THE EFFECTS OF PROJECT PACE ON ADOLESCENT FEMALES' PHYSICAL
ACTIVITY READINESS

THESIS

Presented to the Graduate Council of the
University of North Texas
Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

Christy Nicole Williams
Denton, Texas
May, 1998
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This study evaluated the effects of Project PACE, a program designed to increase physical activity, on the physical activity level and selected psychosocial variables of sedentary adolescent females ages 12 to 18. Psychosocial variables included self-efficacy, attitude, perception of barriers, perceived social support, and knowledge. Of the 69 participants, 40 were enrolled in the treatment group and 29 were enrolled in the control group at the start of the study. The only significant differences were found for attitudes towards physical activity at base line. Findings from this study suggest that implementation of Project PACE protocol in school settings may produce some positive effects, but no significant findings were detected.
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There are so many people to thank, but in the interest of space, let me just mention a few and hope that those people who I don't mention specifically will know of my gratitude.

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CHAPTER 1

INTRODUCTION

Physical activity on a regular basis has been shown to help prevent and treat a variety of diseases such as coronary heart disease (CHD), obesity, diabetes and cancer, as well as having positive psychological effects (Blair et al., 1989; Dubbert, 1992; Harris, Caspersen, Defriese, & Estes, 1989; Sallis & Hovell, 1990).

Despite the news of the positive role of exercise on people's health, a large proportion of the population does not participate in regular exercise and much of the population does not participate in any physical activity at all (Marcus, Simkin, Rossi, & Pinto, 1995). The 1992 Behavior Risk Factor Surveillance System (BRFSS), which is a state-based survey of adults conducted by state health departments, indicated that 28.7% of adults reported no physical activity during the month prior to the survey. Other surveys done on leisure time physical activity in adults indicated similar results, and were consistent in finding that about one-fourth of U.S. adults do not engage in any leisure time physical activity (U.S. Department of Health and Human Services [USDHHS], 1996). The BRFSS also indicated that the percentage of adults who participated in regular, sustained physical activity of at least 30 minutes or more was alarmingly low. The 1992 study revealed that only 20.1% of US adults were regularly engaging in at least 30 minutes of sustained physical activity (USDHHS, 1996). Regular, vigorous physical
activity, defined as rhythmic contraction of large muscle groups, performed at 50% or more of estimated age-and sex-specific maximum cardio-respiratory capacity, 3 times a week or more for at least 20 minutes per occasion was also assessed by the BRFSS (USDHHS, 1996). The proportion of U.S. adults who were regularly active in vigorous activity was 14.2% in the 1992 BRFSS (USDHHS, 1996). Leisure time physical activity, sustained physical activity, and vigorous physical activity, all measures fall short of the Healthy People 2000 goals for adults. The writers of The Surgeon General’s Report (USDHHS, 1996) concluded from a number of longitudinal studies that 60% of Americans are not regularly active and a full quarter of American adults are totally sedentary. This recent information is consistent with previous findings of physical activity levels in the population. In a large representative sample of US adults, it was reported that only 8.1% of men and 7% of women were active in regular vigorous physical activities (Caspersson, Christenson, & Pollard, 1986). Other studies have slightly different numbers, but the message is the same. Dishman (1986) reported that 20% of the population, at most, exercise enough to increase and maintain cardiovascular fitness, or to markedly lower risk for cardiovascular disease and death. Another 40% seem to exercise less vigorously or less regularly, and the remaining 40% are totally sedentary. This information is of particular importance to health promotion professionals, as it seems that a majority of the population are increasing their risks for several major chronic diseases by not participating in regular physical activity (Sallis & Hovell, 1990).

Perhaps even a greater source of concern is found when looking at the activity habits of youth and adolescents. Increasingly children and adolescents are becoming as
inactive as adults. A Centers for Disease Control study (CDC, 1985) reported that the typical American school-aged child displays fitness and activity profiles well below the levels believed to be necessary to significantly lower health risks. Research by Castrone (1991) concluded that only about one third of all American school-aged children meet minimum fitness standards, and one out of every five American children will develop clinical symptoms of coronary heart disease before the age of 16.

Epidemiological research indicates that there is a strong relationship between regular exercise in adults and a reduced risk of cardiovascular disease (Blair et al., 1989). The relationship between exercise and cardiovascular disease in adolescents has recently begun to be explored with preliminary research indicating that there is also a link between lack of physical exercise or a sedentary lifestyle and the presence of cardiovascular risk factors in adolescents and children (Powell, Tompson, Caspersen, & Kendrick, 1987). One study which followed Finnish adolescents for 6 years (Raitakari et al., 1994) found that adolescents who had remained active through their youth had lower measures of several recognized cardiovascular disease risk factors including: serum triglyceride values, subscapular skinfolds, insulin levels, and triglyceride levels when compared sedentary adolescents. In addition, young men who were physically active and had remained physically active throughout their youth also consumed significantly lower amounts of saturated fatty acids in their diets, than did sedentary young men. Further, the study also revealed that physically inactive youth were more likely to start smoking than physically active youth.

While CHD is rare in children and adolescents the presence of CHD risk factors
such as elevated LDL-cholesterol, lowered HDL-cholesterol and elevated blood pressure are causes of concern because of evidence that atherosclerosis begins in childhood (Stary, 1989). Other research has suggested that increasing the regularity of children’s physical activity could potentially lead to decreased cardiovascular disease risk factors and an overall increase in cardiovascular fitness. Interpreting these studies on lipids and blood pressure on youth is limited by several factors such as; physical activity categorizations, interventions, and wide ranges of frequency, type, and duration. There does however, appear to be some evidence of a direct relationship between physical activity and CHD risk factors in children (USDHHS, 1996).

Research has shown that physical activity generally continues to decline as the child enters adolescence. Daily enrollment in physical education classes has declined among high school students from 42 percent in 1991 to 25 percent in 1995 (USDHHS, 1996). The most significant decrease in exercise participation occurs in late adolescence (Fruin & Pratt, 1991; Stephens, Jacobs, & White, 1985). The general decline in activity is not evenly spread throughout both genders however, as girls are more likely to become inactive than are boys (Trost et al., 1996).

Female adolescents are at a greater risk of inactivity than are male adolescents. Females are more likely to be sedentary, and when they are involved in sport and exercise, they are less likely to engage in vigorous physical activities when compared to male adolescents. Further, girls do not join or maintain their participation in competitive sport programs to the same degree as boys (Coakley, 1990). In general, physical activity choices will change, as an inverse relationship between age and physical activity develops
over time. However, with girls the drop in physical activity is more pronounced than in males (Edmundson et al., 1996; Sallis, 1993).

Historically the focus of physical activity promoters has been on the adult population. While the number of adults grew increasingly inactive, so did the number of inactive children and adolescents. Recent research has also found a link between sedentary behavior during youth and sedentary behavior in adulthood. Raitakari et al., (1994) concluded that the level of physical activity tracks significantly from adolescence to young adulthood. Their results support the idea that lifestyle patterns adopted in adolescence persist to adulthood, furthering the assumption that a sedentary youth will likely become a sedentary adult. In writing the consensus statement for physical activity guidelines for adolescents, Sallis & Patrick (1994) wrote two health-related rationales for adolescent physical activity. The first being to promote physical and psychological health and well-being during adolescence. The second being to promote physical activity to enhance future health by increasing the probability of remaining active as an adult. It is believed that adolescents who develop a habit of participating in activities which can then be carried over into adulthood will be more likely to remain active (Sallis et al., 1994).

Recently, because of the need for programs that increase adolescent physical activity, several health professionals have coordinated specific programs designed to increase youth and adolescent physical activity. Once such program is Project PACE (Physician-based Assessment and Counseling for Exercise) (Patrick et al., 1994). The PACE program targets known, modifiable determinants of physical activity such as self-efficacy, social support, and perceived barriers to action (Sallis & Hovell, 1990). Project
PACE is designed to allow for one-on-one individualized activity counseling of the patient by the physician in the physician’s office. The physician is able to determine what stage of change the patient is in, and then target the intervention to the patient’s behavior stage. Project PACE uses three counseling protocols, for precontemplators, contemplators, and actives which correspond to these stages of change.

While PACE utilizes three stages of change identified in the Transtheoretical model (Prochaska & DiClemente, 1982) this model identifies four stages of individual behavior change. These stages, closely related to individual motivation, are:

- **Precontemplation:** Individuals in this stage are neither considering nor interested in change. They are unaware of problems.
- **Contemplation:** Individuals in this stage are aware that a personal problem exists. They begin to think about changing a health behavior at some point in the future.
- **Action:** After a period of contemplation, the individual may enter the Action stage where they begin to change their behavior and try to modify or change environmental factors that may affect their behavior.
- **Maintenance:** This refers to a period of effort to prevent relapse to the previous behavior. It is described by the authors as a continuance of change rather than an absence of change.

People are thought to progress through these stages at varying rates. Many times people will move back and forth between stages a number of times before reaching the maintenance stage. Because movement through these stages is considered cyclical rather than linear, progress is made when an individual moves from one stage to the next, even if
they are not at their final goal of maintenance (US DHHS, 1996). For people who are not yet thinking about becoming more active, encouraging a step-by-step approach to progress through the stages may be more effective and successful than encouraging them to move directly into the action phase of the model (Marcus et al., 1992).

Problem of Study

Because most young people between 11-18 years of age attend school, schools are clearly an appropriate intervention setting for health promotion, and particularly for physical activity promoting activities among adolescents. As our children grow less active and less fit, application of activity increasing health promotion programs in the school setting is justified. Therefore, the purpose of this study is to assess the effectiveness of implementing Project PACE in a school setting, involving adolescent females previously determined by school sports participation status to be at risk for engaging in a sedentary lifestyle.

Significance of the Study

Research has shown that adolescent girls are at risk for sedentary lifestyles (Sallis, 1993). Findings suggest that children and adolescents who are sedentary during their youth are likely to continue this sedentary lifestyle as adults (Raitakari et al., 1994). Since a sedentary lifestyle is a primary risk factor for many preventable diseases, encouraging physical activity in youth is of primary importance. Encouraging adolescents to habitually engage in physical activity, increases the likelihood that these habits will then be carried into adulthood (Sallis et al., 1994). Project PACE is a program that can be easily implemented in a school setting, and might be an effective means of increasing physical
activity in this potentially inactive population.

Justification of the Study

The most extensive and promising research on interventions for promoting physical activity among young people has been conducted with students in schools (USDHHS, 1996). The CDC recommends that comprehensive school and community health programs promoting physical activity among children and adolescents be developed to increase knowledge about physical activity and exercise, develop behavioral and motor skills, and encourage physical activity outside of physical education classes (USDHHS, 1996). As the alarming trend of inactivity among adolescents, particularly female adolescents continues to increase, more programs need to be developed and tested to determine if they are effective in increasing physical activity levels amongst this population.

Research Questions

The following research questions will be investigated:

1. Does the implementation of Project PACE have an effect on the physical activity behavior of this population?

2. Does implementing Project PACE have an effect on selected psychosocial variables (self-efficacy, perception of barriers, perceived social support, and knowledge) in this population?

Hypotheses

The following hypotheses will be investigated:

1. Female adolescents involved in the PACE program (treatment group) will report
participation in significantly more physical activity than a similar population of females who are members of a control group.

2. Measurement of selected psychosocial outcomes (self-efficacy, attitudes, perception of barriers, perceived social support, and knowledge) will be statistically different between females in the treatment group and those in the control group at the conclusion of the intervention. All associations will favor those who participate in the program.

Definition of Terms

Adolescent - A term referring to young adults between the ages of 11-21.

Leisure Activities - "Light" intensity activities which require normal breathing and regular movement.

Moderate Activities - Moderate intensity activities which require increased breathing and movement.

Physical Activity - A term that describes "any bodily movement produced by skeletal muscles that results in energy expenditure" (Casperson, Powell, & Christenson, 1985).

Sedentary - A term referring to a lack of regular vigorous, moderate, or leisure physical activity.

Self-Efficacy - people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performances (Bandura, 1986).

Stages of Change - stages of behavior change as stated in the Transtheoretical Model including: precontemplation, contemplation, action, and maintenance (Prochaska & DiClemente, 1982).

Vigorous Activities - Hard activities which require heavy breathing, sweating, and
movement. Activity should last for 20 or more minutes per session at at least 75% of heart rate reserve (Sallis et al., 1994).

Limitations

For the purpose of this study, the following limitations are identified:

1. Participants are not randomly selected into treatment and control groups. However, assignment of schools to treatment or control groups will be random.

2. Both the retrospective activity recall and the self-reported questionnaire are prone to recall bias, and thus may affect the accuracy of participant responses.

3. While every attempt will be made to maintain consistency in counseling, because of administrative and logistical challenges, some small changes in the delivery of the PACE program may be necessary.

4. Because of the setting and voluntary nature of the study, attendance by participants at every intervention counseling session cannot be guaranteed.

5. Attrition during this experimental study may affect results.

Summary

Regular physical activity has been shown to play a pivotal role in a healthy lifestyle, as well as having several positive psychological effects. Likewise, a lack of physical activity is increasingly linked to several major chronic diseases, such as cancer, coronary heart disease, and obesity (Dubbert, 1992). The importance of physical activity is in the forefront of health promotion. The alarming rate of inactivity among female adolescents signals the need for more research to be done on determinants and effective programs specific to this subpopulation, an area in which the current literature is not yet
sufficient.
CHAPTER 2

LITERATURE REVIEW

This chapter includes a review of the literature related to physical activity determinants among adolescents. It includes an overview of the theoretical basis for Project PACE as well as literature related to increasing activity, knowledge, self-efficacy, perceived social support, attitudes, perception of barriers, and stages of behavior change relating to physical activity in adolescent females. A review of why exercise is important for adolescents, and an in-depth look at Project PACE will also be included in this chapter. Finally, recommendations for adolescent physical activity will be provided.

Theoretical Basis

The most recent approach to physical activity determinant research has been heavily based in several theoretical models. Project PACE draws its theoretical basis from two models in particular, The Social Learning Theory and The Transtheoretical Model.

Social Learning Theory / Social Cognitive Theory

The Social Learning Theory (Bandura, 1986) (later renamed the Social Cognitive Theory) accepts the significance of environmental consequences in the shaping of behavior patterns, however it also stresses the importance of cognitive aspects of learning. The Social Learning Theory proposes that personal, environmental, and behavioral factors operate as reciprocal interacting determinants of each other, and that as one area is
directly impacted, the other two areas will also be indirectly affected.

Researchers have used the Social Learning Theory to successfully identify determinants which have been shown to predict physical activity. In a large study of 1400 California adults (Sallis et al., 1986) regression analyses was used to identify variables which predict physical activity behavior suggested by Social Learning Theory. Exercise self-efficacy, activity attitudes, and health knowledge, were all found to be significant predictors of exercise adoptions and maintenance.

The concept of self-efficacy is a central element of the Social Learning Theory. Self-efficacy assumes that persons who are confident in their ability to perform a specific behavior are more likely to actually perform it. Similarly, those who are confident that they will obtain commonly expected benefits are more likely to perform the behavior (Sallis & Hovell, 1990).

Self-Efficacy

Reviews of social cognitive research illustrates that physical activity is associated with the individuals’ thoughts about their capabilities to perform human movements that lead to events that affect their lives (McAuley, 1992). Investigators have documented that the more positive individuals’ thoughts of personal efficacy the greater their physical activity (McAuley, 1992). Several studies have found that adolescents’ perceived self-efficacy regarding a preventive health behavior was an important predictor of the level of their response to the health message (DuRant & Hergenroeder, 1994). When lacking self-efficacy, adolescents do not manage situations effectively even though they know what to do and possess the necessary skills (DuRant et al., 1994).
A study of 365 5th grade students from three elementary schools and two intermediate schools in rural South Carolina (Trost et al., 1996) was conducted to determine if gender differences in physical activity could be accounted for by differences in selected physiologic, psychosocial, and environmental determinants of physical activity behavior. Self-efficacy was selected on the basis of the SLT and was measured using a questionnaire designed to measure several hypothesized psychosocial determinants of physical activity.

Results indicated that boys scored higher on the self-efficacy sub-scale and reported higher levels of self-efficacy than did girls. The authors concluded that in accordance with the SLT, this finding suggested that boys were more physically active than girls partly because they were more confident in their ability to overcome traditional barriers to physical activity. The authors also suggested that girls be taught behavioral skills that enable them to become more confident in their ability to overcome the everyday barriers to physical activity (Trost et al., 1996).

In another study done to examine psychosocial predictors of physical activity in an adolescent school based population Reynolds et al., (1990) used a sample of 743 10th grade students and conducted assessments at 4 and 16 months post-baseline. The Stanford Adolescent Heart Health Program Questionnaire was used to assess self-efficacy and other psychosocial variables. To determine self-efficacy students were asked to rate how confident they felt about their ability to exercise regularly despite a series of obstacles. Higher levels of self-efficacy were related to higher levels of activity for both males and females (p<.0001). In addition gender differences were also found between
self-efficacy and activity. At the four month follow-up assessment a greater amount of variance in physical activity was accounted for in the equations using data from the females (Reynolds et al., 1990). The psychosocial predictors including self-efficacy were more consistently related to physical activity among females alluding to the notion that females might need different physical activity intervention strategies than males.

Other studies involving children have had mixed results regarding self-efficacy. A study in the Go For Health Program (Parcel, Simons-Morton, O’Hara, Baranowski & Wilson, 1987) included classroom health education and environmental changes in school lunch and physical education to foster healthful diets and exercise among elementary school children. Exercise self-efficacy was measured using a 4-item questionnaire. Students were asked if they were “not sure”, “a little sure”, or “very sure” that they could choose to jog during recess, exercise regularly, keep a steady pace, and improve fitness by exercising. Post-test multiple comparisons indicated that in each grade, mean exercise self-efficacy improved significantly in one intervention school (Parcel et al., 1987).

While the self-efficacy results were somewhat disappointing (differences in only one intervention school), the authors believe that self-efficacy would be enhanced as a product of classroom instruction plus positive practice, and that reasons for inconsistent program effects might be the uneven implementation of the program across schools (Parcel et al., 1987). In addition the authors conclude that from a SLT perspective it is important to influence self-efficacy for performing targeted behaviors and that additional research is warranted to obtain a clearer understanding of the concept of self-efficacy for influencing behavior change in elementary school aged children (Parcel et al., 1987).
Stucky-Ropp & DiLoreno (1993) conducted a study on determinants of exercise in 5th and 6th graders whose ages ranged from 11 to 12 years. Researchers used the children's physical activity questionnaire to assess social learning variables relating to physical activity. Multi-step regression analyses were performed to determine the factors that predict a child's level of physical activity (p<0.001). Child self-efficacy did not emerge as an important predictor of exercise behavior in children. It was suggested that perhaps self-efficacy for exercise was not a powerful predictor of activity level at that age due to less stringent requirements for participating in physical activity in this age group (Stucky-Ropp et al., 1993). These findings support the idea of individual approaches to increasing physical activity and the need to further study self-efficacy as a physical activity determinant in sub-populations such as adolescent females.

Attitudes

Attitudes are considered to be of sociopsychological importance in understanding and predicting behavior (Theodorakis, Doganis, Bagiatis & Gouthas, 1991). Research indicates that individuals with highly assessable attitudes toward a given product have a greater attitude-behavior relationships than individuals with relatively less accessible attitudes. Those individuals with less accessible attitudes display greater sensitivity to environmental factors compared to subjects with more accessible attitudes (Fazio, Powell, & Williams, 1989).

Using the Theory of Reasoned Action (Ajzen & Fishbein, 1980), a cognitive model which examines people's knowledge, beliefs, and attitudes along with their perception of the influence of others, and the contribution of past behavior as an external variable.
Theodorakis et al., (1991) examined the efficacy of attitudes to predict exercise behavior of young students who were 10 to 11 years of age. Pearson correlations showed significant correlation of attitudes toward behavior and subjective norms with the intention. The beta weights for attitude toward behavior and subjective norms were also significant (p<.05). The study concluded that to increase children’s participation in physical activities a modification of both general and specific attitudes towards physical activity are needed (Theodorakis et al., 1991).

Reynolds et al., (1990) concluded that carefully written and evaluated educational materials are needed to alter attitudes, perceived social norms and intentions toward physical activity. Also recommended were direct attempts to alter perceived social norms and attitudes in a school setting.

Social Support

Perceived social support has also been shown by the Social Learning Theory as an important variable for physical activity. Direct social influence can modify behavior and is particularly important in determining the behavior of adolescents (Reynolds et al., 1990). It has been suggested that social influence and support from family members and peers in support of physical activity might increase physical activity (Reynolds et al., 1990). Sallis & Nader (1990) indicate that the family is a powerful influence on promoting health behaviors, including physical activity. Perry et al., (1988) suggested that parents serve important health related roles for their children, as examples of appropriate behavior, as gatekeepers to health related opportunities and barriers, and as a major source of reinforcement in most children’s lives.
Garcia et al., (1995) examined gender and developmental differences in exercise-related beliefs and exercise behaviors in youth and explored factors predictive of exercise. During the 1992-1993 school year two cohorts of children, one group in fifth or sixth grade, and the other in eighth grade were recruited to determine, among other things, the effect of social support had on exercise behavior in adolescents (Garcia et al., 1995). Social support for exercise was defined as a network of relationships that provide active assistance or encouragement of physical activity (Treiber, Baranowski, Braden, Strong & Levy, 1991). Social support was measured using the Social Support for Exercise Survey which consisted of 26 items measuring social support for exercise from family and friends. A three-category response format was used (never, sometimes, often).

Results indicated that older adolescents were significantly less likely to report social support for exercise ($p = .01$) than their younger counterparts (Garcia et al., 1995). The authors concluded that absence of a highly salient athletic self-schema, low self-esteem, low perceived health status, and a behavioral history of minimal exercise, taken together, may make girls more vulnerable than boys to the scarcity of exercise role models and the lower level of social support for exercise reported by adolescents of both genders in comparison to their pre-adolescent counterparts (Garcia et al., 1995).

Hopper, Gruber, Munoz & MacConnie (1996) used two separate studies to examine the efficacy of school-based exercise and nutrition programs with parent components. In one study, one fifth and one sixth grade class were randomly assigned to each of the three different conditions: a school and home condition, a school only condition, and a control condition. In the second study, second and forth grade
classrooms were assigned randomly to a school-based treatment group with parent participation or a control group.

In study one the groups differed significantly on post-test exercise knowledge (p<.001). Post hoc comparisons were used to show that both the school and home group, and the school only group each scored significantly higher than the control group (p<.05). Further, when examining single variables the school and home groups scored significantly higher than the control group on post test measures, providing more evidence that parental involvement and support can enhance the effects of a school based program (Hopper et al., 1996)

In the second study similar results were seen. ANOVA's revealed that at post-test, the children in the treatment group scored higher than the children in the control group on fitness and nutrition measures (p<.001). In both studies children who received parental support and participation improved their knowledge of nutrition and exercise. Findings from this study suggest that with parental participation and support moderate improvements can be made in health-related behaviors in children and adolescents (Hopper et al., 1996).

Using longitudinal data from a cohort of 743 10th grade students from the control group of the Stanford Adolescent Heart health Program, Reynolds et al., (1990) used regression analysis to identify psychosocial variables related to physical activity in adolescents. Measured at 4-month post base line, using a series of statements that were rated by each student from "strongly agree" to "strongly disagree" direct social influence items assessed whether the students family and friends exercised regularly. Results
indicated that the greater the rated activity level of family and friends, the higher the level of physical activity of females at 4 months. The relationship was determined to be statistically significant.

Zakarian, Hovell, Hofstetter, Sallis, & Keating, (1994) conducted a study designed to identify correlates of vigorous exercise among minority and low socio-economic status adolescents. Using a sample of 1,634 9th and 11th grade students, participants were asked to fill out an exercise questionnaire. Variables of friend support and family support for exercise were addressed. Friend support was defined as the frequency with which friends encouraged or offered to exercise with the subject. Family support was defined as the frequency with which family encouraged, rewarded, or reminded the subject to exercise, or the frequency to which they complained about or criticized the subject for exercising. The frequency in which they exercised with or offered to exercise with the subject was also assessed.

Hierarchial multiple regression analysis was conducted on 28 variables. Separate analysis of male and female determinants revealed that for females' family support was a significant predictor of physical activity (Zakarian, et al., 1994). The authors noted that their findings were also supported by the earlier work of Gottlieb & Chen (1985) who also concluded that parental influence and support of physical activity was a significant predictor of exercise behavior in adolescent girls.

The Child and Adolescent Trial for Cardiovascular Health (CATCH) was a multi-site randomized trial to test the effectiveness of a cardiovascular health promotion program in 96 schools in four states. The schools were randomized into two experimental
conditions: intervention and control. Pre and post-measurements on the health behavior questionnaire was collected from over 6,000 students in the 3rd, 4th, and 5th grades. Using a nested design approach in which the schools were the primary unit of analysis the authors observed intermittent effects for the variables of perceived support for physical activity (Edmundson et al., 1996).

The section assessing support for physical activity was divided into two sub-scales: a positive support sub-scale, and a negative support sub-scale using statements such as "one or both of my parents or guardians does exercises with me like running, jogging, dancing, or skating." Perceived positive support for physical activity improved immediately following the third grade program, but the effect was not sustained in the other grades. Possible explanations for this effect is a potential shift from parental/ adult influence to peer influences on behavior (Edmundson et al., 1996).

Social needs and images become more important in the adolescent years and messages of social norms have a greater influence on the adolescent. The influence of family and peers can serve to foster or inhibit the practice of a healthy lifestyle in adolescents (Millstein, 1993). Teens place particular importance on peer relationships but continue to value family interactions and approval. Therefore it is important to examine the effects of family and peer social support for exercise among youth (Garcia et al., 1995). The CATCH authors used their findings on perceived social support as a possible explanation of the decline of physical activity with age observed in adolescents. This indicates a need to not only study the effect on peer support on physical activity, but to also design interventions that address the idea of peer social support in adolescents.
Benefits and Barriers

Pender (1987) defined barriers as perceived blocks or hindrances to action; and benefits as desired outcomes from taking action. Perceived barriers have been found to be a strong predictor of physical activity. Garcia et al., (1995) found that when perceived barriers to exercise were examined among racially diverse youth, barriers predicted exercise in adolescent males. For females, the principal predictor of exercise was the benefits of improving their physical strength (Garcia et al., 1995). Thus, perceived benefits as well as perceived barriers both maybe important factors to address when discussing exercise with adolescents (Garcia et al., 1995). This finding correlates with a suggestion by Marcus, Rakowski, & Rossi (1992) that decreasing barriers to exercise may not by itself result in the individual’s enhanced readiness to be active without increasing their belief’s in the benefits of exercise.

When results from Garcia and colleagues (1995) research were analyzed, they suggested that older female adolescents (8th grade) were less likely than younger adolescents (5th or 6th grade) to believe that the benefits of exercise outweighed the barriers to exercise. However, analysis in boys indicated the exact opposite. Older boys were more likely to believe the benefits of exercise outweighed the barriers than younger boys (p = .009). In addition, while older girls rated themselves as less efficacious than younger girls with regard to exercise, older boys rated themselves about the same, or slightly more efficacious than younger boys with regard to exercise (p = .018).

The benefits/barriers differential was regressed on the proposed antecedents of
exercise that did not enter the initial regression equation at significant levels. This procedure was done to explore the possible indirect effects. The exploratory results suggest the effects of developmental stage (grade), perceived health status, exercise self-efficacy, social support for exercise, and exercise norms on the behavioral outcome of exercise may all be mediated by beliefs about benefits and barriers of exercise (Garcia et al., 1995).

Tappe, Duda & Ehrnwald (1989) used a sample of 236 adolescents enrolled in summer school classes to determine perceived barriers to exercise among adolescents. Participating students completed a questionnaire which included nine barriers identified from a previous literature search. Their results indicated that the barrier to physical activity most frequently cited by adolescents in general was “wanting to do other things with their time.” For females in particular, they were more likely to report the barriers of “unsuitable weather” and “lack of desire or interest” as barriers to exercise (Tappe et al., 1989). In addition, univariate ANOVA’s were used to assess whether differences in perceived barriers to exercise existed among adolescents of high and low levels of exercise involvement. One significant difference was found: adolescents who reported low levels of physical activity perceived time constraints as a greater barrier to exercise than did highly active adolescents (p < .04).

The authors suggested that based on the results of this study female responses indicated an important motivational issue in regard to exercise involvement (Tappe et al., 1989) and that these barriers reflect well-cited gender differences in socialization of individuals toward physical activity. That is, females generally do not perceive themselves
to be physically active and exercise does not tend to play a significant role in their lives (Tappe et al., 1989). In addition, the authors suggested the important perceived barriers to exercise, or those things they felt kept them from exercising, among females indicates a need to “resocialize” females in their perspective regarding exercise involvement.

Sufficient evidence exists to recommend that perceptions of benefits and barriers, and access to facilities and programs for exercise should be addressed in exercise promotion counseling and exercise programs for preadolescent and adolescents, especially females whose duration and intensity of exercise, by and large, tends to be low. Current findings highlight girls as a high-risk group for inactivity and suggests that benefits and barriers to exercising are critical factors to consider in the development of interventions (Garcia et al., 1995).

Knowledge

Increased knowledge may be considered one of the first steps in bringing about changes in behavior (Hopper et al., 1996). Some CVD risk factor intervention studies have demonstrated some success in increasing children’s knowledge about heart health (Connor, Smith, Fryer, Erickson & Drake, 1986) however, several studies have shown that knowledge is inconsistently related to physical activity behavior (Sallis et al., 1992; Ferguson, Yesalis, Pomrehn, & Kirkpatrick, 1989).

Many studies have shown an increase in knowledge of heart health after an intervention period, however it should not be concluded that an increase in knowledge effects exercise behavior. However, Conner et al., (1986) did reported positive results in increasing children’s knowledge of heart health and subsequent behavior change using a
program called "Future Fit." Fifty-five third and fourth grade students participated in the 12-week program designed to increase knowledge of heart health and increase physical activity.

Results of the study indicated that the experimental group had significant improvement in knowledge about prevention of heart disease compared with the control group (p<.01). However, in addition to the data from the children, researchers also asked parents to evaluate the program by completing a brief questionnaire. Eighty one percent of parents responded, and of those responses, 71% indicated that their child talked several times at home specifically about the heart health education lessons. Sixty-seven percent of parents reported noticing changes in their child’s knowledge, including more awareness about heart conditions, knowing what foods are heart healthy, basic knowledge about the body, and the importance of exercise (Conner et al., 1986). More importantly, 62% of the parents indicated that changes in their child’s knowledge carried over into changes in the child’s behavior at home. Some specific behavior changes that were reported included exercising more, acting more self-confident, shopping for healthy foods at the grocery store, and being more active (Conner et al., 1986). Thus, it seems that increasing a child’s knowledge of heart health may have other beneficial effects.

Other studies however, have shown that knowledge is not a significant contributor to increasing physical activity. In a study designed to determine the extent of attitudes, knowledge, and beliefs as predictors of physical activity in children, Ferguson et al., (1989) studied 603 middle school students. To measure knowledge about exercise, items were developed from the health education curriculum used in one of the schools. All the
predictor variables were analyzed, and only knowledge about exercise failed to correlate significantly with either exercise intent or current exercise behavior \( (p<.01) \).

In a review article on determinants of physical activity and interventions in youth, Sallis et al., (1992) state that in studies to determine the relationship between exercise knowledge and exercise behavior in youth, knowledge weakly correlated with physical activity. However it was suggested that while knowledge about the health effects of physical activity may not be important, knowledge of how to be physically active may indeed be a significant influence on physical activity in youth. These results are similar to other studies done which have failed to identify knowledge of health effects as a significant predictor variable for physical activity (Ferguson et al., 1989).

**Transtheoretical Model**

The Transtheoretical model of behavior change (Prochaska et al., 1982) suggests that individuals attempting to change a health behavior move through stages of health behavior change, utilizing a common set of processes to achieve desired goals (Robison & Rogers, 1994). The model suggests that individuals who are trying to engage in a new behavior move through the stages of precontemplation, contemplation, preparation, action, and maintenance, and that movement through these stages is considered cyclical rather than linear because an individual may make several attempts at behavior change before reaching maintenance. In this process individuals may recycle back through the various stages.

Individuals in the pre-contemplation, contemplation, preparation, action, and maintenance stages use different sets of processes, both cognitive and behavioral strategies
to overcome barriers to change (Robison et al., 1994). Processes of change are covert or overt activities that individuals use to modify their experiences and or environments in order to modify their behavior (Marcus et al., 1995). The Transtheoretical Model (Prochaska et al., 1982) suggests that as individuals move through the different stages, they utilize these common processes in order to achieve their desired behavior goal. The 10 processes are: consciousness raising, dramatic relief, self-re-evaluation, environmental re-evaluation, helping relationships, counterconditioning, contingency management and stimulus control. Marcus & Simkin (1994) stated that in a number of cross-sectional, longitudinal, and intervention studies, it has been found that different processes of change are emphasized at different stages of change.

While the few studies that have been done using the Transtheoretical Model have been done on adults, preliminary results indicate that the use of this model may allow for exercise adoption and maintenance by targeting individuals in various stages of change with appropriate intervention strategies (Marcus, Rakowski et al., 1992). In addition, the concept of self-efficacy seems related to particular stages of change and past use of the model indicates that the theory overlaps principles outlined in other theories as well. The reason this theory is considered “transtheoretical” because it encompasses many of the key features of a diversity of psychologic theories (Marcus et al., 1995).

Research has demonstrated that self-efficacy scores increase in a linear fashion with advancing stage (DiClemente, Prochaska, & Gibertini, 1985). Marcus et al., (1994) developed scales to measure stages of change for exercise and self-efficacy for exercise. Two different worksite samples were used to determine prevalence information on stage
adoption and the relationship between stage of adoption and self-efficacy. In the two samples 34-39% of employees were regularly participating in physical activity (action or maintenance.) Scores on efficacy items significantly differentiated employees at most stages. These results indicate that employees who had not yet begun to exercise, in contrast with those who exercised regularly, had little confidence in their ability to exercise (Marcus et al., 1994).

In another cross-cultural study Marcus & Owen (1992) examined the prevalence of stages of readiness to exercise and their relationship to self-efficacy and to the costs and benefits of exercising in sample of 1093 U.S. employees and 801 Australian employees. In both samples, 41% of the subjects were in precontemplation or contemplation and 59% were in preparation, action, or maintenance. Scores on the five-item self-efficacy measure were significantly related to stage of change in both samples. Score on the decisional balance scales were also significantly related to stage. The scores were deemed reliable in differentiating subjects at most stages. The authors concluded that while there were some differences in demographics and response rates, a common pattern between self-efficacy and stage of behavior change emerged (Marcus & Owen, 1992).

While the concept of self-efficacy seems to be of importance to both the SLT and the Transtheoretical Model, observation of other research using the transtheoretical model as a theoretical basis shows that there are other similarities as well.

In an article reviewing applications of the Transtheoretical Model to exercise behavior, Marcus et al., (1994) reported about a worksite intervention study using the Transtheoretical Model. An intervention was designed to increase the initiation,
adoption, and maintenance of physical activity among employees. Employees were randomly placed in either a stage-matched or a standard self-help intervention which consisted of printed materials. Using a Chi-Square analysis to examine the relative efficacy of the interventions in enhancing the adoption and maintenance, comparisons of the groups from baseline to 3 months post baseline revealed that more subjects in the stage-matched group demonstrated positive stage change. In contrast, more subjects in the standard self-help group displayed no stage change or stage regression (p<.01). Thus it seems that tailored intervention programs which combine self-efficacy and social support, along with other variables identified in the SLT are more successful in promoting behavior change (Marcus et al., 1994).

Project PACE utilizes the Transtheoretical Model by initially identifying which stage a person is in and then combines intervention and process of change strategies, for a more successful intervention. Research has demonstrated that an integration of the stages and processes of change can provide a useful guide for interventions (Marcus et al., 1994). Once a particular individual's stage has been assessed, programmers can better design appropriate interventions to help the individual to the next stage of change. This point is particularly important in the context of Project PACE, as many exercise programs are designed for people who have decided to begin exercise, yet a large proportion still have virtually no exercise intentions. This principle is seen as a major flaw in many “action-oriented” programs, that do not take into account what particular stage of readiness the individual may be in (Marcus et al., 1995). The Transtheoretical Model has been used effectively in tailoring treatment for “precontemplators” within the domain of addictive
behavior (DiClemente et al., 1985) and research is indicating that it might also be useful in guiding the design of interventions and programs like PACE as well. In addition, it also utilizes concepts and determinants of physical activity derived from the Social Learning Theory, especially the variables of goal setting and attainment. According to the Social Learning Theory, attainment of goals leads to increased positive feelings towards self which can act as strong motivation for change (Robison et al., 1994). Participants are monitored and encouraged to set and obtain activity goals based on their individual circumstances. Participants are also counseled individually on barriers to activity, and receive guidance and suggestions on how to overcome these barriers. This process increases their likelihood of achieving their goal and increasing their self-efficacy of that behavior. Participants are also given basic information and knowledge of health and exercise practices.

At Risk Youth

For the past several decades the balance of health promotion activities designed to increase physical activity have focused solely on adults. However, evidence is mounting that suggests that activity promoting programs that highlight adolescents as a primary target are warranted. The following section seeks to shed light on why exercise is important for adolescents, and female adolescents in particular. Content will include sections on the increasing rate of female adolescents which are inactive and why they are at greater risk of sedentary lifestyle, that health risks for many chronic diseases especially cardiovascular disease start and can be identified early in life, and finally, evidence that suggest that physical activity can be tracked from childhood to adulthood.
Females are Inactive

Despite the recognized health benefits of regular physical activity, sizable proportions of U.S. children and adolescents fail to meet established guidelines for participation in physical activity (USDHHS, 1996). Low levels of physical activity appear to be particularly prevalent among preadolescent and adolescent girls (Heath, Pratt, Warren, & Kann, 1994).

In an article reviewing large population-based studies to determine physical activity patterns of adolescents Pate, Long, & Heath, (1994) looked specifically at the Youth Risk Behavior Survey (YRBS). YRBS is a questionnaire which includes several items pertinent to physical activity among youth. The YRBS was first administered in 1990 under the auspices of the Centers for Disease Control. Results from the survey revealed that in the 10th grade approximately 33% of females are moderately active, in the 11th grade, 32% are moderately active, but by the time the females reach the 12th grade, only about one quarter of them are moderately active. For vigorous activity, the decline is even more marked. Only about 27% of 10th grade females are vigorously active at least 3 times a week and that number falls to only 17% of 12th grade females (Pate et al., 1994).

In a sample of 852 females, ages 14-18, Bungum & Vincent (1996) used a variation of the Stanford Physical Activity Recall (Sallis, Buono, Roby, Micale & Nelson, 1993) to identify physical activity levels and types, as well as determine racial differences between African American and White female adolescents. The authors found that younger adolescents of both races were significantly more active than that of their same race older counterparts (p<.05). Even after controlling for SES, younger adolescents expanded
more kcals than did their older counterparts, leading the authors to suggest that physical activity may decline with age, even within a relatively homogenous group (Bungum & Vincent, 1996).

In their long-term epidemiologic study of cardiovascular disease risk factors in children and young adults living in Bogalusa, L.A., Myers, Strikmiller, Webber, & Berenson (1996) used The Self-Administered Physical Activity Checklist as a measure of physical activity in 995 youth ages 9-15. Girls in the study had a higher overall percentage of sedentary activity (p<.0001) and the percentage of sedentary time increased with age. That is, 5th and 6th graders had a significantly smaller percent of sedentary time than did the 8th graders (p<.05). In addition, there was also an increase in minutes of selected sedentary activity after school (television watching, video/computer game playing) with grade; the differences between 5th graders and 7th and 8th graders were found to be significant (p<.01) (Myers et al., 1996).

Thus it seems that for both genders, activity declines but that decline is more marked and often accelerated for female adolescents (Sallis et al., 1994). This information is important in identifying female adolescents as an at risk group for a future sedentary lifestyle.

Risk Factors

Epidemiological research indicates that there is a strong relationship between regular exercise and a reduced risk of cardiovascular disease in adults (Fruin et al., 1992). Among adolescents the association between physical activity and health is less clear. Evidence is mounting, however, that physical activity in adolescence is inversely related to
a number of cardiovascular disease risk factors including, elevated blood lipids, hypertension, and obesity (Trost et al., 1996). Research also suggests that many of these risk factors are present in our youth and children. Earlier research indicated that in one study, over 50% of children screened for cardiovascular risk factors had at least one or more factors, such as elevated blood pressure, cholesterol, triglycerides, and body fat (Gilliam, Katch, Thorland, & Weltman, 1977). Later research done by Webber, Cresanta, Voors, & Berenson, (1982) reported that approximately 10-20% of children have multiple risk factors for cardiovascular disease. Gilliam et al., (1977) concluded from their research that several risk factors are highly prevalent in children and youth. These risk factors have also been reported to continue into adulthood (Webber et al., 1982).

The Bogalusa heart study (Myers et al., 1996) revealed that when sedentary activity was stratified by quartile there was a significant difference (p<.05) for triceps skinfolds in white males, with those below the median sedentary time having smaller triceps skinfolds than those above the median. In white females, as quartile of sedentary activity increased, HDL cholesterol decreased with the lowest levels of HDL cholesterol found in children in the uppermost quartile of sedentary behavior, and the highest levels found in the lowest quartile. This linear trend was found to be significant (p<.05).

Stratification of physical activity into quartiles also showed a significant relationship (p<.05) between physical activity and diastolic blood pressure. Diastolic pressure was highest in those children in the lowest quartile and decreased for those in the highest physical activity quartile. This linear trend was also found to be significant (p<.01). In addition, there was also a significant effect of physical activity quartile
membership on triglycerides in white females, although there was no linear relationship (p < .05). Rather, the highest triglyceride levels were found among those in the 50-75th activity percentiles, and the lowest levels among those in the uppermost quartile. The authors concluded that a sedentary activity increased with age with a corresponding decrease in total physical activity. In addition, prevalence of several known CVD risk factors was higher among the physically inactive and that these findings may indicate the early development of an unhealthy pattern (Myers et al., 1996).

To study the effect of physical activity on CVD risk factors in young Finnish adolescents Raitakari et al., (1994) followed 961 participants for 6 years. Physical activity was assessed with a standardized questionnaire, and long term effects of physically active and sedentary lifestyles were studied by comparing groups of young adults who had remained active or inactive in every three examinations.

Among young women physically active trackers, or those who remained physically active over the 6 year period, lower serum triglyceride values (p = .023) and thinner subscapular skinfolds (p = .023) were found when compared to those young women who had remained sedentary over the 6 years. In addition, sedentary girls were found to have started smoking more often than did active girls during the follow-up period (p = .002).

A step wise regression analysis was used to determine whether physical activity had any independent modifying effect on the serum lipoprotein and insulin levels. Physical activity change was independently and inversely associated with the changes in insulin and triglycerides among boys. Significant predictors of the insulin change were changes in physical activity (p<.001). Variables that independently associated with triglyceride
change were changes in physical activity (p<.05), subscapular skinfold thickness (p<.001) and smoking status (p = .09) (Raitakari et al., 1994).

The authors suggested that biologic risk factors such as serum lipids are present in youth and have been shown to track reasonably well from childhood to adulthood (Raitakari et al., 1994). And that while the results in this study were limited to those who had matured leading a physically active life and those who had adopted to sedentary lifestyle, consistently active young women had lower concentrations of serum triglycerides and thinner subscapular skinfolds compared with constantly sedentary young women. Differences in other risk factors, such as serum insulin concentration and insulin/glucose ratio, were in the anticipated direction, although not statistically significant (Raitakari et al., 1994).

Tracking physical activity

With the research suggesting many CVD risk factors are present in our children and adolescents, one must now consider the research which suggests that physical activity tracks significantly from childhood to adulthood, thus a carryover effect of a sedentary lifestyle and multiple CVD risk factors is possible.

In a paper describing the longitudinal tracking of adolescent health behaviors in two Minnesota Heart Health Program communities (Kelder, Perry, Klepp, & Lytle, 1994) seven annual waves of behavioral measurements were analyzed from both communities, beginning in the sixth grade through the 12th grade. The measures of physical activity each year were self-reported hours of exercise per week and physical activity score.

Results indicated that a clearly defined pattern of tracking physical activity was
observed across the grades. The observation was most apparent when comparing the highest activity groups with the lowest activity groups. At each follow-up period, these groups were significantly different (Kelder et al., 1994). In nearly all of the follow-up periods, the students identified in sixth grade as measuring high on the variable of physical activity remained high, and those measuring low, remained low (Kelder et al., 1994).

Significant evidence of physical activity tracking was also found in the 6 year study on Finnish adolescents (Ratikari et al., 1994). Complete data on physical activity index from each study year on 961 participants was used to determine the tracking significance.

Significant tracking of physical activity was observed with 3-year correlations of the index ranging from $r = .33$ to $r = .39$ in girls. Two groups of adolescents (active and sedentary) were formed at baseline according to high and low values of the index. Tracking of physical activity was assessed by calculating the correlation coefficients of physical activity index between subsequent measurements.

To determine the probability of remaining active or sedentary during the 6-year follow-up, cut points of the physical activity index were selected from lower and upper ends of the distribution of the physical activity index. Probability of remaining physically active over 6-year period was 29-57 percent in girls. Of those participants who were initially classified as sedentary at baseline, 51-63% of females were considered sedentary 6 years later. When both sexes and all age groups were considered, the probability of remaining sedentary was significantly stronger than the probability of remaining active ($p = .002$) (Ratikari et al., 1994).

These findings lead the authors to suggest that the level of physical activity tracks
significantly from adolescence to young adulthood and that participation in regular physical activity should be encouraged among adolescents in order to improve risk factor profiles (Ratikari et al., 1994).

Project PACE

Project PACE was developed as a practical system of matching physician counseling with patient readiness for physical activity. It was designed around several barriers to physicians regarding activity and health promotion counseling including time and training in behavioral counseling, both of which are central rationales for developing Project PACE (Patrick et al., 1994).

Using determinants identified in the SLT and stages present in the Transtheoretical Model, the PACE program targets known modifiable determinants of physical activity, along with assessing and identifying the patient’s current stage of change (Patrick et al., 1994).

The entire PACE protocol requires only 2-5 minutes of interaction between the physician and the patient. The first step in the program involves the patient completing a brief PACE assessment form (Appendix A) in which they select one of eleven graded statements which best describes their current level of and interest in physical activity. This score determines the patient’s current stage of change as identified in the PACE protocol.

The back of this assessment (Appendix B) contains the physical activity readiness questionnaire, used to assist the physician with risk assessment. After this, the patient is given one of three protocols, for precontemplators, contemplators, or actives (Appendix C). This instrument helps the patient identify potential benefits and create a suitable
activity program, along with suggesting different activities, ways to overcome barriers, and provides a sample activity log. The final step in PACE is to use brief, inexpensive follow-up procedures to strengthen outcome. Such things as a phone call, or a post-card can be used. Follow-up is considered important as part of the PACE protocol because it prompts patients to continue their activity programs, as well as showing the patient that physical activity is important (Patrick et al., 1994). In this study, repeat visits to the schools will replace the post cards and phone calls as a means of follow-up.

In addition to the physical assessments, tailored counseling techniques are used by the physician to increase the success of the intervention. Many studies indicate that physicians can effectively intervene in their patients' health behaviors (Patrick et al., 1994). PACE authors believe that successful physicians do not issue orders to patients, but instead they engage in brief negations (Patrick et al., 1994). The most important counseling skills for a physician to have are those that enable him or her to effectively give specific advice, help patients set realistic goals, use problem solving skills to surmount barriers, and boost patients confidence with positive reinforcement (Patrick et al., 1994).

There are three PACE counseling protocols, for precontemplators, contemplators, and actives, all of which correspond to their respective stage of change. For Precontemplators, the goal is to get them to consider beginning an activity program, and the patient is required to identify potential benefits of activity, as well as identifying roadblocks or obstacles to physical activity. The main goal for Contemplators is to have them make a specific plan to begin an activity program. They are also asked to identify potential benefits of physical activity and are also asked to identify someone who will
support their efforts at increased activity. For Actives, the main goal is to get participants to continue their already active lifestyle. Actives are also asked to record benefits of physical activity and consider possible changes to their current physical activity program.

Further examination of the PACE program also identifies the use of several other methods to promote physical activity, including the use of contracts, a personalized approach, and its openness to encourage moderate lifetime activities.

Contracts

In a review of literature related to adherence to exercise programs, Robison et al., (1994) suggested that “treatment packages” that combine behavioral and cognitive strategies may hold the key for maximizing adherence to exercise programs. In a study on cardiac patients, adherence to their exercise program was improved when they signed a written agreement, or a contract, before beginning participation in the program (Oldridge & Jones, 1983). Behavioral contracting, usually involves a written agreement stipulating specific behaviors and contingencies (rewards and or punishments) designed to promote behavior change (Robison et al., 1994). Using a contract to improve exercise adherence has been shown to be effective for improving adherence and for decreasing dropout from aerobic exercise programs in a variety of settings (Robison et al., 1994).

Personalized Approach

The personalized approach to teaching physical education has recently offered an alternative to the more traditional teacher-centered approach to teaching. It is believed that the personalized approach helps students by fostering self-responsibility, as well as allowing the individual to progress and learn at their own pace (Mott, Warren, Virgilio,
Berenson, 1991). Students may be more likely to adopt and maintain positive attitudes and behaviors about individual health and fitness through the personalized approach (Mott et al., 1991). Several investigations have demonstrated that the personalized styles to instruction improve knowledge, performance and certain behaviors (Mott et al., 1991).

In a study designed to test the effects of the personalized approach in promoting fitness among other variables, Mott et al., (1991) implemented the Personalized Fitness Module (PFM), a comprehensive program whose curriculum was based on the principle of the SLT. The PFM was implemented in a fifth grade class of 48 students. A control group of 47 students in another 5th grade class participated in a traditional fitness unit.

Results indicated that in the area of cardiovascular endurance, the personalized group scored significantly higher on the one-mile run/walk time (p<.05). The authors concluded that use of a more personalized approach facilitates a greater opportunity for individual differences, self-monitoring skills, and social interaction and that cardiovascular-fitness knowledge and the promotion of positive attitudes toward physical activity and appropriate fitness patterns based on individual needs and interest plays an essential role in the early prevention of cardiovascular disease (Mott et al., 1991).

Moderate / Lifestyle Activities

After reviewing several studies on exercise behavior, Robison et al., (1994) suggested that increased participation and adherence to exercise programs often occurs when moderate exercise as opposed to vigorous exercise is performed. In addition, walking programs and programs that promote "lifestyle activities" or those activities that can typically be done individually without the use of facilities or equipment, appear to
promote higher adherence rates (Robison et al., 1994).

Moderate-intensity physical activities have several behavioral advantages over vigorous activity (Hovell et al., 1989). Activities such as walking, gardening, and climbing stairs have been termed "routine exercise" because they are incidental to everyday living (Hovell et al., 1989). They require little effort because they are part of our "routine activities" and they usually do not require specific equipment or facilities. It has been suggested that an important public health effect might be achieved by encouraging the majority of the population who are least active to become moderately active (Hovell et al., 1989).

In an analysis of gender differences in physical activity and determinants of physical activity among fifth graders, Trost et al., (1996) used the Previous Day Physical Activity Recall to measure physical activity and intensity of physical activity.

On average, boys reported significantly greater participation in vigorous physical activity than did girls in the sample (p = .05). While the boys also reported greater participation in moderate physical activity, more girls reported engaging in moderate physical activity than they did vigorous physical activity. Further results from ANCOVA analysis indicated that participation in community sports was found to be a significant covariate of vigorous physical activity and was more evident in the boy's responses. The results led the authors to suggest that physical educators should endeavor to modify existing school physical education programs to accommodate the needs and interests of young girls. In particular, girls should be provided with opportunities to participate in noncompetitive lifetime activities such as walking, calisthenics and aerobic dance (Trost et
To assess physical activity and racial differences among adolescent females, Bungum et al. (1996) used a variation of the Stanford Physical Activity Recall to question 852 predominately African American adolescents. The most frequently cited mode of activity for both groups was walking, and moderate intense activities comprised sixty-five (AA) and sixty-four (W) percent of physical activity episodes for the sample (Bungum et al., 1996).

The authors found that among female adolescents surveyed, moderately intense activities were the most frequently cited suggesting that adolescent females are willing and able to perform this type of physical activity and that interventions to promote moderate physical activity among the group are advised (Bungum et al., 1996). While PACE does not discourage vigorous activity, it does encourage moderate activities which can be easily incorporated into daily routines and might prove to be more attractive to sedentary youth.

Adolescent Activity Guidelines

The International Consensus Conference on Physical Activity Guidelines for Adolescents convened to review the effects of physical activity on the health of adolescents, to establish age-appropriate guidelines, and to consider how these guidelines might be implemented in primary health care settings (Sallis et al., 1994). The conference invited 34 experts, and established two main guidelines.

1. All adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, transportation, recreation, physical education, or planned exercise, in the context of family, school, and community activities.
2. Adolescents should engage in three or more sessions per week of activities that last 20 minutes or more at a time and that require moderate to vigorous levels of exertion.

In addition, the conference also published consensus guidelines for implementing the activity guidelines in primary health care.

1. All health care providers should regularly assess and counsel their adolescent patients about physical activity.

2. Physical activity assessment should enable health care providers to:
   a) categorize their patients as either already engaging in appropriate activity or in need of increased physical activity
   b) determine if a patient is at increased risk for health outcomes that can be beneficially affected by physical activity
   c) identify barriers to either continues or increased physical activity the adolescent might experience

3. Physical activity counseling should be:
   a) based upon the findings of assessment, including individual needs and interests
   b) be based upon the guidelines for activity in adolescents
   c) result in a specific activity plan that is discussed and agreed upon prior to the end of the visit
   d) involve, as appropriate, peers, family, school, and other public and private community resources.

Summary

Project PACE is an intervention designed to increase physical activity and to adjust
the stage of readiness score in a positive direction. It is based on principles from both the SLT and the Transtheoretical Model, as their applications to exercise and increasing physical activity have been well researched. Research has also shown that a significant number of our young female adolescents are at risk for sedentary lifestyles and the CVD risks associated with that lifestyle. This is of particular importance as research has indicated that physical activity can be significantly tracked from childhood to adulthood, making this group an important one to consider when applying interventions such as Project PACE.
CHAPTER 3

METHODOLOGY

A quasi-experimental design was used to investigate the relationship between individual activity counseling (Project PACE) and activity levels, behavior stage changes, and selected psychosocial variables in a sample of adolescent females. A description of subjects, instruments, data collection and data analysis are included in this chapter.

Sample and Setting

The target population for this study consisted of female adolescent girls ages 12-18 years. Subjects were enrolled in a “non-sports” (“non-athletic”), physical education class in one of 4 public schools in the North Texas area. “Non-sports” physical education classes are for students who are not currently involved in a school sponsored sport. This group was selected because research had shown them to be at risk for sedentary lifestyles (Pate et al., 1994; Garcia et al., 1995).

Efforts were made to keep the number of adolescents in the control and intervention groups equal with approximately 30 females in each group, and a total sample of approximately 60 participants. However because of logistics, these exact numbers were not attained. Participants in the treatment group were those enrolled in “non-athletic” classes at two different schools. Participants in the control group were selected from “non-athletic” classes at two different schools. Schools participating in the study were located in rural towns in the north Texas area.
Schools were located in towns with populations of between 500-4,000 people. With one exception, all the schools were athletically classified as a 2A. The exception was classified as a 3A school. The total number of students who attended classes at the schools ranged from between 150 - 500 students, and the average size of the graduating class was from 40 - 100 students per year.

All girls that were enrolled in the selected physical education classes, who agreed to participate, and obtained parental consent, were considered potential participants. Subjects had to meet the following inclusion criteria to participate in the study:

1. Participants had to be female.

2. Participants had to be 12 to 18 years old.

3. Participants had to be enrolled in the designated "non-sports" (non-athletics) activity class and continue to stay enrolled throughout the course of the study.

4. Participants and their parent or guardian had to consent to voluntary participation in the study.

Protection of Human Subjects

Approval to conduct this study was obtained from the University of North Texas Institutional Review Board. No risks were identified for participants who took part in the individual activity counseling in the study. However, some risks have been associated with physical activity, which participants were being encouraged to increase.

Macera & Wooten (1994) reported that injury related mortality was high among adolescents accounting for over 75% of deaths occurring between those age 15-19 years of age, with about 5% of those injuries attributed to sports injuries. To minimize any risk
of injuries associated with increasing physical activity, time was spent in initial sessions discussing strategies to increase activity safely and to avoid musculoskeletal injuries.

During each session participants were asked if they had suffered any type of injury relating to increasing their physical activity. Time was also spent discussing muscle soreness and other potential temporary discomforts of increasing physical activity. The likelihood of serious injury occurring was small because participants were allowed to choose the type and intensity of activity in which they wanted to participate. Most students chose moderately intense physical activity, thus lowering their risk of injury.

When filling out the necessary questionnaires subjects were informed that all information given would remain confidential. Subjects’ names were coded for data entry, and findings were reported in a group format with no individual name identification. Questionnaires will remain in control of the research personnel and will be destroyed two years after completion of the study.

Variables

Independent Variable

This study contained one independent variable: enrollment in Project PACE, a program designed to increase physical activity among participants. However, age, body weight, and other demographic variables were statistically controlled. Data from participants in the treatment group was compared to the control group which did not participate in Project PACE activities.

Dependent Variables

The following dependent variables were measured:
1. Activity level - as measured by The Previous Day Activity Recall.

2. Behavior Change Stage - as measured by the Behavior Change Statement Inventory

3. Selected Psychosocial Variables (self-efficacy, attitude, perception of barriers, perceived social support, and knowledge) - as measured by the exercise questionnaire.

Instruments

Data was collected at two times during the study, using three instruments (Appendices A, D, and E).

1. The Previous Day Activity Recall - Instrument in which participants determined and ranked their previous day’s activity as very light, light, medium, or hard, for half hour increments. The seventeen 30 minute blocks start at 3:00 PM and continue through 11:30 PM. In addition, 35 common activities were listed on the form and each student entered the main activity for which they participated during each 30 minute time block for the previous day. The student also rated the activity for intensity. The PDPAR has established validity based on concurrent observation with both motion sensors (r=.77) and heart rate monitors (r=.63) and established test-retest reliability (r=.98) based on a published analysis (Weston, Petosa, & Pate, 1997). While such an instrument is subject to recall bias, self-reports of physical activity have also been used extensively in research, and have been shown to be reliable and valid (Baronowski et al., 1984; Dishman & Steinhardt, 1988). Recall questionnaires and global self-reports of activity have been regarded as suitable for epidemiological research on adolescents (Casperson, 1989). Therefore, self-reports of physical activity levels were deemed suitable for this study.

2. A Behavior Stage Change Statement Inventory - Participants selected one statement
from eleven given statements which best described their current behavior stage regarding physical activity. This instrument is used as part of the assessment phase in the PACE protocol. The PACE protocol will be discussed further in the Data Collection section.

3. An Exercise Questionnaire - This instrument measured several psychosocial variables including; self-efficacy, attitude, perception of barriers, knowledge, and perceived social support towards physical activity. Parts of the questionnaire are ordinarily scaled using a Likert type scale. Other parts of the instrument use a categorical (yes/no) type of measure. The instrument was patterned after the design of other instruments previously used to assess psychosocial variables. To assume validity, factor analysis was conducted on both scales with 4 or more items. Those items whose factor loadings are less than .7 were eliminated.

Data Collection

The study was divided into 3 phases in which data was collected at two times. Each time all three instruments were used to collect data from the participants before commencement of the intervention.

Phase 1:

Base line data was collected from participants at the beginning of the study. At this time participants in both the treatment and control groups filled out the Project PACE assessment form. On the first side of the assessment the participants chose one of eleven graded statements (Behavior Stage Change Inventory) that best described their current level of and interest in physical activity. This score determined which of the three stages of change that the participant was in and guided the intervention protocol. The backside
of the assessment contained the physical activity readiness questionnaire (PAR-Q), which was used to determine a subject’s need for a physician evaluation before starting their activity program. No participants in either the control or treatment group required a physician’s permission to enter the program.

After the assessment was completed, subjects were then given the Project PACE protocol for contemplators, (Appendix C). The front of this form helped the participant by identifying potential benefits of physical activity, along with providing a guideline for creating an individual activity program. Some questions asked were: What activities are you going to do? Do you enjoy doing your selected activity? Where, when and how long will you do your selected activity? A question on identifying a person for social support also assisted the subjects in planning their activity program. In addition, the form also gave a partial listing of some types of moderate and vigorous activities, and included a section on common roadblocks, or barriers, and how to get past them. Finally participants were given an activity log to keep track of their exercise (Appendix F). While both treatment and control groups were given the PACE assessment form, Previous Day Activity Recall, and the Exercise Questionnaire, only the treatment groups was given the Protocol for Contemplators, and the Activity Log (Appendices B, C, and F).

Intervention

The initial collection was followed by an 8 week period in which each intervention unit was visited for counseling twice monthly. During each counseling session, the researcher met individually with the girls for 2-5 minutes. The researcher tried to determined if participants had been met their activity goals. If the participants had not
been met their activity goals, the researcher assisted the participant in finding out why their goals were not met and helped them find ways to meet their activity goals (suggestions on overcoming barriers, reassessing goals, etc.).

In each counseling session, participants were asked to state personal benefits of exercise and physical activity (stress relief, feels good, fun, etc.). This line of logic helped serve as a means to reinforce physical activity. At each session, subjects were given an opportunity to ask questions, and the researcher also inquired about any injuries that may have occurred as a result of increased activity. If the PACE protocol had been implemented for the adolescents in the physician's office, one would have expected a significantly lower number of visits for counseling than occurred over the course of this study. However, because consistent and regular encouragement and feedback are necessary to enable behavior changes, this deviation from PACE protocol seemed appropriate (Patrick et al., 1994; Perry et al., 1988). Encouragement for physical activity participation was provided for participants at each counseling session. In addition, specific topics regarding physical activity were addressed individually at each session. The topics for the first four visits were:

Week One: Options for exercise when the weather is bad
Week Two: Scheduling Exercise to overcome time barriers
Week Three: Basic Knowledge of Exercise
Week Four: Identifying Social Support for Exercise

Phase 2:

Following the initial 8 week period of the study, visits for individual counseling
became monthly visits. Monthly visits continued for 4 months. During this time, due to time conflicts, some group sessions were necessary. Topics of discussion included:

Month 3: No Pain No Gain Myth of Exercise

Month 4: The importance of picking an activity you enjoy and is convenient for you

Month 5: Other Barriers to Exercise and ways to overcome them

Month 6: Final Data Collection

Phase 3:

Following the 4 month period of monthly visits, the second data collection took place. Post intervention measures were taken using the 3 instruments specified and used in gathering baseline data. The data collection and intervention looked as follows:

<table>
<thead>
<tr>
<th></th>
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<th>Spring</th>
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<td>X 0</td>
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<tr>
<td>Control Group</td>
<td>0</td>
<td>0 0</td>
</tr>
</tbody>
</table>

During each visit, participants were given a blank activity log, so that they could chart their progress. Completion of the activity log was voluntary, but it is used in the PACE protocol.

Data Analysis

Data was analyzed using the Statistical Package of the Social Sciences (SPSS). ANOVA’s with repeated measures were used to assess differences in physical activity levels, stages of change, and changes in psychosocial variables between the control and treatment groups. Differences in age and body weight were controlled for using ACOVA strategies.
Summary

A quasi-experiment study design was used to investigate the relationship between individual activity counseling (Project PACE) and activity level, behavior stage changes, and selected psychosocial variables in female adolescent girls. The sample was selected from four public schools in the North Texas area.
CHAPTER 4

RESULTS

The purpose of this quasi-experimental study was to investigate the relationship between Project PACE and physical activity behavior, stage of behavior change, and select psychosocial variables among adolescent females. A description of the sample and findings are presented in this chapter.

Description of Sample

Participants for this study were female adolescents enrolled in a “non-sports” physical education class in one of 4 public schools in the North Texas area. Of the 69 participants who participated in the base line data collection, analysis at the third data collection was completed on 44 participants (N=29; Treatment Group, N=15; Control Group). A small number of subjects were excluded from final data analysis because they transferred out of the specific "non-sports" physical activity class during the course of the study and into other physical activity classes (N=8). The remainder of the original participants who were not accounted for in the final data analysis were not in class on the day of final data collection (N=17). Specific reasons for these absences are not known, however a minimum of 3 participants became pregnant during the course of the study, and at least temporarily withdrew from the specific "non-sports" physical activity classes in which they were originally enrolled at the beginning of the study.
Five “non-sports” classes (physical activity classes for those students not involved in any school sport) at four different schools were used for the convenience sample. Data was collected over an 8 month period during the fall of 1996 and the spring of 1997.

This group was predominantly white (N=64; 92.8%). The remainder of the subjects were Hispanic (N=5; 7.2%). Two of the Hispanic subjects were in the control group, and three were members of the treatment group. Thus, the ethnic composition of the treatment and control groups are similar.

The mean age of the treatment group was 14.4 (± 2.5). The control group had a mean age of 15.1 (± 1.5). Age differences between groups were not significant (p=.08).

Descriptive data on demographic, psychosocial variables and physical activity behavior presented by intervention status at the initial data collection is shown in Table 1.

Table 1

| Psychosocial Variables and Physical Activity Behavior: Treatment and Control Groups |
|-----------------------------------------------|------------------|---------------------|
| Variable                                | Treatment (Mean ± SD) | Control (Mean ± SD) |
| Barriers                                 | 3.9 ± 2.1        | 3.5 ± 3.3           |
| Beliefs                                  | 17.3 ± 6.0       | 18.0 ± 3.2          |
| Attitudes                                | 10.9 ± 1.4       | 12.4 ± 9.8 *        |
| Knowledge                                | 6.9 ± 2.8        | 12.4 ± 7.0          |
| Self Efficacy                            | 10.6 ± 1.5       | 11.1 ± 2.1          |
| Social Support                           | 12.8 ± 3.0       | 14.1 ± 2.9          |
| Physical Activity Behavior               | 31.1 ± 5.1       | 34.4 ± 10.3         |
T-test analysis detected a significant difference between group means for attitudes (p<.05). The mean score for the control group was higher (X=12.4) than in the treatment group (X=10.9) at the initial data collection. No other significant differences in the means of the control and treatment groups were detected during the initial data collection (p>.05).

Descriptive data on demographic psychosocial variables and physical activity behavior presented by intervention status for the second and third data collections are presented in Table 2. Knowledge means in both the treatment and control groups increased from the second to the third data collection. Increases in the treatment group scores however were more pronounced than in the control group. Mean knowledge scores from the second data collection in the treatment group were 6.6 ± 3.8. At the third data collection, mean scores for the treatment group had increased to 8.8 ± 1.6. The increases in mean knowledge scores, however, were not significant for either group (p>.05).
Table 2

Psychosocial Variables and Physical Activity Behavior by Intervention Status: Second and Third Data Collections

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment (Mean ± SD)</th>
<th>Control (Mean ± SD)</th>
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<tbody>
<tr>
<td>Barriers II</td>
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</tr>
<tr>
<td>III</td>
<td>4.2 ± 1.9</td>
<td>4.7 ± 1.6</td>
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<tr>
<td>Beliefs II</td>
<td>16.0 ± 2.2</td>
<td>15.7 ± 3.1</td>
</tr>
<tr>
<td>III</td>
<td>16.8 ± 2.4</td>
<td>15.9 ± 2.5</td>
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<tr>
<td>Attitudes II</td>
<td>11.2 ± 1.5</td>
<td>11.8 ± 2.1</td>
</tr>
<tr>
<td>III</td>
<td>11.8 ± 1.4</td>
<td>11.2 ± 2.6</td>
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<tr>
<td>Knowledge II</td>
<td>6.6 ± 3.8</td>
<td>6.4 ± 3.1</td>
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<tr>
<td>III</td>
<td>8.8 ± 1.6</td>
<td>7.7 ± 2.2</td>
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<tr>
<td>Self Efficacy II</td>
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<td>III</td>
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<tr>
<td>Social Support II</td>
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<td>12.7 ± 4.2</td>
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<tr>
<td>III</td>
<td>11.9 ± 2.7</td>
<td>12.8 ± 3.7</td>
</tr>
<tr>
<td>Physical Activity II</td>
<td>35.3 ± 10.5</td>
<td>30.2 ± 8.0</td>
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<tr>
<td>III</td>
<td>32.8 ± 6.4</td>
<td>36.6 ± 10.9</td>
</tr>
</tbody>
</table>
With the exception of Attitudes II and III for the Control Group, and Physical Activity II and III for the Treatment Group, all mean scores improved from time II to time III for both the treatment and control groups, although none of the improvements were significant (p>.05). The largest increases in mean scores between time II and time III measures were found for the variables of Knowledge for the Treatment Group and the variable of Physical Activity for the Control Group. ANOVA tests were completed for initial and interaction data and results of the analysis are found in Table 3.

Table 3

ANOVA Scores: Initial and Intervention Data

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<th>P-value</th>
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<td>.03</td>
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<td>3.81</td>
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<td>Attitudes</td>
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<td>.80</td>
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<td>INT</td>
<td>2</td>
<td>3.19</td>
<td>.05</td>
</tr>
<tr>
<td>Knowledge</td>
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<td>.14</td>
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<tr>
<td>INT</td>
<td>2</td>
<td>1.49</td>
<td>.23</td>
</tr>
<tr>
<td>Self Efficacy</td>
<td>2</td>
<td>1.04</td>
<td>.36</td>
</tr>
<tr>
<td>INT</td>
<td>2</td>
<td>.46</td>
<td>.64</td>
</tr>
<tr>
<td>Social Support</td>
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<td>5.9</td>
<td>.004</td>
</tr>
<tr>
<td>INT</td>
<td>2</td>
<td>.04</td>
<td>.96</td>
</tr>
</tbody>
</table>
Findings

The only significant finding of the data analysis was for the variable of attitudes, detected during the initial data collection. The initial mean attitude score for the control group ($X=12.4$) was significantly different than the mean attitude score for the treatment group ($X=10.9$) during the initial data collection.

While changes were detected between measures and data collections, there were no other significant findings detected to support the hypothesis of the study outlined in Chapter One.

Summary

The participants in the study were female adolescents with a mean age of $14.4 \pm 2.5$ in the treatment group and $15.1 \pm 1.5$ in the control group. Most of the participants were white ($N = 64; 92.8\%$) the remainder of the sample were Hispanic ($N = 5; 7.2\%$). All participants were enrolled in a “non-sports” physical activity class in one of 4 public schools in the North Texas area.

T-test analysis detected a significant difference between control and treatment groups for the variable of attitudes during baseline data collection. The mean attitude score was higher in the control group than in the treatment group.
The most interesting, and yet disappointing finding from this study is that Project PACE was not an effective strategy to influence physical activity behavior or psychosocial variables related to physical activity. However, statistically significant differences were found.

The quadratic term in the trial by intervention interaction assessment was significant \( (p=.008) \) for the treatment group. Plotting the PDPAR mean index scores \( (31, 35, 32) \) for the PACE group showed that physical activity behavior increased from baseline to the second data collection and then decreased at the third data collection. The increase in scores from the first to second data collection, and then the decrease in scores from the second to the third data collection are explainable. The increase from 31 to 35 could be explained by the effects of the intervention. Between data collections one and two, the principal investigator delivered Project PACE messages once every two weeks. The drop from 35 to 32 could be explained by a decrease in the frequency of the delivery of the intervention to once per month. However, the fluctuations in PDPAR index scores of the control group \( (34, 30, \text{ and } 37) \) cannot be explained, as it was expected that these scores would remain stable. Thus, any attempt to attribute changes in PDPAR scores to the intervention are ill advised.
Reasons for the instability in these results are difficult to explain. However, because only one day of physical activity behavior was recalled it is possible that the collection periods were not of sufficient length to measure current physical activity behavior. When a broader measure of physical activity (How many of the past 7 days did you exercise or participate in sports or vigorous activities that made you sweat and breathe hard such as basketball, jogging, fast dancing, tennis, swimming, fast biking, or similar aerobic activities?) was assessed, a similar pattern emerged. While increase in the number of days of physical activity in the intervention group was favorable (3.9, 4.0, 4.1) the behavior of the control group was more difficult to explain. Why this group would begin at 3.5 days per week, decrease physical activity to 3.0 days and then increase to 4.6 days per week is not known. Investigators are aware that at one control school the females involved in cheerleading were placed in the “non-sports” physical education classes. At all other schools cheerleaders were not enrolled in this type of class. Another possible reason for the instability in physical activity results is measurement error.

A trial by intervention interaction was detected for attitudes. This data shows that the attitudes of those who received the intervention improved slightly, while the attitudes of those in the control group decreased. This finding is difficult to explain. Reasons for an improvement in scores of intervention students are understandable, as it is plausible that the strategies of Project PACE improved such attitudes. However the decrease in positive attitudes among the control group is difficult to explain. It is plausible that the intervention was successful in counter acting a secular trend or age effect of poorer or lower attitudes toward physical activity among these youth. Tracking data to support the
existence of such a secular trend makes it impossible to attribute changes in attitudes toward physical activity to the intervention.

The statistically significant main interaction effects associated with the beliefs toward physical activity are also difficult to explain. The fall in belief scores regarding the benefits of physical activity among control participants defies explanation. It is possible, but very unlikely, that a secular trend or age effect similar to the ones previously mentioned affected these results.

Results of the present study suggest that Project PACE may not be an effective method to increase physical activity among adolescent females. Several factors may have contributed to these disappointing results. First, the intervention strategies in the present study were delivered by a graduate student. Project PACE was designed to be delivered by a physician. The benefits of having a graduate student implement the PACE program, such as having more time for personal contact and instruction with each program participant, are apparent. However, it remains plausible that physician advice influences the behavior of Americans to a greater extent than that of a graduate student, and therefore physicians would potentially be more effective delivery agents of the PACE project. Accordingly, it is recommended that future efforts employing this strategy directly involve physicians in the delivery of the Project PACE message. Additional studies with larger numbers of subjects are recommended to increase statistical power.

A final reason for the dearth of positive impacts of Project PACE is its limited scope. While the program includes strategies to improve psychosocial aspects of exercise and physical activity enhancing skills, no attempt is made to alter physical environments.
(making physical activity opportunities available). It is possible that a combination of Project PACE and providing exercise opportunities (intramural sports, walking clubs, etc) would facilitate increases in physical activity behavior of adolescents.

Assuming that the data from the intervention schools is accurate, and this may not be a safe assumption, it appears that Project PACE may produce some positive effects as small gains were seen for attitudes toward physical activity, knowledge and self-efficacy. However, after working with these female teens, it is the author’s hypothesis that intervention intensity and frequency would need to be increased, and environmental changes made before positive changes in physical activity behavior and psychosocial variables related to physical activity would be realized.
APPENDIX A

PACE ASSESSMENT FORM
The statement which most reflects my current free time physical activity/exercise is number___________.

1. I do not exercise or walk regularly now, and I do not intend to start in the near future.
2. I do not exercise or walk regularly, but I have been thinking of starting.
3. I am trying to start to exercise or walk, (or) During the last month I have started to exercise or walk on occasion or on weekends only.
4. I have exercised or walked infrequently (or on weekends only) for more than 1 month.
5. I am doing vigorous or moderate exercise less than three times a week (or moderate exercise less than 2 hours a week.)
6. I have been doing moderate exercise three or more times a week (or more than 2 hours a week) for 1 to 6 months.
7. I have been doing moderate exercise three or more times a week (or more than 2 hours a week) for 7 months or more.
8. I have been doing vigorous exercise three to five times a week for 1 to 6 months.
9. I have been doing vigorous exercise three to five times a week for 7 to 12 months.
10. I have been doing vigorous exercise three to five times a week for more than 12 months.
11. I do vigorous exercise six or more times a week.

NAME_________________________________________

SCHOOL_________________________________________
Based on your health status, it is recommended you do the following to improve your health:

- You appear to be able to do either moderate or vigorous physical activities.
- You can benefit greatly by starting a program of regular walking or other moderate activity.*
- Before you increase your physical activity, you need to have an exercise tolerance test.*

* Call this office for an appointment or referral.

**SUGGESTED PROGRAM (FITT)**

| Frequency | F _____ times per week |
| Intensity | I _____ moderate _____ vigor activity |
| Type      | T _____ Type of physical activity |
| Time      | T _____ minutes per session to begin |
|           | (work up to _____ min in ____ weeks.) |

**MAJOR CVD RISK FACTORS:**

- Smoking
- Hypertension
- Elevated lipids
- Physical inactivity
- Positive family history

I agree to try out this physical activity plan from ____________ to ______________

__________________________  ____________________________
Patient's Signature          Providers Signature
APPENDIX C

PACE CONTEMPLATOR PROTOCOL
Congratulations. On your PACE assessment you said that you are ready to make physical activity a regular part of your life. You are taking a big step toward improving your physical and mental health. This form should be able to help you start an activity program you can stick with.

What are the two main benefits you hope to get from being active? Write them down here and think of them often.

1. ____________________________________________
2. ____________________________________________

PHYSICAL ACTIVITY MUST BE REGULAR. Plan to do an activity of your choice, three to five times per week.

WHAT ACTIVITIES ARE YOU GOING TO DO?
Some activities enjoyed by many people are listed on the back. In choosing your activity, consider these questions:

- **Do you enjoy it?** Can you afford the supplies, equipment, facilities, or classes? Are there family or friends to do this activity with you? Can you do it year-round or do you need more than one activity?
  
  Type(s) of activity: ____________________________________________

- **Where will you do your activity?** Can you do this activity at home or in your neighborhood? Do you have to go to a gym, a park, or a health club? Is this place convenient for you?
  
  Place(s) for activity: ____________________________________________

- **What is the most realistic time for you to do this activity three to five times per week?**
  Will you have to reschedule other activities?
  
  Days and times for activity: ____________________________________________

- **How long do you plan to do your activity each time?** Build up time gradually over several weeks. Start with a 5 to 10 minute workout and build up to 30 to 60 minutes of moderate activity or 20 to 40 minutes of vigorous activity.
  
  Length of activity: ____________________________________________

- **Who can support you with your new activity program?** It is ideal for someone to be active with you. You may want to ask someone to encourage you or help you to be active.
  
  Who will help you and how? ____________________________________________
ACTIVITIES

MODERATE:
Walking (at home, to work, on lunch break)
Gardening (must be regular)
Hiking
Slow cycling
Folk, square, or popular dancing
Ice and roller skating
Doubles tennis
Taking the stairs

VIGOROUS:
Jogging
Aerobic dance
Basketball
Fast cycling
Cross-country skiing
Swimming laps
Singles tennis and racket sports
Soccer

HOW TO GET PAST ROADBLOCKS

ROADBLOCK
I do not have the time.
I do not enjoy exercise.
I am usually too tired to exercise.
The weather is too bad.
Exercise is boring.
I get sore when I exercise.

HOW TO GET PAST IT
We’re only taking about three 30-minute sessions each week. Can you do without three TV shows a week?

Do not "exercise." Start a hobby or an enjoyable activity that gets you moving.

Regular activity will improve your energy level. Try it and see for yourself.

There are many activities you can do in your own home, in any weather.

Listening to music during your activity keeps your mind occupied. Walking, biking, or running can take you past lots of interesting scenery.

Slight muscle soreness after physical activity is common when you are just starting. It should go away in 2-3 days. You can avoid this by building up gradually and stretching after.
**ACTIVITY NUMBERS**

**Eating**
1. Meal
2. Snack
3. Cooking

**Sleep/Bathing**
4. Sleeping
5. Resting
6. Shower/Bath

**Transportation**
7. Ride in car, bus
8. Travel by walking
9. Travel by bike

**Work/School**
10. Job (list)
11. Homework/Paperwork
12. House chores (list)

**Spare Time**
13. Watch TV
14. Go to movies/concert
15. Listen to music
16. Talk on the phone
17. Hang around
18. Shopping
19. Play video games
20. Other (list)

**Physical Activities**
21. Walk
22. Jog/run
23. Dance (for fun)
24. Aerobic dance
25. Swim (for fun)
26. Swim laps
27. Ride bicycle
28. Lift weights
29. Use skateboard
30. Play organized sport
31. Did individual exercise
32. Did active game outside
33. Other (list)
<table>
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<tr>
<th>Activity Numbers</th>
<th>Very Light</th>
<th>Light</th>
<th>Medium</th>
<th>Hard</th>
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<td>Supper</td>
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<tr>
<td>Evening</td>
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<tr>
<td>10:30</td>
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<tr>
<td>Night</td>
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<tr>
<td>11:00</td>
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</tbody>
</table>

Choose the day of the week that you did these activities.

Put Activity Numbers in this column.

Put an X in the box that best describes the activity you did.
EXERCISE QUESTIONNAIRE

1. Name ____________________________ Date __________________

2. Race (please circle)
   A. African-American  B. White  C. Hispanic  D. Other

3. Height ___________ meters

4. Weight ___________ kilograms

5. I am confident I can exercise three times per week for the next two weeks.
   
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

6. I am confident I can make time for exercise even on days when I am very busy.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7. I am confident I can exercise even when my body is sore or achy.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

8. For you to participate regularly in one or more physical activities during your free time would be...........

<table>
<thead>
<tr>
<th>Very Bad</th>
<th>Bad</th>
<th>Neither Good or Bad</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

9. For you to participate regularly in one or more physical activities during your free time within the next two weeks would be...........

<table>
<thead>
<tr>
<th>Very Unhealthy</th>
<th>Unhealthy</th>
<th>Neither Healthy or Unhealthy</th>
<th>Healthy</th>
<th>Very Healthy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
10. For you to participate regularly in one or more physical activities during your free time within the next two weeks would be........

<table>
<thead>
<tr>
<th>Very Boring</th>
<th>Boring</th>
<th>Neither Boring or Exciting</th>
<th>Exciting</th>
<th>Very Exciting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

11. Regular Exercise helps a person stay at their normal weight by using up extra calories.

12. Regular exercise helps control stress

13. Regular exercise helps the heart become a more efficient muscle.

14. Most women have to be careful exercising because they are likely to get large bulky muscles.

15. Exercise must be done every day to benefit one's health.

16. Regular exercise can lower your cholesterol level.

17. Wearing extra layers of clothing while exercising will help your body get rid of fat.

18. The important thing about exercise is how hard you run not how far.

19. When thinking about exercise, the statement, "No Pain No Gain" is true.

20. It is more important for men to exercise than women.

21. My friends think I should exercise in one or more physical activities during my free time in the next 2 weeks.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

22. My parent(s) think I should exercise in one or more physical activities during my free time in the next 2 weeks.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
23. My brother/sister(s) think(s) I should exercise in one or more physical activities during my free time in the next 2 weeks.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

24. Members of my family encourage me to exercise.

<table>
<thead>
<tr>
<th>Almost Never</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

25. Exercise will help me feel less depressed.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

26. Exercise will help me feel less bored.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</table>

27. Exercise can help my heart and lungs become stronger.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
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</tbody>
</table>

28. Exercise can make me look better.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
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<td>4</td>
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</table>

29. Lack of time prevents me from exercising.

<table>
<thead>
<tr>
<th>Almost Never</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
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</thead>
<tbody>
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<td>1</td>
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30. Schoolwork prevents me from getting exercise.
### Question 31
Lack of motivation prevents me from getting exercise.

<table>
<thead>
<tr>
<th>Almost</th>
<th>Occasionally</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very</th>
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<tbody>
<tr>
<td>Never</td>
<td>1</td>
<td>2</td>
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### Question 32
How many hours of television do you usually watch each night?

- a. less than two hours
- b. two hours or more

### Question 33
On how many of the past 7 days did you exercise or participate in sports or activities that made you sweat and breathe hard such as basketball, jogging, fast dancing, tennis, swimming, fast biking, or similar aerobic activities.

- a. 0
- b. 1
- c. 2
- d. 3
- e. 4
- f. 5
- g. 6
- h. 7

Age ___________________
APPENDIX F

PACE ACTIVITY LOG
**ACTIVITY LOG**

Use this activity log to keep track of your physical activity. Write down how long your do your activity as well as positive feelings and experiences. Note any roadblocks that discourage you from doing your activity and do something about them. When this log is full, make one of your own.

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Minutes</th>
<th>Feelings/Comments</th>
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<tbody>
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</table>
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