and post-test (M = 12.99), SD = 8.58) were low in comparison with the maximum score of 40. The t statistic (t (71) = -5.03) was significant at $p<.001$. However, there was a 67% increase from pre-test to post-test scores. A concrete example of this change could equate to a change in answers from never to one to two days per week in half of the items. The knowledge test included one, two-point item asking students to identify one intrinsic and one extrinsic reward. Ninety-four percent of students could correctly give an example of one type of a reward. Only 78% could give an example of both types of reward. Some students only listed one answer, which is a part of the reason that only 78% of students gave two correct answers. Although only one lesson addressed self-reinforcement, it seemed that students increased their use of self-reinforcement from pre to post-test. The teacher felt that the seventh and eighth graders did not have difficulties with identifying intrinsic and extrinsic rewards, so it is puzzling why only 78% of students gave two correct answers.

Time-management

One lesson was devoted to time-management. The mean scores on the time-management subscale for pre-test (2.6, SD = 2.99) and post-test (M = 4.31, SD = 3.8) were low in comparison with the maximum score of 16. The t statistic was significant at $p<.001$. This was a 66% increase from pre-test to post-test scores. This change could equate to either a two-point jump on one of the questions, or a one-point jump on two of the questions. The knowledge test asked students to identify a way that they could add physical activity into their day. Eighty-eight percent of students provided acceptable answers. It would seem that the lesson on time-management was sufficient to change students' use of time-management strategies.

Self Efficacy

Five lessons were developed for the self-efficacy construct. Out of a maximum score of 28 on the self-efficacy subscale, the mean pre-test (M = 4.24, SD = 4.49) and post-test (M = 7.96, SD = 6.03) scores were low. The t statistic ($t(71) = -5.56$) was significant at $p<.001$. This was a 42% increase from pre-test to post-test scores. An example of such a change would be for four items to change one point, or for one item to change from never to six to seven days per week. The knowledge test assessed student knowledge of several fitness concepts. Regarding the components of fitness, 88% provided one acceptable answer. Students had more difficulties identifying moderate behavior (86% gave a correct answer) than vigorous behavior (97% gave a correct answer). One possible explanation for this may be that students equate the terms "physical activity" and "vigorous activity". Many were unaware

that some activities they do are moderate in intensity. Other students wrote sports like soccer or basketball in for moderate. Another question asked students to write the definition of a barrier to physical activity – 81% answered correctly. Students were then asked to write an example of a barrier, and a proper way to overcome the barrier. Ninety-two percent of students correctly identified a barrier to physical activity, but only 72% identified a correct way to overcome the barrier. The most common reason for a missed second point was lack of specificity in their overcoming strategy. It would seem that these five lessons formed a solid basis for changing self-efficacy subscale scores. The lessons also seemed to provide the students will sufficient knowledge regarding fitness concepts and barriers to physical activity.

Tailoring

Three lessons addressed the tailoring construct. Although the maximum score for the subscale was 20, the mean pre-test score was 9.07 (SD = 3.12), and the post-test score was 10.06 (SD = 3.06). This is an 11% increase in subscale scores. The t statistics ($t(71) = -2.20$, $p = .031$) was not significant at the $p = .006$ level. Since this scale is new, it may be that the tailoring was not measured adequately. This subscale needs to be investigated and reexamined by a panel of experts to assess if tailoring is addressed sufficiently. The knowledge included three items for this subscale. The first item queried students about the importance of monitoring your heart rate. Eighty-six percent of students answered correctly. The question regarding the use of the FITT principle seemed to stump the most students, with only 38% providing correct answers. The most common error on this question was that students listed

what FITT was instead of how to use it. Students may have misinterpreted the question. The last question involved comfort zones – 50% of students provided correct answers. As suggested by the low knowledge scores on the last two questions, students did not possess an adequate amount of knowledge at the end of the intervention. Although the lessons followed a logical progression, it seems that students had difficulty with knowledge of tailoring. It may be that students of this age lack the ability to come upon the link between the activities – they may lack the cognitive skills to conceptualize such a progression. This lack of understanding of the concept may also have a negative affect on use of the skills.

Summary

The evaluation revealed that the intervention was effective in increasing use and knowledge of self-regulation for all subscales except for tailoring. Pre-test values on all subscales were low as were post-test values, even though the change was statistically significant. No norms exist as to what a "typical" score on the self-regulation instrument is for adolescents. No dose-response relationship exists for self-regulation score change and change in physical activity, so it is unclear whether or not this intervention is sufficient enough to increase physical activity levels, since physical activity was not measured. Since there was no comparison group, it is difficult to say with certainty that the intervention precipitated the change in self-regulation scores.

One confounding factor that may have played a part in the change from pre-test to post-test was the nature of the instrument. The directions of the instrument ask

students how many times per week in the past 30 days they used the skills in the items. The post-test was taken during the last week of the intervention. It is unclear whether some students answered the questions according to their use of the skills in class or outside of class. However, in both the pre-test and post-test, the lower limit in the scores began at 0. This means that some students answered that they never used the skills in the past 30 days. In future studies, the directions should clearly state that the skills were used outside of class, or the post-test instrument needs to be given 30 days post-intervention.

Since the intervention took place in Pittsburgh, Pennsylvania, it was impossible to observe each lesson to see if it was implemented exactly as planned. The physical education teacher also requested not to be audio or videotaped. Instead, one focus of this study was to use the teacher's perspective on each lesson to assess the practicality and acceptability of the intervention. The results of this assessment are reported below.

Practicality/Acceptability

As mentioned earlier, the students did not enjoy completing the paperwork. They continually asked if they could do some sort of activity rather than fill out the workbooks. Although this fitness unit took the place of the health unit, which is also in lecture format, the students still equated it to regular physical education. This may have been in part due to the excitement of having new equipment or to the fact that, since the unit was mixed in formats, students may have just continually expected activity rather than lecture. In the future, it would be useful to either have one lecture

class followed by four activity days, or to have the lecture occur concurrently in another class.

As mentioned in the previous chapter, the physical education teacher felt that the intervention might have been more accepted by a younger group of students. Although some of the lessons were difficult for the sixth graders, modifications could be made to make the content more age-appropriate. The teacher felt that junior high students expected to be physically active during physical education, and that the paperwork was something new and unpleasant to them.

One unexpected occurrence during the intervention was that several lessons had to be taught in one day, since students were pulled out of physical education for one reason or another. This may have caused some lessons not to be covered in their entirety. Some parts of the activities had to be cut out so that all students could complete the activity. For example, in the comfort zone homework, students were told to take their heart rates while on the fitness equipment as well as record how they felt during and after the activity. Students were taking too much time to complete the activity while on the equipment, so the teacher had to take the heart rate portion out of the activity.

Student workbooks were created to keep all the students' assignments together. Some students filled the workbooks out completely, while others chose to fool around and not take the workbooks seriously. Some of the seventh and eighth grade students thought some of the lessons were "goofy." The sixth graders, although unhappy with the paperwork, seemed to accept the activities and assignments more than the seventh and eighth graders.

Junior high students are a difficult group to work with. It is at this general time that students start to try to become more independent. At the same time, however, peer influences are a strong motivating factor in adolescent's lives. In looking at the difference between a sixth, seventh, and eighth grader, it is amazing to see how quickly social norms and independence become important to an adolescent. The sixth graders were easier to work with, although they did have some trouble with a couple of the lessons. The seventh and eighth graders were more difficult, partly because they were constantly complaining about the unit.

The activity portions of the unit were generally more accepted by all students. During the kickboxing class, most students participated and stayed on task the entire class. Even students that previously had problems focusing on activities in the past seemed to stay on task and enjoy the class. In the seventh and eighth grade class, though, there were still a couple students that had to be removed from the class for behavior problems. These exceptions aside, it may be said that short lectures followed by numerous activities may be the best way to reach students.

Discussion

This study provides preliminary evidence that a 25-day physical education intervention can significantly increase knowledge and use of self-regulation skills for physical activity among sixth, seventh, and eighth graders. It would be interesting to see if longer or shorter interventions have similar effects.

Even though the measures were significantly changed, there are still changes that need to be made to the intervention. First, the instrument could be further

modified. Some of the subscales, such as time-management or tailoring, may be too short to capture the subscale in its entirety. Even though a panel of experts assessed face and content validity, there may be more items that could help assess the construct. A factor analysis of the instrument items needs to be completed to further validate the instrument. Also, the instrument could be modified so that it would be less likely to cause students to miss single items. For example, each question could be highlighted in a different color, say white or gray, so that it is easier for students to keep track of which question they are answering. Some of the items also may not match the scale given for students to answer. For example, questions regarding long-term goals may not warrant answer selections in days per week. All items need to be reviewed to see if the answer scale is logical for the skill or technique in question. Test-retest reliability measures should also be taken as the instrument is revised.

Second, students frequently complained about the amount of paperwork. The optimal situation would have been to lecture during health class and to have concurrent activities in physical education. This was not possible in this study nor may it be possible in most school settings. In general, students are not required to take many credits of physical education, and many of them elect to take a version of physical education in the summer.

Limitations

Since this is a private school with few students per grade, a comparison group was not possible. There is only one physical education instructor, and she sees all students from kindergarten to eighth grade. The seventh and eighth grade groups

were split into a seventh grade only, a seventh and eighth grade mix, and an eighth grade only group. Therefore, there was no opportunity to use half the students in each grade as a comparison group. Also, since this study occurred in a school, there was no opportunity for random selection or assignment of students to groups.

The ability to generalize the results of this study to other populations is limited. This school is filled with a select group of students, since parents have to pay $6,000 per year for their child to attend. The school also had access to resources that most other schools would not have. Most schools will not have the funding to purchase fitness equipment for students to use during physical education.

Modification of the lessons occurred from sixth to seventh grade, as mentioned in Chapter 3. After each lesson, the teacher wrote comments on time allotment, student understanding, and general concerns about the lesson. The teacher and researcher discussed the log and overall intervention after the first group, sixth grade, to modify lessons for the subsequent groups. Only a few minor changes were made to lesson content, and several lessons were given multiple days for completion for subsequent groups. Overall, the format of the intervention remained intact. The knowledge test was added after the first group had already completed the intervention. Because the teacher felt that the sixth grade group had difficulty grasping some of the lessons, the decision to create a knowledge test was made. Since the self-regulation instrument measured students' use of the skills and knowledge, it was important to discover if the students actually learned the concepts.

APPENDIX A

SELF-REGULATION INSTRUMENT

Instructions:
This scale measures your actual use of techniques to increase or maintain physical activity. Circle the choice that best describes your actual use of these techniques within the past 30 days.

There will be five answer choices:
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Physical Activity is any regular physical movement, play, sport, or exercise that you do to maintain/improve your fitness or health. Examples include: walking, jogging, tennis, basketball, soccer, swimming, football, aerobics class, bicycling, etc.

Self-monitoring

1. I kept track in my head **how often** I did physical activities.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

2. I kept track in my head of **specific things that helped me** be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

3. I kept track in my head of specific things that **hindered my ability** to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

4. I wrote down **how often** I did physical activity.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

5. I wrote specific things that **helped me** be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

6. I wrote down specific things that **hindered my ability** to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Goal setting
7. I created **short-term goals** related to **how often** I am physically active. Example: I will run Monday, Wednesday, and Friday this week.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

8. I created **long-term goals** (monthly or longer) related to **how often** I am physically active. Example: I will swim 3 days a week for the next two months.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

9. I created **goals** for physical activity **time or distance** Example: I will swim 20 minutes or I will bike 3 miles.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

10. I created physical activity **goals** that **focused on my health**. Example: I will be physically active 3 days a week to feel better.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

11. I created physical activity **goals** that **focused on my appearance**. Example: I will be physically active 3 days a week to lose 10 pounds.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

14. I set **goals** for physical activity **in my head**.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

15. I **wrote down** my physical activity **goals**.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Social Support

12. I made a **written agreement** with someone else to be physically active on a regular basis.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

13. I made a **verbal agreement** with someone else to be physically active on a regular basis.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

16. I was able to get someone to help me be physically active on a regular basis.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

17. I exercised with a pet to help me be physically active on a regular basis.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

18. I **received praise** from someone for being physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

19. I **received a reward** from someone for being physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

20. I asked someone to remind me to perform physical activity.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

21. I asked someone to assume some of my chores so that I could be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

22. I asked someone for advice or demonstration of physical activities.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Environmental Aid

23. I placed physical activity equipment where I would see it to remind me to be active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

24. I placed posters or pictures where I would see them to remind me to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

25. I wrote a note to remind myself to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

26. I listened to music while I was physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

27. I watched television while I was physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

28. I read while I was physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

29. I used home physical activity equipment to help me be active on a regular basis.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

30. I used a local exercise facility/club to help me to be physically active on a regular basis.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

31. On trips away from home, I find ways to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Self-reinforcement

32. I reward myself for being physically active (snack, watch TV, see a movie, buy a gift).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

33. I reward myself for reaching health goals related to physical activity (improve fitness).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

34. I reward myself for reaching appearance goals related to physical activity (weight loss, tone body).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

35. I punish myself for not being physically active (do not get reward).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

36. During physical activity, I focused on how good I felt.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

37. After I was physically active, I focused on how good I felt.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

38. I reminded myself of positive health benefits of physical activity (Improve fitness)
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

39. I reminded myself of how physical activity makes me look better (lose weight, tone body).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

40. I reminded myself of health problems of not being physically active (heart disease).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

41. I reminded myself of appearance problems of not being physically active (gaining weight).
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Time-management

42. I set aside time periods to be physically active in my head.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

43. I wrote down specific times to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

44. I rearranged my schedule of other activities to be sure that I had time to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

45. If I had conflicts with my scheduled time periods for physical activity, I chose to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Self-efficacy

46. In my head, I noted barriers that influence my ability to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

47. In my head, I planned ways to overcome barriers to my physical activities.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

48. I wrote down barriers that influenced my ability to be physically active.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

49. I wrote down ways to overcome barriers to my physical activities.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

50. I asked others to identify barriers to my physical activities.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

51. I planned ways to be physically active when I'm on trips away from home.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

52. I planned ways to be physically active during bad weather.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

Tailoring

53. I adjust the speed of my physical activity so I am comfortable.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

54. I adjust how long I do physical activity so I am comfortable.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

55. I do physical activities that are "good for you" rather than fun.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

56. I do physical activities "as hard as I can" to get the most benefit.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

57. I plan different types of physical activities to make it fun. Example: Jog one day, swim one day, play tennis one day each week.
Never 1-day/week 2-3 days/week 4-5days/week 6-7days/week

APPENDIX B

STUDENT WORKSHEETS

Physical Activity History

Please read each question, circle yes or no, and list activities.

1. Where you involved in any sports when you were younger? ***Yes No***

If so, what sports did you participate in?

_____

_____

2. Are you involved in any sports now? ***Yes No***

If so, what sports are you involved in?

_____

_____

3. **Do you participate in any type of physical activities outside of sports?** **Examples: bicycling, walking, swimming, aerobic dance, weight training, running** ***Yes No***

If so, what type of activities?

_____

_____

4. List your activities and sports that you participate in now, and write how many days per week and hours per day that you spend doing each. **Use the back of this form if needed.**

Activity ***Days Per Week*** ***Hours Per Day***

_____

_____

_____

Fitness Profile

List some of your experiences with physical activity in the past. Include if you enjoyed participating in the activity. Also, include why you stopped the activity.

_____

_____

Do you have any medical conditions (asthma, bone/joint problems) that would keep you from doing certain activities?_____

_____

What types of physical activities do you enjoy? Include both sports and other physical activities (such as walking)._____

_____

For the following question, circle the answer tin each pair hat best describes what you prefer:

When I am physically active, I . . .

like competition	do not like competition
like moderate activity	like vigorous activity
like to be with other people	like to be by myself
listen to music	do not listen to music
like to be indoors	like to be outdoors

Looking at your answers above, what types of activities would include most of your preferences?_____

Heart Rate Worksheet

There are two places that you can take your pulse: the thumb side of your wrist and your neck. Press lightly with your index and middle fingers on either site. When you count, you should start with zero. If you time yourself for 6 seconds, then you add a "0" to the end of the number to find your heart rate in one minute. (6 seconds X 10 = 60 seconds)

Sitting quietly

Sit quietly for 3 minutes. Record your heart rate_____

Walking

Walk around the gym for 5 minutes. Record your heart rate_____

Jogging

Jog for 5 minutes around the gym. Record your heart rate_____

Running

Run fast for 3 minutes around the gym. Record your heart rate_____

Other Activities

Try a variety of other activities. List each below, and record your heart rate.

Activity	Heart Rate

CALCULATING TARGET HEART RATE

(220-age)(60%) = Low target heart rate
(220-age)(90%) = High target heart rate

Step 1: Find resting heart rate

Sit quietly for five minutes. After five minutes, stay seated and take your pulse for one minute. This is your resting heart rate.

Resting Heart rate:_____

Step 2: Maximum heart rate

Fill in the equation and finish calculating:

220-_____ = _____
Age Maximum Heart Rate

Step 3: Low target heart rate

Fill in the equation to find the lower end of your target heart rate zone:

(_____*.60) =_____
Maximum HR Low Target

Step 4: High target heart rate

(_____*.90) =_____
Maximum HR High Target

Step 5: Target Heart Rate Zone

_____ to _____
low target high target

THIS IS YOUR TARGET HEART RATE ZONE!

Comfort Zone Worksheets

Treadmill

1. Walk at 3.2 miles per hour for 3 minutes.
   - What is your heart rate?_____
   - How did you feel while walking?_____
   - How did you feel after?_____
   - Do you think that you could walk at this pace for 20 minutes or more?
     Yes No

2. Walk at 3.8 miles per hour for 3 minutes.
   - What is your heart rate?_____
   - How did you feel while walking?_____
   - How did you feel after?_____
   - Do you think that you could walk at this pace for 20 minutes or more?
     Yes No

3. Jog at 4.5 miles per hour for 3 minutes.
   - What is your heart rate?_____
   - How did you feel while jogging?_____
   - How did you feel after?_____
   - Do you think that you could jog at this pace for 20 minutes or more?
     Yes No

4. Run at 5.5 miles per hour for 3 minutes.
   - What is your heart rate?_____
   - How did you feel while running?_____
   - How did you feel after?_____
   - Do you think that you could run at this pace for 20 minutes or more?
     Yes No

Look at your answers to the questions. What intensity level do you feel most comfortable doing?_____Why?_____
_____

Comfort Zone Worksheets

Elliptical Trainer—set resistance at level 2.

1. Pedal at ___ steps per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

2. Pedal at ___ steps per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

3. Pedal at ___ steps per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

4. Pedal at ___ steps per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

Look at your answers to the questions. What intensity level do you feel most comfortable doing?_____Why?_____
_____

Comfort Zone Worksheets

Stationary Bike.

1. Pedal at 60 revolutions per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

2. Pedal at 75 revolutions per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

3. Pedal at 90 revolutions per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

4. Pedal at 110 revolutions per minute for 3 minute.
   - What is your heart rate?_____
   - How did you feel during the activity?_____
   - How did you feel after?_____
   - Do you think that you could pedal at this pace for 20 minutes or more?
     Yes No

Look at your answers to the questions. What intensity level do you feel most comfortable doing?_____Why?_____
_____

Goal Setting Worksheet

Long term goals

Think of two long-term physical activity goals that you may want to work towards in the next four weeks. Be sure to include the activity, how often you will do the activity, and how long you are going to do the activity each time.

1. _____

   _____

2. _____

   _____

Action Plan–short term goals

Choose one of the two goals that you wrote above. Break this goal down into smaller steps. Be sure to include the three parts of a goal (activity, how often, how long).

_____

_____

_____

_____

Rewards Worksheet

In the first column, write the long term and short term goals that you selected on the Goal Setting Worksheet. In the second column, think of some intrinsic rewards that you may feel by reaching each goal.

Long-term goal:	Rewards:
_____	_____
_____	_____
_____	
Short-term goals:	
_____	_____
_____	_____
_____	
_____	_____
_____	_____
_____	
_____	_____
_____	_____

Fitness Trials

Cardiovascular Endurance

12 minute walk/run

-walk or run as far as you can in 12 minutes. The teacher will tell you when to start and stop. When the teacher says stop, walk in place until the teacher helps you figure out how much of your last lap you completed.

-Make sure you keep track of how many laps you have done!

Number of laps complete:_____
Number of laps that equals 1 mile:_____

Use the following equation to help you figure out how many miles you completed:

$$\frac{\text{\# laps complete}}{1} \times \frac{1 \text{ mile}}{\text{\# laps in 1 mile}} = \_\_\_\_\_ \text{miles}$$

Muscular Strength

Push-ups

Try to do as many push-ups as you can do. Remember that you have to go all the way down and all the way up for each push-up to count.

Push-ups completed_____

Fitness Trials

Muscular Endurance

One-minute sit-up test.
Find a spot on the mat with feet up on the bottom bleacher or a chair. Cross hands over chest. Your partner will keep track of how many sit-ups you complete. A sit-up only counts if your elbows touch your knees!

Number of sit-ups in one minute_____

Flexibility

Sit-and-Reach

Sit with your legs straight out in front of you about shoulder width apart. Your feet should be equal with the tape line on the floor. When the instructor says "go", you will SLOWLY reach your hands out as far as you can. Your partner will record how many inches you've reached.

Inches:_____

Personal Fitness Plan

According to your fitness trials, which of the three components of fitness are your strengths?

_____

_____

According to your fitness trials, what components of fitness do you think that you could improve?

_____

_____

Look at your Comfort Zone worksheet and your personal fitness worksheets.
What was your comfort zone heart rate?_____

What were some of the activities that you preferred?

_____

_____

What were your limitations?_____

_____

_____

Personal Fitness Plan

Write your long-term goal:

_____

_____

You will now work on a fitness plan to help you reach your goal. Write the activities (Type) that you will participate in to reach your goal, how many days per week that you will do them (Frequency), for how long each time (Time), and how hard the activity will be (Intensity). In the last column write what component of fitness that the activity targets.

Activity	Frequency	Time	Intensity	Component

Fitness Buddy

My fitness buddy, _____, and I plan to be physically active _____ times per week, for _____ minutes each time. We will work at an intensity of _____. The activities that we will do are:

_____

_____

_____

I will report our progress everyday in my activity log.

_____ _____

Name Date

Beat the Barriers!

Barriers to physical activity are things that keep you from being physically active on a regular basis. In the left column, list the top five barriers that keep you from being physically active. In the right column, come up with at least one way to beat the barriers.

Barriers	Beat the barrier!
1._____	_____
_____	_____
2._____	_____
_____	_____
3._____	_____
_____	_____
4._____	_____
_____	_____
5._____	_____
_____	_____

Goal Tracking Worksheet

List your long-term and short-term goals from the goal setting worksheets:

Long-term:_____

_____

Short-term:_____

_____

_____

_____

Have you reached any of your goals?_____

If so, which ones?_____

_____

_____

If not, why do you think that you have not reached your goals?____

_____

_____

How are you going to modify your goals for the next few months while you are not in physical education?_____

_____

_____

Resource Worksheet

Stationary aerobic equipment	YES	NO	Aerobic workout videotapes or audio tapes	YES	NO
Bicycle	YES	NO	Step Aerobics, slide aerobics	YES	NO
Dog	YES	NO	Skates (roller, in line, ice)	YES	NO
Trampoline for jogging in place	YES	NO	Sports Equipment (racquets, balls)	YES	NO
Running shoes	YES	NO	Surfboard, boogie board, windsurf board	YES	NO
Swimming pool	YES	NO	Canoe, row boat, kayak	YES	NO
Weight lifting equipment (e.g. free weights, Nautilus©, Universal©)	YES	NO	Skis (snow or water)	YES	NO
Toning devices (e.g., ankle/wrist weights, Dynabands©, Thighmaster©)	YES	NO			

2. Neighborhood Environment: Please indicate which of the following apply to your neighborhood (circle all that apply)

A. Sidewalks
B. Heavy traffic
C. Hills
D. Street lights
E. Dogs that are loose
F. Enjoyable scenery
G. Frequently see people walking or exercising
H. High crime

4. Is your neighborhood (circle only one response):

Residential Mixed commercial Mainly commercial

5. Convenient facilities: For each of these places where you can be physically active, please indicate if it is on a frequently traveled route (e.g. to or from school or work, or within a 5-minute drive from school or home)

Aerobic dance studio	YES	NO	Public recreation center	YES	NO
Basketball court	YES	NO	Racquetball/squash court	YES	NO
Beach or lake	YES	NO	Running track	YES	NO
Bike lanes or trails	YES	NO	Skating rink	YES	NO
Golf course	YES	NO	Sporting goods store	YES	NO
Health spa/gym	YES	NO	Swimming pool	YES	NO
Martial arts studio	YES	NO	Walking/hiking trails	YES	NO
Playing field (soccer, football, softball, etc)	YES	NO	Tennis courts	YES	NO
Public park	YES	NO	Dance studio	YES	NO

Which of the above do you use?_____

Fitness Scavenger Hunt

You are going on a scavenger hunt. . .You should find at least two things under each category that fit the description. If you are having trouble finding something, be creative!

Cardiovascular equipment: something that you can use to help keep your heart and lungs fit.

Example: in-line skates. This fits because in-line skating makes you sweat, makes your heart beat faster, makes you breathe harder, and helps keep your heart and lungs fit.

1. _____

2. _____

Muscular strength/endurance training equipment: something that you can use to keep your muscles fit.

Example: ankle weights. This fits because you can put the ankle weights on your legs/arms for resistance training to keep your muscles fit.

1. _____

2. _____

Aids: something that can help you be physically active.

Example: TV. This fits because you can watch television when you stretch or ride a stationary bike.

1. _____

2. _____

Pedometer Worksheet #1

You will wear the pedometer for one day. Make sure that you always have it attached to your pants or belt, and to keep it close to the center of your right leg.

1. Set the pedometer to "0" when you get it. Put it in the correct place on your belt.
2. Don't play with the buttons on the pedometer because you may erase your steps.
3. Record how many steps you take from the time you put it on during class to the time you take it off before bed.
4. Reset the pedometer so that you will start from zero when you put it on in the morning.
5. Take the pedometer off when you sleep, bathe, shower, or swim. Do not put the pedometer in water.
6. Put the pedometer on again in the morning (making sure you start at 0), and record the number of steps that you take from when you put it on to when you take it off in class.

STEPS taken from class to bedtime:_____

STEPS taken from morning until class:_____

Total:_____

Pedometer Worksheet #2

You will wear the pedometer for one day. Make sure that you always have it attached to your pants or belt, and to keep it close to the center of your right leg.

1. Set the pedometer to "0" when you get it. Put it in the correct place on your belt.
2. Don't play with the buttons on the pedometer because you may erase your steps.
3. Record how many steps you take from the time you put it on during class to the time you take it off before bed.
4. Reset the pedometer so that you will start from zero when you put it on in the morning.
5. Take the pedometer off when you sleep, bathe, shower, or swim. Do not put the pedometer in water.
6. Put the pedometer on again in the morning (making sure you start at 0), and record the number of steps that you take from when you put it on to when you take it off in class.

STEPS taken from class to bedtime:_____

STEPS taken from morning until class:_____

Total:_____

APPENDIX C

TEACHER PACKET

Lesson 1: Introduction, Anthropometric data

Introduction to fitness unit – inform kids that they will not necessarily have to participate in sports. They will have the opportunity to try new activities. Benefits of physical activity – (that can affect kids NOW) increases energy, improves sleep, strengthens muscles and bones – and those that can affect them LATER (helps control weight, reduces stress, strengthens and helps keep the heart and lungs healthy). Introduce briefly the equipment that they will have the opportunity to try.

Height and weight will be taken for descriptive purposes only. (For BMI calculations to describe the sample)

Students will be told about the opportunity to participate in the "Walk to Cedar Point" program. Emphasize that this is not a contest where they compete against each other, but an activity that they can participate in to challenge themselves. Everyday when they come to class, they should pick up their workbooks and fill out the Activity log in the back portion of the workbook. They will begin this next week (Tuesday), and will do this EVERY DAY. This record will help them fill out the chart. The conversion is every 20 minutes of activity that they do outside of school will equal 10 miles. It is approximately 200 miles from Pittsburgh to Cedar Point.

Lesson 2: Workbooks, filling out forms

Introduce workbooks to students. They will use the workbooks in class as a supplement to the lesson taught by the teacher. Students should write their name and age on the front of the workbooks.

The first form for the students to fill out is the physical activity history form. Tell students to read each question, circle yes or no, and write in their sports or activities. The last question asks students to write how often they participate in activities or sports. Be sure to emphasize that they should fill in both the number of days per week and the number or hours per day.

The second form is the self-control instrument (used at baseline and at the end of the unit). The self-control instrument will be passed out separately from the workbooks. Go over the directions with the students, and ask if they understand. Tell them to ask questions as they go along if they have any.

Lesson 3: Operation of equipment, safety, newsletter distribution

Introduce each piece of equipment, and have one student be the demonstrator. Emphasize safety (straddle treadmill belt before turning it on, walk until belt comes to a complete stop before exiting treadmill, etc). Show students equipment features that they can use. Show students that each piece of equipment has a heart rate feature.

Explain that they will be learning about heart rate in a few days, but that they should practice having the machine read their heart rate.

Students should then get into small groups and cycle through the three machines, as well as the other fitness equipment. Tell students to read posters at each station to help them do the activities correctly. Each group should work together to learn the new activities.

Teacher will hand out the newsletter for students to give to parents.

Lesson 4: One-Day physical activity recall

Students will have two activity recalls in their workbooks. The physical activity recall that students are to use is contained in the bound workbook pages. There are three pages that will be addressed: Activities scale, Activity numbers (on the backside of the Activities scale), and the grid. There are several steps in filling out the recall – the teacher will use overheads to explain how to fill out the form.

1. Read instructions on first page to student. They should first look at the pictures on the first page to identify how to classify their activity intensity. Notice that there are several activities that are in a progression. For example, in the far left column, walking, playing a game and running are in a line. Also point out that biking and swimming, depending on how hard it is, can fall into two different categories. They should then turn the page over to find a list of activities. They should first read through this list to understand what type of activities are on it. Last, have them review the activity table.
2. Students should fill in (in words) what activity they did for each of the time blocks for the PREVIOUS DAY. Remind them to fill in exactly what they did the previous day, and not what they normally do. When they finish filling in their activities in words, have them look at the previous page to write in the number that is assigned to the activity that they entered. If there are blanks next to an activity that they completed (ex. Item 10), they should write in the specific activities that they did.
3. The last step is for the students to rate their intensity. They should refer to the first page with the pictures of different activities to help them decide how hard each activity was. They should mark an "X" in the correct column next to each activity.

After students complete the recall, they should add up the number of hours they spent sitting, talking on the phone, watching television, playing videogames, or using the computer. Next, have them add up the number of hours/minutes that they spent being physically active. Talk to them about the importance of trying to cut down on the number of hours/minutes they spend doing sedentary activities, and increasing the number of hours/minutes they spend being physically active.

STAGE OF CHANGE: In front of the fitness log in the back of their workbooks, there is a sheet that has five boxes on it. There are five phrases that deal with

different levels of engagement in physical activity. Have students circle the one that best fits their participation in physical activity.

If time permits, have students go to their favorite station.

Lesson 5: Heart rate

Explain to students that heart rate is a measure of how fast/slow the heart is beating at a given time. Maximum heart rate is an age-based estimation of how fast your heart can beat. This is an estimation – some people can get their heart rate higher than this number, and others can't even get close to it. This number decreases as you get older. Tell students that the reason this is important is because it can help you figure out your heart rate training zone. This is a range from 60% – 90% of your maximum heart rate. Target heart rate is a good way to see if you are working hard enough or too hard when being physically active. Have students refer to the target heart rate worksheet, fill in their age, and figure out their maximum heart rate. They should then calculate their heart rate training zone.

Instruct students on the proper way to take a pulse – find their pulse either at the wrist or neck, start with zero, and begin counting when you instruct them. Time them for 6 seconds, and tell them to add a zero. This would be their heart rate in a minute. Tell them that you can take your heart rate for 10 s, 30 s, or even for a whole minute. Taking your pulse for 1 minute is the most accurate, but 6 seconds can be a quick and easy way to find out what your heart rate is. Remind students that some machines are equipped with a heart rate monitor.

Have students take another student's pulse for 6 seconds. They should then use the heart rate worksheet in their workbooks to record their heart rate at different intensities. Have all students walk around the gym for 3 minutes and record their heart rate. Next, have students jog around the gym for 2 minutes and record their heart rates. Last, have students run one lap fast and record their heart rates.

If there is extra time, have students experiment with other activities (that they choose) and find their heart rates.

GROUP 1, DAY 1 WITH PEDOMETERS. Explain to the class what the assignment is. There are two pedometer worksheets in the front folder in their workbooks. They should take out the first one, and take it home with them. You can briefly explain that they should clip it to their pants, shorts, belt, etc, and keep it in the front middle of their right leg. They should not wear the pedometer when bathing, swimming, etc. They should not fool with the buttons, or they will erase their steps. They are to record their steps before they go to bed, reset the pedometer in the morning, and record their steps when they get to class. They should add the two numbers to get their total steps, and turn the sheet in.

Lessons 6&7: Moderate v/s vigorous activity, comfort zone

Explain to students that there are two intensities of activity: moderate and vigorous. Moderate activity is activity such as walking or doing chores that you can do while talking to someone, and should last at least 10 minutes. Moderate activity slightly elevates your heart rate and makes you breathe a little harder. Vigorous activity is activity such as running that makes you sweat and breathe hard, and is hard to do while talking to someone. Vigorous activity should last at least 15 minutes.

Have students walk for one minute at a brisk pace. Have students jog for 1 minute. Ask the class what the difference between the activities was. Which one was moderate, and which one was vigorous? Ask them to name two to three more activities in each category.

Separate students into small groups and have them turn to the comfort zone worksheets. As the students rotate to the specific pieces of equipment, they should follow the directions on the worksheets and record their answers.

Continue this activity the next class day.

Lesson 8: Goal setting and rewards

Tell students that a goal is setting a target behavior that your want to reach. For example – being able to run one mile in 8 minutes by December. There are two types of goals: short and long term. Short term goals can be milestones that they feel will help them reach their long-term goal. Using the example above, a short-term goal may be to be to run an eleven-minute mile, three times per week for two weeks.

There are three parts of a goal: the specific behavior, how often you do the activity, and how long you do the activity. In the example above, running is the specific behavior, three times per week is how often, and 11 minutes is how long it will take. The goal should also be realistic. For example, if I can't run a mile, then setting a goal of running a marathon in 4 weeks is not realistic.

Have students look at the goal setting worksheet in their workbooks. Have them write down three long-term goals that they may want to work towards. Have them reread their goals to make sure that they include all three parts.

Have students choose one or two of the long-term goals devise an action plan on how to accomplish the goal. Tell them to set smaller, short-term goals to help them achieve their long-term goal. These short-term goals should include how often they will do each activity, and for how long each time.

For the remainder of the time, have students self-select their physical activity.

GROUP 2, DAY 1 WITH PEDOMETERS. Explain to the class what the assignment is. There are two pedometer worksheets in the front folder in their workbooks. They should take out the first one, and take it home with them. You can briefly explain that they should clip it to their pants, shorts, belt, etc, and keep it in the front middle of their right leg. They should not wear the pedometer when bathing, swimming, etc. They should not fool with the buttons, or they will erase their steps. They are to record their steps before they go to bed, reset the pedometer in the morning, and record their steps when they get to class. They should add the two numbers to get their total steps, and turn the sheet in.

Lesson 9: Goal setting and rewards

There are two types of rewards: intrinsic and extrinsic. Extrinsic rewards are something that you can buy, eat, or get from someone else. For example, you could buy a CD, eat ice cream, or receive praise from someone for being physically active. Intrinsic rewards are rewards that you can not touch, but are feelings inside of you. For example, after being physically active, you can feel more awake, feel proud of yourself for accomplishing a goal, or feel better.

Ask students what they think are good rewards for physical activity goals. Write them on the board.

Explain that the reward should fit the goal. Go through each of the goals on the board and critique them. Ask students why they feel that the goals either fit or do not fit the goals. Give student an example of a good reward for a physical activity goal (buying yourself a CD that you can listen to while you are physically active).

Have students fill out the Rewards Worksheet and choose their physical activity for the rest of class.

Lesson 10: FITT, Components of Fitness, Fitness Testing

Write "FITT" on the board, and fill in the rest of the words as you explain them.

The FITT principle: **F**requency – how often you do physical activity
Intensity – how hard the activity is
Time – how long you do the activity for
Type – what type of exercise it is (biking, running, etc)

All components of the FITT principle can and should be modified when designing an activity program. The reason for this is because your body adjusts to the amount of activity that you do. If you keep doing the same activity at the same intensity, for the same duration, and the same number of days, then you will not improve your health. Tell students that they can change the program if it gets too easy, or if it is too hard. For example, if it is easy for them to play basketball for 20 minutes, three days per week, they can try to increase the time, or add another day of basketball in their schedules. If they try to play basketball for 20 minutes, three days per week and find it too hard, they can try to play for 10 to 15 minutes or to try it two days per week. They can then slowly work back up to 20 minutes, three times per week.

The three components of fitness that we will focus on are: Cardiorespiratory endurance, muscular strength and endurance, and flexibility. Just because you have one of the components, it does not necessarily mean that you have all of them. Cardio = heart, respiratory = lungs. Cardiorepiratory endurance is the ability of your heart and lungs to keep working efficiently while you are physically active. For example, a cross-country runner has good cardiorespiratory endurance. Muscular strength is the ability of your muscles to move heavy objects. Muscular endurance is the ability of your muscles to move some object over and over again. A cross-country runner also has muscular endurance in their legs, because they can keep moving the person to the finish line. A cross country runner does not necessarily have a lot of muscular strength. An Olympic weightlifter has muscular strength, but may not have muscular endurance. Flexibility is the ability of your muscles to stretch. It is important to include flexibility in your program to help prevent injury.

Have students turn to the fitness trial worksheets. They will complete the four fitness trials for cardiovascular endurance, muscular strength, muscular endurance, and flexibility. The teacher will time the students for the 12 minute walk/run. Have students walk in place when time is up so that they can be told the total number of laps that they did. They can then figure out the number of miles using the equation on the sheet. Students will then break up into groups for the other assessments. They will complete pull-ups, sit-ups (in one minute), and sit-and-reach.

Lesson 11: Limitations, Preferences

Explain that all of us have different preferences, abilities, and limitations in regards to physical activity. Our past experiences with physical activity can either be positive or negative, which may affect our current opinions about physical activity. We may also have limitations, such as asthma or a joint problem that prevents us from doing certain things. When thinking about a fitness program, it is important to consider these things.

Have students complete their fitness profile worksheets.

The rest of the class is reserved for activity.

Lesson 12: Personal Fitness Plan

A fitness plan is a way for students to map out how they will achieve their fitness goals. Since everyone's goals are different, their fitness plans are also likely to be different. Fitness plans should always involve the FITT principle and be specific.
Examples – BAD – I will play basketball this week.
GOOD – I will play basketball at a fast pace (full court) on Monday, Wednesday, and Friday for one hour each day.
Ask students why they think these are good goals.

Have students turn to their Personal Fitness Plan worksheets. They should record the following information on the first sheet: strengths and weaknesses from fitness trials,

comfort zone heart rate, activity preferences, and limitations. On the second page, have them record their long-term goal. They can then begin to fill out the fitness plan. When they fill this out, they need to include the activity, frequency, time, intensity, (FITT) and component of fitness that this activity targets (muscular strength, endurance, cardiovascular endurance, flexibility).

Lesson 13: Parent's activity

Tell students that they have a copy of the physical activity recall in the front pocket of their workbooks. They should take this one-day recall home, and have a parent/family member fill it out. The student should explain to the parent/family member how to fill out the recall. The student should remain in the room while the parent/family member fills out the recall so that they may answer any questions that the parent/family member may have.

Students will have the opportunity to participate in aerobic kickboxing or other fitness activities of their choice.

GROUP 1, DAY 2 WITH PEDOMETERS. Explain to the class what the assignment is. The second pedometer worksheet is in the front pocket of their workbooks. Remind students that they should clip it to their pants, shorts, belt, etc, and keep it in the front middle of their right leg. They should not wear the pedometer when bathing, swimming, etc. They should not fool with the buttons, or they will erase their steps. They are to record their steps before they go to bed, reset the pedometer in the morning, and record their steps when they get to class. They should add the two numbers to get their total steps, and turn the sheet in.

Lesson 14: Fitness Buddy Assignment

Tell students that it is important to find someone to be physically active with them. IF they plan on meeting the person everyday at 3:30 to be active, then they are more likely to do so. They also can spend quality time with someone while being physically active. It also allows for support in the form of praise or encouragement.

Students will be required to find a fitness buddy to be physically active with. Their fitness buddy could be a friend, family member, or pet. They should find someone/thing that can be <u>regularly</u> active with them. Students can fill out the fitness buddy worksheet the next day, after they have asked their buddy be regularly active with them.

Students will have the opportunity to engage in activity for the remainder of class time.

Lesson 15: Barriers to Physical Activity

Barriers to physical activity are things that prevent us from being active. Barriers can be internal (lack of motivation) or external (weather). Ask students to think of some barriers to physical activity, and write their answers on the board.

The teacher will explain that there are ways to overcome each of the barriers listed on the board. For example, if they typically like to walk outside and the weather is bad, then they should find an alternate location or alternate activity. Ask students to think of ways to overcome each of the barriers on the board.

Have students fill out the Beat the Barriers Worksheet. They should list their personal barriers to physical activity, not the class' list.

The remainder of the class period is reserved for physical activity.

Lesson 16: Fitness Resources

Students should turn to their Resource worksheet. The first section includes what types of resources they have at home that will help them be physically active. They should circle either yes or no for **each** item. Make sure they answer the question below the table, asking which of the above that they actually use. The second section asks students to circle the answers that apply in their neighborhood. They should circle all that apply to them. The third and fourth sections involve their feeling of safety in their neighborhood as well as the type of neighborhood that they live in. They should only circle one answer in these two sections. The last section deals with the facilities that the student has access to. Like the first section, they should circle either yes or no for **each** item. Again, have them list which of the things in the table that they actually use.

The students can engage in activity.

In the last minute of class, explain to students the fitness scavenger hunt. The scavenger hunt worksheet is in the front pocket of their workbooks. They will take this home, and will have to find at least two things in their home for each of the categories. They can ask other family members for help. Tell them to be creative! They should bring the sheet in the next class day and turn it in to the teacher.

GROUP 2, DAY 2 WITH PEDOMETERS. Explain to the class what the assignment is. The second pedometer worksheet is in the front pocket of their workbooks. Remind students that they should clip it to their pants, shorts, belt, etc, and keep it in the front middle of their right leg. They should not wear the pedometer when bathing, swimming, etc. They should not fool with the buttons, or they will erase their steps. They are to record their steps before they go to bed, reset the pedometer in the morning, and record their steps when they get to class. They should add the two numbers to get their total steps, and turn the sheet in.

Lesson 17: Fitness Resources, Scavenger Hunt

Have students share some of the fitness items that they found in their homes. List all items on the board so that students can see how many useful things they have to at their disposal to help them stay physically active.

Activity day
Have a guest fitness leader come in and lead the class in some type of fitness activity. If no one is available, make an obstacle course that involves fitness activities, and break the class up into two groups. Try to come up with some physical activities as well as some "teamwork" activities.

Lesson 18: Goal Revision
The instructor will explain that it is necessary to continue to monitor their goals. They should modify their goals if they find out that they are too easy or too difficult. They should also review if the goals that they have modified are still realistic. Last, they should modify their fitness plan to reflect their change in goals.

Students will open their workbooks to the Goal Tracking Worksheet. They will write down their goals and whether or not they have achieved them. If they have not reached their activity goals, they should write down why they think that they did not meet their goals.

All students should then modify their goals for the next several months when they are not in physical education. We will review their goals and their progress when they cycle back to Mrs. Hunt for physical education.

APPENDIX D

INTERVENTION PLANS

Intervention Plan
Lesson 1

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Height, weight, physical activity history, and self-control measures will be taken.
2. Progress of the walk to Cedar Point will be recorded on a visible chart in the gymnasium for all students to see their progress. This chart will track all students for the fitness unit (5 weeks).

Content	Process	Time
Students will have height and weight taken	Teacher will explain the new fitness unit, benefits of physical activity.	5 minutes
	Teacher will take height and weight while remaining students cycle through an obstacle course.	20 minutes
The Walk to Cedar Point program will be explained. The conversion will be 20 minutes of activity will equal 10 miles. The estimated mileage from Pittsburgh to Cedar Point is roughly 200 miles.	Teacher will explain the walk to Cedar Point Program. -Log minutes in workbooks -Record on chart daily	5 minutes

Intervention Plan
Lesson 2

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Height, weight, physical activity history, and self-control measures will be taken.

Content	Process	Time
Students will fill become acquainted with their workbooks, and will fill out the physical activity history form as well as the self-control instrument.	Teacher will pass out workbooks to students. -Name and age on cover	3 minutes
	Teacher will explain the physical activity history form to the students. -In workbook -Circle yes or no -write in activities -last item – days per week and hours per day	2 minutes 5 minutes
	Students will fill out the physical activity history form.	20 minutes
	Self-control instrument -Pass out forms -from Never to Very Often, circle how often they did each thing in the last four weeks.	

Intervention Plan
Lesson 4

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

1. Educational Objectives: Students will complete a one-day physical activity recall, and identify time blocks in their day where they could be physically active.

Content	Process	Time
Students will identify how much time they spent doing sedentary activities, will fill out a 1-day recall, and will identify time during their day where they could fit in physical activity.	The teacher will give specific instructions (overhead) on how to read and fill out the recall. -Students should first look over the one-day recall. -They should then look at the grid and write down what they did during those times -They should write the activity number (from the facing page)in the grid, and draw a line to the time that they stopped that activity. -Mark an "X" in one of the three intensity columns that describes how they hard they felt each activity was (1st page) Students will complete a one–day recall	7 minutes 10 minutes

Intervention Plan
Lesson 5

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will identify how to take their pulse and calculate heart rate through lab participation and a lab assignment. Students will also demonstrate how to take their exercise heart rate at different intensities of exercise through lab participation and a lab assignment.

Content	Process	Time
Students will learn what maximum heart rate is, how to calculate maximum heart rate, and how to take their resting pulse.	Describe what maximum heart rate is - an estimation of the how fast your heart can beat -something to base target heart rate range on, changes with age Describe target HR range -60-90% max Pulse taking -start with 0, take it for 6 seconds, add a zero Have students practice on themselves and others	4 minutes 5 minutes
Students will observe that their heart rate changes according to the intensity of their physical activity	Students will use their heart rate worksheets to take their heart rates while sitting, walking, running, and jumping rope	21 minutes

Intervention Plan
Lessons 6 & 7

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will be active at different heart rates and identify their level of enjoyment at each intensity through lab participation and lab assignment.

Content	Process	Time
Students will learn the difference between moderate and vigorous physical activity, and will identify examples of each.	Teacher instruction: -Moderate activity: slightly increases HR and breathing, can talk to someone (at least 10 minutes) -Vigorous activity: makes you sweat and breathe hard, and it is hard to talk to someone (at least 15 mintues)	3 minutes
	Students will walk briskly for 1 minute. Students will jog for 1 minute. Teacher will ask what the students felt during each activity. Teacher will explain that either type of physical activity is good for you.	5 minutes
Students will determine their comfort zone by trying different intensities. They will record their heart rate and how they felt during and after each trial.	Students will form small groups to try different intensities of activity. They will record heart rate and how they felt during and after exercise in their workbooks.	22 minutes

Intervention Plan
Lesson 8

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will set and monitor personal goals regarding their level of fitness and physical activity participation. Students will identify proper rewards for reaching goals in a group discussion.

Content	Process	Time
Students will learn what a goal is, what the difference between short term and long-term goals are, and how to set personal goals.	Teacher lecture -Long-term goals are further in the future. -Short-term goals can be used to help reach long term goals	3 minutes
	Teacher will explain the 3 points in setting goals: -Specific activity -how often -how long	3 minutes
	Students will fill out goal setting page, and will devise an action plan to accomplish goal (including milestones).	10 minutes
	Students will have the opportunity to participate in physical activity.	14 minutes
PEDOMETERS Group 2, day 1	Same instructions as given to first group.	

Intervention Plan
Lesson 9

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will set and monitor personal goals regarding their level of fitness and physical activity participation. Students will identify proper rewards for reaching goals in a group discussion.

Content	Process	Time
Students will learn the proper types of rewards for the physical activity goals that they set.	Teacher will ask students to name what they think is a good reward for meeting your physical activity goal. (write on board)	2 minutes
	Intrinsic versus extrinsic goals -extrinsic is something that you buy, you eat, you get from someone ex. Buying a CD, eating ice cream, receiving praise from a teacher -intrinsic is something that you feel (and that you can not touch) ex. Feeling better, being proud, feeling good about yourself) Teacher will tell students that they reward should fit the goal -eating a candy bar is not a good reward for meeting a physical activity goal. -an example of an acceptable reward is buying a CD that they can listen to when they are active.	5 minutes

Intervention Plan
Lesson 10

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will identify what the FITT principle is, and how they can use it to change their physical activity plan in a lab assignment.
2. Students will identify the five types of fitness, complete fitness testing, and assess their level of overall fitness.

Content	Process	Time
Students will be able to identify what the FITT principle is, and how to modify it.	Teacher defines what FITT is (frequency, intensity, time, type).	2 minutes
	Teacher tells students that all components of the FITT principle can be modified. -example 3d/week basketball for 20 minutes (both too easy and too hard) -ask how program can be modified in both cases	3 minutes
Students will identify four components of fitness, and complete fitness testing.	Teacher will explain 4 components -Cardiovascular endurance, muscular strength & endurance, flexibility	5 minutes
	Teacher will describe procedures to evaluate each component.	2 minutes
	Students will complete fitness testing, and record their results in their workbooks.	15 minutes

Intervention Plan
Lesson 11

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will devise a physical activity plan to improve their weak components, and use the FITT principle to modify their program. Students will use their "comfort zone" heart rate and subjective experience to first assign intensity.

Content	Process	Time
Students will identify personal limitations, health concerns, and activity preferences.	Teacher will briefly explain what limitations, health concerns and activity preferences are. -Abilities, background experience in physical activity -Bone/joint problems, asthma, heart problems, etc Types of activities that they enjoy	2 minutes
	Students will use the personal fitness worksheet to record these.	3 minutes
	Students will have time to be physically active.	25 minutes

Intervention Plan
Lesson 12

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will devise a physical activity plan to improve their weak components, and use the FITT principle to modify their program. Students will use their "comfort zone" heart rate and subjective experience to first assign intensity.

Content	Process	Time
Students will create a personal fitness program to help them reach their fitness goals. The program will address the components that they weren't as successful at completing in the fitness evaluation, and will use the FITT principle to design and modify the program. Students will recall their comfort zone and use this intensity to set initial exercise intensity.	Teacher lecture -Personal fitness plan: goals, all aspects of the FITT principle.	2 minutes
	Students will find their comfort zone worksheet and record their comfort heart rate.	1 minute
	Students will write their goals at the top of the fitness plan worksheet.	1 minute
	Students will identify activities that they enjoy.	2 minutes
	Students will identify their strengths and weaknesses according to the fitness evaluation.	2 minutes
	Students will fill out the remainder of the fitness plan worksheets. -FITT and component targeted	10 minutes

Intervention Plan
Lesson 13

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will report a parent's frequency of participation in physical activity, and will have their parent complete a one-day physical activity recall.

Content	Process	Time
Students will identify parent's activity, and will have parent fill out a 1-day recall.	Teacher will describe the homework assignment. Students will have their parent fill out a one-day recall. -front pocket of WB	2 minutes
	Students will have the opportunity to participate in an aerobic kick-boxing demonstration or work on the equipment.	28 minutes
PEDOMETERS Group 1, Day 2	Same instructions, but try to beat their first day's steps!	

Intervention Plan
Lesson 14

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will recruit a friend, relative, or pet to become physically active with them in their leisure-time.

Content	Process	Time
Students will recruit someone to participate in physical activity with them.	Teacher lecture Important to have someone to be physically active with -helps you be regularly active -set aside time together -gives you support	2 minutes
	Teacher instruction -find a person or animal that they can be regularly active with -exercise buddy homework fill out form in class today or tomorrow at beg. of class	3 minutes
	Activity	25 minutes

Intervention Plan
Lesson 15

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will identify barriers to physical activity and ways to overcome them in class discussion. Students will identify their top three personal barriers that keep them from being physically active, and will identify ways to overcome each through a lab assignment.

Content	Process	Time
Students will identify general barriers to physical activity as well as ways to overcome the barriers.	Teacher lecture -barriers (ex. time), keep us from being active -internal or external	1 minute
	Students will recite (and teacher will record on board) other barriers.	5 minutes
	Teacher lecture -overcoming barriers	1 minutes
	Students will recite (and teacher will record on board) ways to overcome each of the barriers that they listed.	5 minutes
	Beat the barriers worksheet instruction -five personal barriers to PA, ways to overcome each	5 minute
	Students will have time to exercise	12 minutes

Intervention Plan
Lesson 16 & 17

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will identify barriers to physical activity and ways to overcome them in class discussion. Students will identify their top three personal barriers that keep them from being physically active, and will identify ways to overcome each through a lab assignment.

Content	Process	Time
Students will identify from memory what facilities, equipment, or other resources they have to be physically active.	Teacher will briefly explain how students should fill out their Resource worksheet. -1st part: circle yes or no for each item, list what they actually use -2nd part – circle all answers that apply in neighborhood -3rd, 4th sections, circle one answer -5th section, same as 1st	2 minutes
	Students should fill out their worksheets.	7 minutes
	Students can engage in physical activity.	20 minutes
	Teacher explains the fitness scavenger hunt homework. -two in each category -can ask family for help -be creative!	1 minute
PEDOMETERS Group 2, Day 2	Same instructions as group 1	
NEXT DAY: Discuss what students found in the scavenger hunt	Point out the number of things that they can use to be physically active.	5 minutes

Intervention Plan
Lesson 18

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will set and monitor personal goals regarding their level of fitness and physical activity participation. Students will identify proper rewards for reaching goals in a group discussion.

Content	Process	Time
Students will review goals set at the beginning of the unit, reflect on their progress, and modify the goals accordingly.	Teacher will explain that it is important to continue to monitor your behavior to see if you are meeting your short-term and long-term goals. -Important to change goals if they are too easy or too hard. -Be sure to review if the goal is realistic -Make a new plan of how to continue to work toward goals.	3 minutes
	Students will fill out the Goal tracking worksheet.	7 minutes
	Students will engage in activity	20

Intervention Plan

Behavioral Objective: Middle school students attending the Falk school will increase their frequency of participation in overall physical activity to at least three times per week for at least 30 minutes per bout.

Educational Objectives:

1. Students will track their activity for one day using a pedometer.

Content	Process	Time
Students will be required to wear a pedometer for one day .	Teacher will instruct students on the proper way to wear pedometer - on front of pants or belt - reset when they put it on, record number of steps before bed - reset in morning, record number of steps when they return it	5 minutes
	Activity	25 minutes

APPENDIX E

KNOWLEDGE TEST

Write the **COMPLETE** answer below the question. If the question asks for more than one answer, make sure to write more than one answer!

1. Name one way that you can add physical activity into your day.

2. List **one** example of an **intrinsic** reward, and **one** example of an **extrinsic** reward.

3. Name **one** of the four components of fitness that we measured during the fitness trials.

4. Why is it important to take your pulse while you are doing physical activity?

5. Name **one** example of moderate physical activity.

6. Name **one** example of vigorous physical activity.

7. What are the **three** parts of a physical activity goal that we mentioned in class?

8. Write **one** example of a physical activity goal. Remember to make sure that you include the three parts of a physical activity goal.

9. How can you use the FITT principle to change your physical activity program? Give **one** example.

10. Name **one** way that having a fitness buddy could help you to be physically active on a regular basis.

11. Define what a barrier to physical activity is.

12. Name one barrier to physical activity, **and** one way to "beat" the barrier.

13. Why is it important to keep track of your physical activity progress?

14. Why is it important to modify your physical activity goals?

15. Name **one** piece of equipment that you found during your fitness scavenger hunt that can help you be physically active.

16. How can you use comfort zones to increase how often you are physically active?

17. When using a physical activity log, what types of things do you write in the log to monitor your progress? Name **two** items.

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