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Self-Determination Theory as a Pedagogical Foundation for Collegiate Physical Activity Courses

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The University of Southern Mississippi

SELF-DETERMINATION THEORY AS A PEDAGOGICAL FOUNDATION FOR COLLEGIATE PHYSICAL ACTIVITY COURSES

by

Scot Edward Long

A Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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ABSTRACT

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Inactivity, obesity and associated medical, social and economic problems are pervasive in contemporary society. Modern science is aware of the preventative role physical activity offers in deterrence of these problems and the benefits physical education offers. Traditionally, physical education has focused primarily on physiological variables; however, physical activity begins with a behavioral change. Motivation is the necessary factor to initiate physical activity and self-determination theory (SDT) can be used to explain learner motivation in the world of collegiate physical education. Institutionalized schooling is typically performed in a controlling nature, which creates a poor environment for learning and motivation. The purpose of this study was to examine college students' self-determination to be physically active along with perceptions of autonomy, competence, and relatedness using perspectives of self-determination theory. Variables of SDT were used to structure a motivational pedagogical environment to increase student motivation. The population for this study was limited to college students at a university in the Southeast. A total of 69 students participated in two six week HPR 101 weight training classes. Two primary instruments were used to determine levels of self-determination as based on SDT. The Learning Climate Questionnaire was used as a manipulation check.

Descriptive statistics (frequencies, means, and standard deviations) and a multivariate analysis of variance were used to conduct the analysis. Results showed amotivation, external regulation, introjected regulation, intrinsic regulation, autonomy, competence and relatedness all increased with treatment but not significantly between control and experimental groups. SDT is an excellent means to use as a methodology to increase motivation in physical education pedagogy.

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CHAPTER I

INTRODUCTION

For the first time in world history, there are now as many overnourished people as undernourished around the world (Newman, 2004). In the United States, the sudden escalating rise in obesity over the last three decades has caused a true public health crisis (Ogden et al., 2006; U. S. Department of Health, 2001). Inactivity is a primary factor in becoming obese and its associated comorbidities, especially in contemporary society where physical activity is on the decline (Kilpatrick, Hebert, & Bartholomew, 2005). Research clearly shows the benefit of physical activity improving both physiological and psychological health (U. S. Department of Health, 2000). Epidemiological data indicates, however, that the majority of the public is not concerned about the importance of becoming and remaining physically active (Kilpatrick et al., 2005). The American College of Sports Medicine (ACSM, 2010) concurs, recently stating that although the benefits of physical activity are well known, physical activity participation rates are low and dropout rates are high (Barkley, 2012).

Finkelstein, Ruhm, and Kosa (2005) claim that we live in an increasingly pathogenic environment caused by technological advancements, which thereby contributes to a more sedentary lifestyle. Ryan, Williams, Patrick, and Deci (2009) agree, adding that long ago our ancestors had to physically move around to survive whereas today the opposite is true; humans are now required to sit still for extended periods of time to earn a living as part of our increasingly cognitive society. Leading a sedentary lifestyle is causing much morbidity and mortality in contemporary society; therefore, finding ways to increase physical activity participation is extremely important

for the current and future health of all people (Malina, 2001). Factors leading to physical activity include psychological (individual reasons such as a free gym membership) and social-psychological (other individuals in the motivation process such as having a friend to exercise with), which contribute to exercise motivation and overall physical activity (Summers-Karn, 2008).

Where does society start with treatment? Knowledge has been called power and perhaps college is then a logical place to offer information to help college students become and stay physically active. The young adult years have strong influence concerning habitual physical activity over a person's lifetime and are, therefore, vital for long-term health and fitness outcomes (Ferrara, 2009). The power of college physical education on the promotion of combating inactivity and its associated problems to a majority of the American population has gone mostly unrecognized as many colleges and universities have eliminated (or reduced) physical education requirements over the past generation (Strand, Egeberg, & Mozumdar, 2010). The physical activity levels of young people in industrialized countries are simply too low to offer health benefits (Cavill, Biddle, & Sallis, 2001). In agreement, the Centers for Disease Control and Prevention (CDC) (1997a) advised that physical education classes should be an increasingly important part in raising the physical activity levels with the younger generation in K-12 because these classes usually involve most members of an age cohort. Physical education has the power to help prevent chronic inactivity-related diseases just as awareness and advocacy can help strengthen physical education programs in contemporary society (Sparling, 2003).

Physical education weight training classes have a high attendance rate at many universities (Gao, 2008), and weight lifting itself is a very popular physical activity

among college students (Suminski, Petosa, Utter, & Zhang, 2002). Specifically, weight training is recognized by the American College of Sports Medicine (ACSM, 2000) as being a vital part of a comprehensive exercise program for healthy adults. Therefore, a beginning weight training class (HPR 101 at a university) was chosen as a research context for this study.

Research concerning physical activity has long examined physiological variables. The initiation and adherence of physical activity begins, however, with a behavioral change. This has led behavioral scientists to research the factors which contribute to the uptake and maintenance of regular exercise (Hagger & Chatzisarantis, 2005). Many factors contribute to physical activity including social, environmental, cultural, and psychological motivation (Burton, Turrell, Oldenburg, & Sallis, 2005; King, 2001). Motivation compels humans to act, and theory based upon motivation can guide interventions to increase exercise and ameliorate the risk factors associated with chronic illness (Hagger & Chatzisarantis, 2008).

Self-Determination Theory (Deci & Ryan, 2000) is a theoretical perspective of human motivation which has often been used to research motivation in physical education (Ntoumanis & Standage, 2009). This particular theory makes an excellent fit in relation to motivation and physical activity as its framework is highly applicable to physical education (Ntoumanis & Standage, 2009). However, there are very few experimental and intervention studies using SDT and its principles to effect change in exercise behavior (Hagger & Chatzisarantis, 2008). Therefore, the theory is optimally primed for further application of its principles (Markland, Ryan, Tobin, & Rollnick, 2005; Markland & Vansteenkiste, 2007; Vansteenkiste & Sheldon, 2006). Self-Determination Theory has quickly become a leading theoretical perspective in the area of

exercise research and the future seems to be promising for both researchers and practitioners alike as SDT offers much in relation to predicting behavior, understanding behavioral mechanisms, and designing interventions (Hagger & Chatzisarantis, 2008). In addition, weight training classes are an excellent context in which to use Self Determination Theory (SDT) as an intervention into a physical education class.

Teachers, professors, and physical educators interested in improving pedagogical skills can use SDT to increase motivation to physical activity among students. Higher levels of self-determination help foster more positive cognitive (e. g., concentration), behavioral (e. g., frequency of exercise participation), and affective (e. g., exercise enjoyment) motivational outcomes (Vallerand, 2001). Ntoumanis and Standage (2009) overviewed school physical education based studies which showed positive results related to motivating students via tenets within SDT. Studies of teachers offering students more autonomy (part of SDT) show more exercise and physical activity during leisure time than those in a controlling environment (Chatzisarantis & Hagger, 2009). Perlman and Webster (2011) agree, stating interventions using SDT have clearly shown that student motivation is strongly related to the degree to which autonomy is supported by the teacher (Ntoumanis, 2001, 2005; Vallerand & Losier, 1999). More students need to participate in physical education for both present and future health, and the social psychological factors conducive to starting and remaining physically active should be explained. Self-Determination Theory certainly holds much hope for illuminating psychological and socio-contextual factors inducing involvement in physical activity in the world of physical education (Edmunds, Ntoumanis, & Duda, 2008).

Although there is clear evidence that leading a physically active lifestyle is beneficial, contemporary college students remain largely sedentary (Ferrara, 2009). This

has become a significant health problem for college students as epidemiological evidence has demonstrated a drop in physical activity levels from high school to college (Kilpatrick et al., 2005). About 50% of all college students show a decrease in physical activity after graduation (Calfas, Sallis, Lovato, & Campbell, 1994). Approximately 35% of all college students are overweight or obese with the college years being optimal for further weight increases (Ferrara, 2009). Recent data obtained from the President's Council on Physical Fitness and Sports indicated research-based knowledge has demonstrated that habitual physical activity aids, not hinders, academic growth (Tomporowski, Davis, Miller, & Naglieri, 2008).

Daily physical education at the primary school level was found to offer significant long-term positive effects on the physical activity habits of adult women in a study by Trudeau, Laurencelle, Tremblay, Rajic, and Shephard (1999). The same study additionally found that for men, physical education lowered smoking rates well into later life. This being said, physical education should offer the participant a lifetime of health benefits, not just while it is being performed in school or college. Physical education researchers Fishburne and Hickson (2005) agree, declaring that young people need to be physically educated in order to remain physically active for the rest of their lives. The National Association for Sports and Physical Education (NASPE) announced that habitual physical activity limits disability and increases functional status in a person's middle and later adult years. According to NASPE a primary focus of physical education is to help people become better educated about making decisions concerning leading a physically active lifestyle (NASPE, 2001). Exercise professionals who comprehend the psychological processes which impact behavior are better equipped to help students initiate and maintain a program of physical activity (Barkley, 2012).

Irwin (2004) agrees with the previous information adding that more than one half of the university students in the United States are not active enough to obtain health benefits. Engaging in consistent exercise among college students exerts both physical and mental benefits including reduced cholesterol (Merrill & Friedrichs, 1990), increased bone mass, reduced test anxiety (Topp, 1989), and reduced depression and improved self-esteem (Berger & Owen, 1983). All of this has led behavioral scientists to research elements that contribute to starting and maintaining habitual exercise (Hagger & Chatzisarantis, 2005). Scholars and practitioners alike are concerned in finding ways to help resolve the crisis of physical inactivity through psychological theories like SDT (Cardinal, Lee, & Kim, 2010). Researchers in medicine, exercise science, and public health have recently become especially interested in the psychological influences on exercise behavior. These behaviors offer much for research because they are malleable via intervention designed to initiate change (NICE, 2007).

The college years are a vital time for young people in which the avocation of following a healthy lifestyle can be set (Ferrara, 2009). The transition from high school to college is an influential part of life where the risk of weight gain is significantly greater than other parts of a person's life (Hovell, Randle, & Fowler-Johnson, 1985; Levitsky, Halbmaier, & Mrdjenovic, 2004). College females may gain 20 pounds per year, which is much greater than women of the same age not attending college (Hovell et al., 1985; Levitsky et al., 2004). College freshmen suddenly experience many new experiences and lifestyle changes such as dietary habits, daily energy expenditure, living environment, and exposure to alcohol (Huang et al. 2003; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Increased problems with academics or social life issues may potentially cause increased weight gain in college students (Macht, Haupt, & Ellgring,

2005; Serlachius, Hamer, & Wardle, 2007; Torres & Nowson, 2007). Not surprisingly, research has shown that nearly 50% of all college students experience a decline in physical activity after graduating (Calfas et al., 1994).

Traditional methods taken to increase physical activity participation have largely not realized the importance motivation and enjoyment play into habitual involvement (Dishman et al., 2005). Not everything about why people do or do not exercise is understood (Markland & Ingledew, 1997). Therefore, research involving exercise motivation and behavioral change may offer data and insight as to how to initiate people to be more physically active. Hall, Wilson, Rodgers, and Norman (2010) stated that very little is known concerning the motivation of people who do not exercise and have no intention of doing so.

Intrinsic motivation is a strong contributor in determining regular physical activity participation because activities that are not inherently fun and rewarding are often discontinued. The most widely used and theoretical perspective for understanding motivation, fun, and intrinsic motivation is SDT (Ryan & Deci, 2000). Increasingly, more and more physical activity-related research has supported the basic tenants of SDT and what the theory has to offer by helping increase motivation towards physical activity (Brustad, 2010).

Problem Statement

Inactivity is pervasive in modern society and the effects of leading a sedentary lifestyle have wreaked havoc causing much medical, economic, and social damage to our nation and the world at large. Motivational theory can be used to foster increased motivation to exercise, thereby helping combat this ever-rising world-wide problem. If information can be gained as how to best nurture increased physical activity, then

researchers will be one small step closer into helping end the problems leading a sedentary lifestyle fosters. Can college physical activity courses be designed utilizing components of SDT, thereby producing increased motivation to physical activity?

Purpose of the Study

The purpose of this study was to examine college students' self-determination to be physically active along with perceptions of autonomy, competence, and relatedness using perspectives of self-determination theory. This study provides feedback and information concerning self-determination to be physically active via both questionnaires and intervention results. These data can then be used to make informed decisions as to how best structure a college physical education class to increase students' motivation towards physical activity.

Research Question

Does a teaching methodology utilizing SDT result in improved exercise motivation among the participants?

Hypotheses

H_1: Students in the experimental group will demonstrate a significantly greater increase in self-determination as measured by the relative autonomy index (RAI) as measured by the Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) than students in the control group.

H_2: Students in the experimental group will demonstrate a significantly greater increase in autonomy, relatedness, and competence related to exercise as measured by the Basic Psychological Needs in Exercise Scale (BPNES) than students in the control group.

Definition of Terms

Autonomy: The will to participate in an activity of one's own choice; being the origin of one's own behavior (deCharms, 1968; Deci & Ryan, 1985).

Basic Psychological Needs in Exercise Scale (BPNES: The BPNES (Vlachopoulos & Michailidou, 2006) is an 11-item domain-specific self-report instrument used to measure perceptions of the needs of autonomy, competence, and relatedness (Deci & Ryan, 2000) in relation to exercise.

Behavior: Observable activity in a human or animal. Response to internal or external stimuli (Dictionary.com, 2010).

Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2): The BREQ-2 (Mullan, Markland, & Ingledew, 1997) is a nineteen-item questionnaire used to measure levels of self-determination to be physically active.

Body Mass Index (BMI): A measure of body weight relative to height.

Competence: Being able to produce a sought after outcome; preventing unwanted events (Deci & Ryan, 1985).

Exercise: Planned, structured, repetitive activity for the purpose of becoming more physically fit.

Motivation: Possessing an incentive to do something (Self Improvement, 2006).

Learning Climate Questionnaire: The LCQ is a 15-item questionnaire used to carry out a manipulation check. This instrument assesses the perceptions of individuals about the degree to which a particular social context is autonomy supportive versus controlling (Williams & Deci, 1996).

Physical Activity: Any bodily movement produced by the contraction of skeletal muscles that result in a substantial increase over resting energy expenditure (ACSM's

Guidelines, 2010); this is to include elective forms of activity such as sport and exercise as well as required forms of activity such as labor (CDC, 1996).

Relatedness: Feeling connected to other people in a group or social milieu (Baumeister & Leary, 1995; Deci & Ryan, 1985).

Self-determination: The process of being in charge of one's life. The capacity, the need, supports, and the opportunity for making choices and decisions (University of Kansas, 2010).

Delimitations

The study was delimited to college students in physical activity classes at a university in the Southeast in the United States.

Assumptions

It was assumed that all students completing the questionnaires will be honest in their responses and that the class instructor is capable of following the lesson plans.

Limitations

This study's findings was relevant only to students taking physical activity classes at the college level.

CHAPTER II

REVIEW OF THE LITERATURE

Benefits of Physical Activity

Although it is well-known in the world of fitness and medicine that exercise offers significant physical and psychological benefits, (Blair & Connelly, 1996) few people receive sufficient exercise and many simply do not exercise at all (Cameron, Craig, Stephens, & Ready, 2002; Katzmarzyk, Gledhill, & Shephard, 2000). Regular physical activity has been shown to decrease obesity, hypertension, lipoproteins, serum cholesterol, osteoporosis and Type 2 diabetes mellitus, as well as psychological problems like depression and anxiety (Dennison, Straus, Mellits, & Charney, 1988). In agreement, the United States Department of Health (2004) added that overwhelming evidence shows the defensive benefits physical activity offers in preventing noncommunicable diseases such as diabetes mellitus, cardiovascular disease, obesity, and certain forms of cancer.

Researchers Sallis and Owen (1999) and Salmon (2001) indicated that physical activity is extremely important for both physical and psychological reasons in addition to offering an increase in well-being and quality of life (McAuley & Rudolph, 1995). When individuals are physically active, they feel more energy and fulfill deep psychological needs, which foster a general sense of wellness (Ryan et al., 2009). Sadly, evidence shows that in light of these overwhelming realities, activity levels should be rising, when in fact, they are falling (Owen & Bauman, 1992). Because of this information, it is vital to research and better understand the psychological determinants of physical activity behavior which make exercise and physical activity a pleasurable experience (Murcia, de

San Roman, Galindo, Alonso, & Gonzalez-Cutre, 2008), especially when enjoyment is seen as one of the primary reasons people engage in physical activity (Ryan et al., 1997).

Health Risks of Inactivity

The American College of Sports Medicine (ACSM) has long stated the benefits of regular physical activity as a combatant of obesity and its related medical problems (ACSM Guidelines, 2010). The recent eighth edition of the ACSM's Guidelines for Exercise Testing and Prescription states, "Every U.S. adult should accumulate 30 minutes or more of moderate physical activity on most, preferably all, days of the week" (ACSM's Guidelines, 2010, p. 6). The ACSM additionally declared being sedentary is a major public health concern supported by a recent survey stating only 49.1% of U.S. adults are meeting the CDC-ACSM physical activity requirements. Leading a hypokinetic lifestyle has been associated in the development of many chronic diseases such as cancer (Byers et al., 2002), diabetes, (Fritz, Wandell, Aberg, & Engfeldt, 2006), obesity (Ross, Freeman, & Janssen, 2000), and cardiovascular disease (Hooper et al., 2001).

The data supporting the notion that physical activity is extremely important to everyone's health both physically and mentally is very significant according to fitness organizations such as the ASCM. The ACSM guidelines show "in a meta-analysis of 23 sex-specific cohorts of physical activity or fitness representing 1,325,004 person-years of follow-up clearly showed the dose-response relationship between physical activity, physical fitness, and the risks of coronary artery disease" (ACSM's Guidelines, 2010, p. 5). There should be no doubt that if society can influence people at a young age to become physically active and remain so for a lifetime, that the benefits will be great and widespread.

Determinants of Physical Activity

No single factor is responsible for determining physical activity. Many variables interact to produce the outcome of physical activity be it in the form of exercise, play, or work. Sallis and Owen (1999) reviewed findings from approximately 300 studies on the determinants of adult physical activity. Conclusions suggested a wide range of factors seem to influence physical activity in adults including personal, social, and environmental variables. Socioeconomic status and perceived self-efficacy were shown to be the strongest and most consistent factors associated with physical activity. Interestingly, few consistent positive or negative associations were found related to variables listed as behavioral skills or attributes, physical environmental influences, or sociocultural influences (Sallis & Owen, 1999). Interrelationships between the individual, their family friends, and culture each produce an effect (Malina, 2008).

In contrast to Sallis and Owen's (1999) findings, the United States Department of Health and Human Services found that the largest obstacles most people encounter when trying to improve their physical activity are time, safe environments, and access to convenient facilities (U. S. Department of Health, 2000). Phillips, Schnider, and Mercer (2004) identified the principal reasons listed by people for quitting an exercise program as being (1) failure, (2) no improvement, and (3) motivational changes. Just starting an exercise program, however, is no guarantee of success as over 50% of people starting an exercise program will quit within the first six months (Berger, Pargman, & Weinberg, 2002; Matsumoto & Tekenaka, 2004). Exercise begins with a mental commitment, a behavioral change, i.e., motivation. What then causes this behavioral change and what can physical educators do to increase motivation to exercise at the level that is necessary to facilitate the desired health outcomes?

Trost, Owen, Bauman, Sallis, and Brown (2002) reviewed and updated evidence concerning personal, social, and environmental factors associated with physical activity in adults. Correlates included attitudes, barriers to physical activity, enjoyment of physical activity, expected benefits, intentions, perceived behavioral control, self-efficacy, normative beliefs, perceived health, and knowledge of health and exercise. The researchers examined 24 studies and found physical activity self-efficacy (Bandura, 1982) to be the most consistent correlate of behavior relating to physical activity. Likewise, Booth, Owen, Bauman, Clavisi, and Leslie (2000) found self-efficacy to be strongly related to participation in physical activity in a study involving older Australians.

In relation to exercise, self-efficacy is described as the belief that an individual can succeed in the effort to exercise despite any potential barriers (Leenders, Silver, White, Buckworth, & Sherman, 2002). Research by Oman and King (1998) also demonstrated self-efficacy perceptions to significantly predict exercise adherence in a supervised home-based activity program after a two-year follow-up. Self-efficacy has consistently been shown to be a very strong predictor of exercise behavior in numerous studies over the years (Buckworth, Granello, & Belmore, 2002; Marcus & Owen, 1992; Sullum, Clark, & King, 2000). Ingledew, Markland, and Medley (1998) found in order for people to progress to a pattern of consistent exercise, the activity must be enjoyable. Likewise, Ryan, Fredrick, Lepes, Rubio, and Sheldon (1997) listed exercise adherence was related to enjoyment of the activity more so than cosmetic motives.

An adult's physical activity patterns may be related to their physical activity patterns as a child (Azevedo, Araujo, Cozzensa de Silva, & Hallal, 2007; Malina, 2001; Malina, 2006), though other studies state the opposite (Anderssen, Wold, & Torsheim,

2005; Telema et al., 2005). Dishman and Sallis (1994) found that in supervised programs where activity can be directly observed, former participation in physical activity is the most reliable predictor of present participation. Being active for at least six months in an organized program is likely to lead to being active for one or two years afterward. There is scant evidence that just participating in school sports (in contrast to a formal exercise program) will predict adult physical activity or that activity as a child can predict later physical activity for that individual as an adult. Furthermore, physically active children receiving parental encouragement are more active as adults than sedentary children not receiving parental encouragement (Weinberg & Gould, 2007).

The purpose of the study was to determine if there are increases in competence, relatedness, autonomy, and motivation of college students following participation in physical activity class developed using SDT. If research can discover why some people enjoy regularly exercising and being physically active while others habitually lead a sedentary lifestyle, results may be used to improve pedagogy of college physical activity courses. Exercise is of little value when performed inconsistently or for just a week or month out of a lifetime. Exercise must become a consistent part of life in order to be significant in promoting a healthier lifestyle. The findings of this study will hopefully be used to help create a better understanding of the motivation to exercise, thereby offering the participants a lifetime of physical activity and its acquired benefits.

College Students and Physical Activity

Data from the Behavioral Risk Factor Surveillance Survey (BRFSS) indicate the greatest increases in obesity occur between ages 18-29 years, corresponding to the transition from adolescence to adulthood when many attend college (Centers for Disease Control, [CDC] 2009). Although the benefits of being physically active are clear, being

sedentary is a major health problem with college students (Kilpatrick et al., 2005). As far back as 1996, documented research has shown poor student participation concerning physical activity and sports at the college level, leading to health problems such as diabetes and cardiovascular disease in college students (Centers of Disease Control and Prevention [CDC], 1997a; Dinger & Waigandt, 1997; Douglas et al., 1997; Patrick, Colvin, Fulop, Calfas, & Lovato, 1997; Wiley et al., 1996). Young adulthood has been shown to be an important developmental stage in regard to starting and maintaining an active lifestyle (Dishman, 1994). Health behaviors established in an individual's younger years often transfer into middle and later adulthood, further identifying the college-years as a fundamental time period in a person's life where key permanent habits may be established (Barnekow-Bergkvist, Hedberg, Janlert, & Jansson, 1996; Sallis & Patrick, 1994).

It is estimated that between high school and college, students experience a 62.5% decrease in physical activity behavior (Cullen et al., 1999). Ferrara (2009) agreed stating that many college students suffer from obesity or being overweight and do not adhere to the CDC's recommended physical activity guidelines. Not only are many college students inactive but more importantly, health and physical education professionals in higher education have failed to effectively increase college students' physical activity behaviors (Keating, Guan, Pinero, and Bridges, 2005). Ferrara (2009) stated that very few studies have researched nutrition, weight loss programs, and exercise in relation to college students. Ferrara (2009) further asserts, "College campuses are an important setting where promotion of healthy lifestyle habits can occur" (para. 1). Previous interventions have largely been unsuccessful producing only moderate effects (Keating et al., 2005). Keating et al. (2005) found three main problems with current physical activity

research concerning college students: (1) research concerning physical activity and college students is seriously lacking; (2) little multilevel approaches (personal, psychosocial, and environmental) examining physical activity levels exist; (3) subjective and inconsistent physical activity measures are used making different sample comparisons difficult to compare.

School-based physical education offers a medium where health, social, and psychological gains associated with physical activity can be endorsed to large numbers of students (Chang, Hsu, & Lin, 2009). College is, thus, an ideal place, and the college years are an ideal time to both study and foster positive health-and fitness-related behavioral changes in people. College may be the first truly stressful time in a young person's life, and consistent physical activity confers a duality of physical and psychological benefits to college students (Pinto & Marcus, 1995). These late adolescents and young adults are mature enough to understand problems, gain knowledge, and change while being young enough to make easier transitions when compared to middle-aged and older adults. Furthermore, more college students are obese or at least overweight and do not meet the minimum physical activity guidelines set by the CDC (2009b). Epidemiological evidence clearly shows insufficient physical activity among college students. Only 38% of college students are vigorously active regularly while only 20% are regularly moderately active. Forty-percent of men and 32% of women regularly exercise while in college perhaps due to an average 62.5% reduction in activity students are shown to have after high school. The transition from high school to college shows a significantly higher weight gain risk than other periods with students gaining as high as .75 kg per month (20 lbs. per year) (Ferrara, 2009). After graduating college, 50% of individuals' physical activity levels drop (Kilpatrick et al., 2005). There

is no doubt that exercise programs improve the health of participants in the college student population; yet, most programs do not address motivational factors associated with physical activity and its benefits, which are vital to adherence (Ferrara, 2009).

It is important for researchers and practitioners to perform research and address the question of why college students do or do not participate in health promoting behaviors such as physical activity and exercise. In addition, it is vital to explore motivational characteristics of participants who adhere to long-term exercise and those who drop out (Daley & Duda, 2006). Sadly, a significant percentage of the population is too sedentary to obtain health benefits from physical activity and even for those who do start a physical fitness program, half will quit within three to six months of starting (Dishman, 1993). There is a need for theoretically-based research "on the motivational processes linked to the commencement and continuation of physical activity. Such work should provide greater insight into the mechanisms by which social environmental factors and individual differences impact on physical activity adoption and maintenance" (Daley & Duda, 2006, p. 231). Kilpatrick et al. (2005) echo this information, stating an integral issue in physical activity research is the importance of understanding motivation and ways to enhance it.

The problems and research possibilities of physical activity and health have not gone unnoticed by the college community. As far back as the 1980s, Slava, Laurie, and Corbin (1984) examined the long-term effects of a conceptual physical education program and found that information learned in physical education classes will aid students in making wise choices concerning exercise and physical activity. In the 1990s, Brynteson and Adams (1993) researched the effects of physical education programs on college alumni after two to 11 years of follow-up. Results showed a positive relationship

between the number of classes required to meet the physical activity standards of the college and perceived knowledge concerning the benefits of exercise as well as attitude from the alumni. In the new millennium, D'Alonzo, Stevenson, and Davis (2004) studied program outcomes designed to improve self-efficacy and fitness in Black and Hispanic college-age women. Findings indicated increased physical activity after completion of a 16-week aerobic exercise program.

The American College Health Association National College Health Assessment II (ACHA-NCHA II) is a national research survey which collects data on college students' health. The survey is organized by the ACHA to help the college community collect data on college students' lifestyles. This data offers the largest-known comprehensive data set to date concerning the health of college students (ACHA-NCHA II, 2011). Students meeting the recommendation for moderate-intensity exercise (cardio for 30 minutes on 5 days or more per week), vigorous-intensity exercise (cardio for 20 minutes on 3 or more days per week) or a combination of both (according to the ACSM, 2010 and AHA, 2010) included 52.3% for males, 43.6% for females with a combined total of 46.7%. Twenty-one percent of students were classified as being overweight (BMI-25-29.9), 7% were classified as being Class I Obesity (BMI-30-34.9), 2.9% were classified as being Class II Obesity (BMI-35-39.9), and 1.6% were classified as being Class III Obesity (BMI-≥40; ACHA, 2011).

Introduction of Theories Used in Physical Activity Research

Although many theories have been used to help explain why people do or do not participate in physical activity and the exercise experience, SDT and its contributions are relatively new (Deci & Ryan, 1985; Ryan, 1995; Ryan & Deci, 2000). The Theory of Trying (TT) (Bagozzi & Warshaw, 1990) and the Theory of Planned Behavior (TPB)

(Ajzen, 1991) are both theories obtained from Fishbein and Azjen's Theory of Reasoned Action (TRA), which is an expectancy-value model (Ajzen & Fishbein, 1980). In essence, these theories state that people are motivated to perform behaviors they believe will cause a highly valued outcome. Conversely, people become less motivated when the outcome is not desired or valued (Ajzen & Fishbein, 1980). The TRA has been frequently used in physical activity research; however, it is limited by the theory's basic premise that initiating a behavior involves a rational decision-making process while performance is within the user's volitional control. Consequently, the individual must have all skills and abilities, behavior, and resources without outside help to perform the action (Ajzen, 1985; Ajzen, 1991; Bagozzi & Warshaw, 1990; Sheppard, Hartwick, & Warshaw, 1988). A meta-analysis of TRA found it only explained 25% due to intention and just under 50% of variance in intentions (Sutton, 1997) which further suggests that support for this theory is not great (Munro, Lewin, Swart, & Volmink, 2007).

Bandura's Social Cognitive Theory (SCT) (1986, 1989) has often been used in research of physical activity (Bandura, 1986) and emphasizes the importance of three central mechanisms concerning self-regulation of behavior. Self-efficacy beliefs, outcomes expectations, and personal goals are the three theoretical elements interwoven and connected which guide human behavior. The theory basically states that humans become motivated to learn and initiate a behavior by watching others and then pursuing a desired behavior and that self-efficacy is vital to stable performance when obstacles appear (Bandura, 1986). Social Cognitive Theory also emphasizes the importance between self-efficacy and intentions (goals) as personal self-efficacy will affect behavior (Bandura, 1997; Yordy & Lent, 1993). Limitations to SCT include that habitual exercisers may need less planning over time as they exercise more frequently and self-

efficacy may reach a plateau (Bandura, 1989; Yordy & Lent, 1993). Stone (1999) stated that SCT has such a wide-ranging focus that its components are difficult to define and use and is sometimes used only in part (Munro et al., 2007).

The Protection Motivation Theory (PMT) was proposed by Rogers in 1975 and states that people perform a behavior such as walking via interpretation of threats and coping. Threat appraisal dictates whether the behavior (walking) poses a threat to health and mobility. Coping appraisal refers to the ability to cope with said threats and on variables that may add or diminish the likelihood of an adaptive response such as faithfulness to walking (Rogers, 1975). According to PMT people may stick with a behavior (exercise, physical activity) if it is believed that the behavior can be done consistently with little cost such as becoming sore or too exhausted (Sirur, Richardson, Wishart, & Hanna, 2009). In other words, a person may change a behavior solely out of the individual's fears (Rogers, 1975). An important shortcoming of this theory is not all environmental and cognitive factors involved in initiating an attitude change are identified. An example of this would be relenting to the pressure to adapt to social norms (Munro et al., 2007). In addition, a meta-analysis on PMT found only moderate effects on behavior (Floyd, Prentice-Dunn, & Rogers, 2000).

According to Munro et al. (2007), SCT, TRA, TPB, and PMT all contain several limitations: (1) non-voluntary factors can affect behavior (Gebhardt & Maes, 2001); (2) spending time to think about making a repeated behavior is uneconomical (Stroebe, 2000); (3) these theories do not adequately explain behavioral skills needed for adherence (World Health Organization, 2003a); (4) these theories do not describe the origin of beliefs and how these beliefs affect other behaviors (Weinstein, 1988).

The Transtheoretical Model (TTM; Prochaska, DiClemente, & Norcross, 1992) contends that individuals move through various stages of change and that regression or progression of the stages is possible. This model takes into account various points in time, not just a snapshot in time as many of the other theories do. The TTM has been used to study exercise participation and contains six stages: (1) Precontemplation stage; (2) Contemplation stage; (3) Preparation stage; (4) Action stage; (5) Maintenance stage; (6) Termination stage. This model suggests that different interventions and information should be matched to a particular stage a person might be in (Weinberg & Gould, 2007). A construct in the TTM is Decisional Balance (Janis & Mann, 1977), which states that people will weigh the pros and cons of a decision to form a balance sheet to determine potential gains and losses based upon the individual's current stage. According to Bandura (1997), a limitation of TTM is that it violates all three of the basic suppositions of stage theories: (1) qualitative transformations across discrete stages; (2) invariant sequence of change; and (3) non-reversibility. Bandura goes on to assert that people are too multidimensional to fit into certain, distinct stages and that stage-thinking may limit the choice of change-promoting interventions (Munro et al., 2007). Armitage and Conner (2000) added that TTM gives little explanation on how people change and why only some people are successful.

Self-Determination Theory itself is based upon three mini-theories, which were each developed to describe motivationally based phenomena evolving from field and laboratory research (Deci & Ryan 1985, 2000; Ryan & Deci, 2000). The three mini-theories are briefly described in the subsequent paragraphs.

(1) Cognitive Evaluation Theory (CET). This theory involves the social contexts of intrinsic motivation and how factors such as rewards, interpersonal controls, and ego-

involvements interplay with intrinsic motivation. Cognitive Evaluation Theory states how important competence and autonomy supports are in increasing intrinsic motivation, which is critical for behavior such as sport involvement (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

(2) Organismic Integration Theory (OIT). Concerned with extrinsic motivation and its subscales of external regulation, introjection, identification, OIT states integration to fall along a continuum called internalization. The more internalized the extrinsic motivation becomes, the more autonomous the individual becomes concerning the behavior at hand. Organismic Integration Theory also deals with social contexts, which foster or diminish internalization. Autonomy and relatedness are seen as vital aspects of supporting internalization (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

(3) Basic Psychological Needs Theory (BPNT). This theory involves the psychological needs of autonomy, competence, and relatedness and their importance to well-being and psychological health. Environments that thwart or support the three needs are vital to wellness. These three needs must all be met; if any are missing, then distinct functional costs will arise (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

Using SDT to help understand the causes for exercise participation is particularly interesting because it specifies the various reasons for and meanings of behavioral engagement and the resulting consequences of endorsing various motives concerning particular domains (Deci & Ryan, 1985, 2000). Basically, SDT suggests that human motivation changes to the degree in which it is autonomous (self-determined) or controlling (Edmunds, Ntoumanis, & Duda, 2006). Seen early on as being extremely valuable in the explanation of exercise motivational behavior and its potential, SDT has gained support and praise over time (Hagger & Chatzisarantis, 2007). Self-

Determination Theory has a proven, lengthy track record as to motivation in exercise and sport outcome, especially in relation to behavior (Hagger & Chatzisarantis, 2007). The choice to use SDT as a theory to research physical activity and motivation becomes increasingly stronger due to not only its strong connection to explanation of certain behaviors (physical activity, exercise) but also due to its perfect working relationship with motivation in physical education. Its framework and various subparts are highly relevant to the research involving physical education (Ntoumanis & Standage, 2009). In the future, knowledge gained from studying exercise behavior and SDT could help health professionals better understand the significance of recommending different regulatory styles in the exercise context, thereby helping improve pedagogical design of college physical activity courses (Wilson, Rogers, Blanchard, & Gessell, 2003).

Physical Activity Courses

Today, physical education has transformed its structure from solely sport-centered to health-related in hope of strengthening future citizens' quality of living and quality of life (Sun & Chen, 2010). College fitness courses offer the potential to increase knowledge and awareness of fitness and health by exercise itself and through interventions based on theoretical perspectives such as SDT. Manipulation of theories explaining motivational behavior (such as SDT) may help increase motivation for exercise participation. It is important to not only examine predictors of college students' physical activity levels but to research how course content can be best developed to maximize effectiveness (DeLong, 2006). This is all predicated upon students obtaining a high level of motivation, especially self-determined motivation (Ryan & Deci, 2009).

Why do contemporary college students enroll in physical activity classes? Weinfeldt and Visek (2009) indicated the main reason for enrolling is to improve fitness

and the primary benefit listed was staying consistently active. Students enrolled in sport classes list fun as the foremost factor in participating. Those taking fitness classes list improving fitness levels as the most important reason for participation (Weinfeldt & Visek, 2009). Weinfeldt and Visek additionally found that although universities have the resources to provide many opportunities for participation in physical activity, research on physical activity among college students is limited.

In 1860, Dr. Edward Hitchcock taught physical fitness at Amherst College (Swinford, 2002) while a century later (in the mid-1960s) almost 90% of four-year colleges and universities in the United States required physical education classes in order to graduate (Hensley, 2000). From 1961 to 1969, the percentage of American colleges requiring physical education to graduate rose from 84% to 87% (Oxendine, 1961; Oxendine, 1969). In 1972, 94% of colleges and universities offered physical education classes, but only 74% required physical education for graduation (Oxendine, 1972). In 1978, 94% offered physical education while only 57% required physical education to graduate (Oxendine & Roberts, 1978) and this trend continued in 1989 dropping to only 45% (Miller, Dowell, & Pender, 1989). In the 1990s, studies revealed that 92% of U. S. colleges and universities offered physical education, but only 65% required it for graduation. This is also when academic fitness courses started replacing physical activity courses which were a previous requirement (Trimble & Hensley, 1990). By 2000, 63% of colleges and universities in the United States required a physical activity course to graduate diminishing the requirement from the 1960s (Hensley, 2000). Strand et al. (2010) indicated in their study of 116 two- and four-year colleges and universities, physical activity courses were offered at 86.5% of two-year schools and 87.2% of four-year schools.

Today, physical activity courses are no longer required at all colleges as they were in the past (DeLong, 2006). There appears to be a current trend to replace physical activity classes in college, such as walking and volleyball, with academic, health-related fitness classes, such as *Fitness for Life*. This is partially because of the convenience and popularity of internet-based education (Strand et al., 2010). Adams, Graves, and Adams (2006) added that continuing to offer courses in health and physical education is important for colleges and universities because for many students, this may be their only exposure to structured and organized physical education classes during their college tenure.

Are then, college physical activity courses beneficial, and what is the long-term adherence? While colleges and universities sometimes require physical activity courses, the effect of these courses is not known (Adams & Brynteson, 1992; Pearman et al., 1997; Sallis et al., 1999). Some interventions trying to increase physical activity in college students proved ineffective two years after graduation (Calfas et al., 2000; Sallis et al., 1999) while other research stated that college alumni who took physical activity courses while in college had better lifestyle habits later in life compared to those who did not (Brynteson & Adams, 1993; Lock, 1990; Pearman & Valois, 1997). Healthy Campus 2010 (American College Health Association, 2011) listed 10 leading health indicators for college campuses: (1) social and emotional health; (2) coping with stress; (3) psychological relationship to food; (4) sexual health; (5) nutrition; (6) unintentional and intentional injury; (7) alcohol and other drugs; (8) tobacco; (9) health services cost; and (10) insurance availability (Ewing, 2007).

These topics include subjects such as overweight and obesity, physical activity, substance abuse, tobacco use, and responsible sexual behavior. The future of traditional

college physical activity courses may be on the decline (because of poor results); thus, the need to determine if structuring the classes using lessons based on SDT will increase students' autonomy, competence, relatedness, and motivation, thereby leading to better results (Strand et al., 2010). If these attributes would increase the likelihood of continued participation, then perhaps educators could advocate using SDT to structure physical activity classes.

Using Theory in Research

How is theory useful in studying physical activity? Physical activity is the result of human behavior, and by understanding behaviors related to physical activity, participation can be increased. Behavioral science is employed to understand physical activity as a behavior and to offer the empirical and conceptual knowledge base to design physical activity programs (Baranowski, Anderson & Carmack, 1998).

To increase physical activity, participation behavior must be researched and the explanation of any behavior comes in the form of theories. A theory is defined as "a coherent and non-contradictory set of statements, concepts or ideas that organizes, predicts and explains phenomena, events, behavior, etc." (Eccles, Grimshaw, Walker, Johnston, & Pitts, 2005, p. 108). Theories are developed as a result of both failures and successes of earlier studies. In sciences such as psychology, sociology, and kinesiology, theories are commonly used to organize an understanding of basic and clinical sciences (Eccles et al., 2005). Utilizing a theoretical foundation in research helps gain knowledge by increasing the chances of adding knowledge to previous accomplishments while avoiding prior failures (Brawley & Culos-Reed, 2000).

Theory can thusly be used to design an intervention in physical activity classes. This begins with identifying concepts within the theory that are mediators of change. A

mediator is a concept which explains the result an intervention (such as SDT) produces on an outcome (Sirur et al., 2009). In regard to a comprehensive theory, for a change to occur in the outcome, a change in the mediator(s) must first occur. This only transpires when the proper intervention takes place, which is designed to cause a change in the mediators. The amount of change in the mediator(s) should be measured to explain (a) variability in the outcome and (b) effectiveness of the intervention or treatment. If the intervention causes a change in the outcome not explained by the mediating concepts, then the theoretical framework may not be complete, and other mediators need to be acknowledged (Baranowski, Lin, Wetter, Resnicow, & Hearn, 1997).

Self-Determination Theory

Self-Determination Theory is a theory of motivation which states that people are driven to behave in effective and healthy ways (Deci & Ryan, 1985; Ryan, 1995; Ryan & Deci, 2000). It is a theory of human motivation, development, and wellness. Self-Determination Theory posits people to be actively seeking optimal challenges and fresh experiences to master and integrate (Deci & Ryan, 1991). Many other theories concerning motivation center on the amount of motivation individuals possess for certain behaviors while SDT distinguishes between types of motivation. The theory additionally suggests the explicit types of positive developmental tendencies and negative environments which are damaging to these tendencies (Ryan & Deci, 2000). Concerning exercise and activity, SDT is useful to help determine why students currently participate in physical activity and if they intend to in the future (DeLong, 2006). In its most simplistic definition, SDT states that in relation to physical activities participants may be both intrinsically and/or extrinsically motivated (Ryan et al., 2009).

People may be stimulated by external factors such as rewards or opinions of others or from within by curiosity, care, or abiding values. Self-Determination Theory represents a broad framework of the theory of human personality and motivation in which Deci and Ryan (1991, 1995) proposed three main intrinsic needs involved in self-determination (feeling internally controlled). These more self-determined forms of motivation are related to increased positive experiences and better motivation to engage in physical activity (McDonough, 2006). There are three psychological needs which serve to initiate behavior and are needed for psychological health and well-being. Autonomy, competence, and relatedness are the three psychological needs which, within a social context, represent a huge impact on a person's motivation. Ryan and Deci (2000) state these three basic psychological needs are innate, essential, and universal to all people. When satisfied, these needs foster better health and well-being but if thwarted lead to pathology and ill-being. All three needs must be met for individuals to thrive just as people cannot live without both food and water. Autonomy is best described as *being in control of your life*, while competence can be explained as *succeeding in what you do*. Lastly, relatedness is *connecting with others.* Deci and Ryan (2000) additionally maintain that when these three needs are met, humans have increased self-motivation and mental health, but when diminished, there is less motivation and decreased well-being.

More specifically, in relation to exercise behavior, SDT uses a multidimensional approach as to why certain people adopt healthy lifestyle behaviors while others do not. The theory further describes an individual's motivation for certain behaviors as being autonomous or controlled. Autonomous behavior comes from one's self or being self-determined and an autonomy-supportive environment offers choice and opportunity for self-direction with minimal pressure, imposed goals, and demands (Ryan, Mins, &

Koestner, 1983). Controlled behavior describes an overzealous coach shouting constant orders to the team forcing the players to physically follow commands, which may be counterproductive for many individuals. In comparison of autonomous and controlled behavior, Ryan and Deci (2000) state that autonomous regulation of behavior is more stable and enduring and has more positive effects on human well-being in comparison to controlled regulation.

Motives for Physical Activity

Motivation affects many variables of a college student's decision to pursue physical activity such as effort, adherence, and the type of activity selected (DeLong, 2006). The most frequent motives listed with regard to participating in physical activity are to improve cosmetic appearance, improve or maintain health, enjoyment, or for the social experience and psychological benefits (Ryan et al., 1997). Human motivation has been thought of as flowing along a continuum with several forms of behavioral regulation which varies in degrees of self-determination as related to physical activity (Deci & Ryan, 1985). Researchers Deci and Ryan (2000) describe self-determination itself as a viewpoint of motivation within human beings who want to improve themselves by doing things (driven by behaviors) they think are important or meaningful for personal development. Edmunds et al. (2006) assert that basically, SDT posits human motivation differs in the degree from which it is self-determined (autonomous) or controlling. At the top of the list in regard to physical activity behavior commitment is intrinsic motivation. The phenomenon of intrinsic motivation came to light in studies of animal behavior when researchers found that many organisms pursue playful and curiosity-driven behaviors even when there is no reward or reinforcement (White, 1959). Intrinsic motivation is listed as the most self-determined behavioral regulation and is defined as doing

something for feelings of fun, personal challenge, and personal satisfaction endemic to the activity itself. An intrinsically motivated individual performs an activity for the pure pleasure of doing the activity. Running for the fun, enjoyment, and satisfaction of running is an example of intrinsic motivation.

Different kinds of motivation transfer to various levels of self-determination. Self-determination is a behavior consisting of intrinsic motivation and extrinsic motivation each consisting of different motivational behaviors (Carron, Hausenblas, & Estabrooks, 2003). Within this framework is amotivation, which is described as having no desire to perform an activity (DeLong, 2006). Intrinsic motivation is the highest level of self-determination with amotivation being the lowest. Self-Determination Theory states that these varying degrees of motivation show the different levels of value placed upon the requested behavior. These motives range from amotivation or unwillingness all the way to passive compliance, and lastly, active personal commitment (Ryan & Deci, 2000).

Intrinsic Motivation

Motivation involves energy and direction. Motivation produces an outcome (Ryan & Deci, 2000). People may be motivated because they truly value an activity like exercise or because they feel external coercion, e. g., lose weight or get kicked off the cheerleading squad. People who have self-authored motivation have more interest, excitement, and confidence, which transfer into enhanced performance and persistence (Deci & Ryan, 1991; Sheldon, Ryan, Rawsthorne, & Ilardi, 1997) as well as better self-esteem (Deci & Ryan, 1995). Interestingly, this is true even when individuals possess the same self-efficacy or competence for the activity at-hand (Ryan & Deci, 2000). This describes intrinsic motivation, which, according to Ryan and Deci (2000), defines the

positive potential of human nature causing mankind to try new challenges, learn, explore, and push oneself. Furthermore, intrinsic motivation can have three forms according to Vallerand (1997): (1) to know; (2) to experience stimulation; and (3) toward accomplishments. Regarding intrinsic motivation, to know encompasses performing an activity for the sheer fun, satisfaction, and pleasure of doing so. Intrinsic motivation for stimulation involves experiencing an activity for the aesthetic or physical sensation of said activity. Lastly, when someone desires to improve themselves or attain their maximum potential, the corresponding motivation is said to derive from motivation from accomplishments (Vallerand, 1997). In relation to physical activity, intrinsically motivated people exercise for the sheer love of the activity itself not because of an outside factor such as receiving a reward or fear of guilt or shame if they do not. Research shows that intrinsically-motivated people exercise with more interest, excitement, and confidence, which translate into better performance, persistence, and creativity (Deci & Ryan, 1991; Sheldon et al., 1997).

Extrinsic Motivation

In the middle of the continuum is extrinsic motivation whereby an individual performs a behavior such as physical activity for rewards or threats, which shows low self-determination (Daley & Duda, 2006). Ryan et al. (2009) argued that most individuals who regularly exercise do so because they have something to gain from it not because of enjoyment or out of interest. Extrinsic motivation is responsible for more behavior after early childhood as the choice to be intrinsically motivated is lessened by social pressures to do uninteresting things and new responsibilities come into play (Ryan & LaGuardia, 2000). Extrinsically motivated behaviors are also stated as being externally regulated and are the least autonomous. Going every week to the YMCA to

exercise only because there is a free T-shirt or gift certificate for those who regularly attend would be an example. The term extrinsic motivation describes performing an activity to receive a separable outcome, which is in total contrast with intrinsic motivation. There are, however, various levels of extrinsic motivation. For example, a college student who exercises because they understand the value of being physically fit is extrinsically motivated while a college student who exercises only out of guilt (if no exercise is performed) is also extrinsically motivated. Each of these examples involves instrumentalities—not the pleasure of the exercise itself but the former involves personal endorsement and a feeling of choice while the latter involves compliance and external regulation. Both involve intentional behavior, but each contains a different level of relative autonomy (Ryan & Connell, 1989; Ryan & Deci, 2000, Vallerand, 1997). Perlman and Webster (2011) assert that external motivators can be effective in the short term while they are present; however, once taken away, the effect is lost. The researchers add this is also true when the goal is long-term behavior maintenance. Ryan and Deci (2000) state that extrinsically motivated behaviors are not often interesting, but people perform them (at least initially) because the behavior (running, lifting weights, etc.) may be valued, started, or modeled by others for whom they care about. Interestingly, most people have to be motivated extrinsically because not all activities are intrinsically interesting, equally challenging, or intrinsically pleasing (Sun & Chen, 2010).

There are four levels of extrinsic motivation. External regulation is at one end (next to amotivation) while integrated regulation is at the other (next to intrinsic motivation) with introjected regulation and identified regulation being in the middle.

External regulation. External regulation is the least self-determined and describes performing an action solely to satisfy external pressures or to gain external rewards

(Markland & Tobin, 2004). External regulation is also what many people associate with as being extrinsic motivation (Blankenship, 2008). An example would be a Marine Corps recruit in boot camp who only works hard to avoid punishment (push-ups, extra running, etc.) from the drill instructor (external pressure).

Introjected regulation. Introjected regulation is the next step from external regulation towards intrinsic motivation. Introjected regulation involves an internalization of external controls in which the individual applies via self-imposed pressures to avoid guilt, for ego or pride (Markland & Tobin, 2004). With introjected regulation, a behavior may be pursued to get approval from others or one's self (Blankenship, 2008). A martial arts student who works hard and shows no fear in front of other students (out of ego) may be motivated by introjected regulation.

Identified regulation. Identified regulation is yet another step toward intrinsic motivation and refers to a behavior that involves personal importance and conscious value. Identified regulation is the first external motivational form to emanate from an intrinsic choice (Blankenship, 2008). An example would be a weightlifting student who works hard to get stronger to become more fit, not because of a true love of weightlifting. Also, the student is more concerned by values in the outcome of an activity (getting stronger and fit) in contrast to those unrelated to the values (e.g., T-shirts). In relation to physical activity, the activity is done of one's own free will but not because of fun and enjoyment in and of the activity itself (Sun & Chen, 2010).

Integrated regulation. Lastly, and next to intrinsic motivation (but still a part of extrinsic motivation) is integrated regulation, which occurs when behaviors are performed when identified regulations have been fully assimilated to the self. Integrated regulation is very close to intrinsic motivation except that with integrated regulation the

action is performed as a means to an end and not out of the pure joy of doing so as with intrinsic motivation (Blankenship, 2008). Running (outside of P. E. class) because the student believes in the values of running that have been conveyed by the teacher is an example of integrated regulation. The difference between integrated regulation and intrinsic motivation is that integrated regulation behaviors are done to achieve a separable outcome while intrinsic motivation describes performing a behavior for the pure pleasure of that activity in and of itself (Ryan & Deci, 2000). deCharms (1968) went on to say that frequently, higher levels of extrinsic motivation may diminish an individual's amount of intrinsic motivation.

Amotivation. Amotivation represents an absence of motivation and lies completely outside the motivational continuum (Ryan & Connell, 1989). Amotivation exists when an individual has very little or no motivation to participate in activity and, thus, values nothing in the activities' outcome, or the individual feels incompetent to do it (Bandura, 1986). In regard to physical activity, amotivated people will not pursue exercise or physical activity because no value is placed upon the activity, or they will perhaps just go through the motions with no intent. Furthermore, physical education students who are amotivated may feel alienated and helpless (Ntoumanis, Pensgaard, Martin, & Pipe, 2004). Seligman (1975) proposed that individuals with amotivation do not expect the behavior to produce a desired outcome or they do not value the outcome. Ntoumanis (2001) said that previous cross-sectional research has shown a negative relationship concerning students' amotivation and their effort in physical education. There may also be feelings of incompetence and a sense of a lack of control (Ryan & Deci, 2000). Amotivation has been linked with poor concentration in class and boredom (Vallernad et al., 1993), school dropout (Pelletier, Fortier, Vallerand, & Briere, 2001),

and high perceived stress at school along with poor psychosocial adjustment (Baker, 2004). Amotivation is a completely non-self-determined form of regulation and is thereby placed at the very least of the self-determined end of the regulation continuum (Daley & Duda, 2006).

Standage, Duda, and Ntoumanis (2005) maintain that intrinsic motivation predicts a positive effect on motivation and negatively predicts unhappiness and to no surprise, amotivation positively predicts unhappiness. Intrinsic motivation and identified regulation were positively associated with higher levels of pleasure with exercise according to Vlachopoulos and Karageorghis (2005).

Internalization. Regarding SDT, exercise motivation is theorized to change as time goes by. Internalization is an active, natural process in which individuals integrate and reconstitute extrinsic motivations to become more self-determined while performing them (Deci & Ryan, 2000). In relation to intrinsic motivation, extrinsic motivation, and physical activity, experts say that a dynamic process may cause individuals to change from one motivation to the other over time. In the beginning (less than six months), extrinsic motivations (social recognition, competition, and affiliation) for exercise are related to poorer psychological well-being while long-term exercisers (six months or more) may develop more intrinsic motives which relate to improved psychological well-being. This process may be due to individuals internalizing the motivation to exercise as time goes by, which affects psychological well-being. Exercise may also become more pleasurable and rewarding over time through reinforcement of positive feelings when exercise motive and psychological well-being interact. This simply means that intrinsic motives (stress management, challenge, and enjoyment) may only become prevalent to long-term exercisers (Maltby & Day, 2001). Practically, SDT allows physical educators

to get their students to go from a psychological state of *having to*, to one of *wanting to* in relation to developing a physically active lifestyle (Sun & Chen, 2010). Finally, Ryan et al., (2009) contend that many intentional acts use a combination of both intrinsic and extrinsic motivation such as selecting an activity for enjoyment (intrinsic motivation) while simultaneously performing the activity for another outcome such as health (extrinsic motivation). The Transtheoretical Model's Stages of Change (one of the model's four dimensions) have been studied by researchers to examine the change from extrinsic motives (regarding physical activity) to intrinsic motives (Mullan & Markland, 1997).

In relation to health promotion, there are important reasons for differentiating between autonomous and controlling regulations concerning exercise participation. Positive motivational consequences such as quality of life, psychological well-being, and behavioral persistence have been linked with more autonomous regulations and/or negatively associated with more controlling regulations (Reinboth, Duda, & Ntoumanis, 2004; Ryan & Deci, 2000; Sarrazin, Vallerand, Guilett, Pelletier, & Cury, 2002; Vallernad, Fortier, & Guay, 1997; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). In relation to participation in exercise, self-determined, identified, and intrinsic regulations positively relate to future intentions to exercise, current exercise behavior, as well as physical fitness in young people and adults in exercise and leisure settings (Chatzisarantis & Biddle, 1998; Landry & Solomon, 2004; Mullan & Markland, 1997; Rose, Parfitt, & Williams, 2005; Wilson & Rodgers, 2004). There seems to be little doubt as to the importance of intrinsic motivation in relation to exercise participation and adherence (Daley & Duda, 2006).

Psychological Needs

According to Deci and Ryan (1985), there are three fundamental human innate needs; competence, autonomy, and relatedness. Self-Determination Theory states these human needs refer to "innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being" (Deci & Ryan, 2000, p. 229).

Murcia et al. (2008) used SDT to examine the effects of peers and exercise enjoyment. Their research showed that a peer supportive climate with an emphasis on cooperation, personal improvement, and effort influenced variables such as motivation and enjoyment. The three basic psychological needs of competence, autonomy, and relatedness were affected by the task climate which predicted self-determined motivation. These variables likewise affected the degree of enjoyment the participants experienced while exercising. Deci and Ryan (2000) state that competence, autonomy, and relatedness are three basic needs (each representing a basic psychological need) which, when met, offer further self-motivation and better mental health. When these three needs are not met, however, diminished motivation and well-being occur. These basic needs can be either a physical or psychological need and must be met for one to obtain an ongoing sense of integrity and well-being or *eudemonia* (Ryan & Fredrick, 1997; Waterman, 1993). Self-Determination Theory states that individuals feel more self-determined motivation when the activities they pursue give feelings of autonomy, competence, and relatedness, which are vital in enhancing well-being and satisfaction of life (Deci & Ryan, 2000).

Competence

Competence is the belief that one can accomplish the task at hand (Ferrer-Caja & Weiss, 2000) as well as the need to produce behavioral outcomes (Chatzisarantis &

Hagger, 2009). Competence may predict physical self-worth and physical activity, and those with high levels of competence view tasks from a more self-determined or autonomous viewpoint (DeLong, 2006). For an individual to be able to act, he or she needs to possess some level of confidence and effectiveness. A person with more competence views him or herself as the originator of the behavior and as being responsible for the initiation of the behavior (Deci & Ryan, 2002). The more competent a person views him or herself to be, the more intrinsically motivated one will be at the activity at hand (Deci & Ryan, 2002). In relation to SDT, competence also relates to a person's skills and history to the behavior at hand (Ryan et al., 2009).

Autonomy

Autonomy is the freedom to choose what behavior or activity to pursue (Levesque, Stanek, Zuehlke, & Ryan, 2004) and/or the need to experience oneself as initiator and regulator of one's actions (Chatzisarantis & Hagger, 2009). Individuals like to feel in control of themselves rather than being controlled from an outside source (DeLong, 2006). Autonomy has also been described as an internal state advertising the integrated endorsement and organization of actions (Ryan et al., 2009). Individuals with more autonomy generally have a higher internal perceived locus of causality, which confers higher intrinsic motivation. Those with less feelings of autonomy usually have feelings of external perceived locus of causality and therefore diminished autonomy, which is often the case regarding external motivation (Ryan & Deci, 2000). The more autonomous one's behaviors are, the more likely the individual will push on despite any obstacles, perform better, and have a better experience in relation to physical activity (Deci & Ryan, 2000; Ryan & Deci, 2006). Interestingly, Deci and Vansteenkiste (2004) stated that autonomy does not mean to be independent of others.

Relatedness

Relatedness encompasses feeling cared for and feeling for others as well as feeling understood, having fun with others, and being involved in quality conversation (Ryan & Deci, 2000). Relatedness also describes a sense of connection and belonging, which are both important to integrity and wellness (Ryan et al., 2009). Intrinsic motivation is thought to increase with a sense of relatedness. For instance, pupils who view their teachers as caring about a given task perform better than pupils who view their teachers as being uninterested and uncaring about them and their tasks. As an example of relatedness, Dishman and Buckworth (1996) found that exercising in a group causes increased adherence compared to exercising alone.

When designing interventions based upon SDT, research has shown that interventions designed to synergistically meet all three needs at once (competence, autonomy, relatedness) offer higher behavioral engagement than designing an intervention for each individual need alone (Deci, Eghrari, Patrick, & Leone, 1994). Previous research in the world of exercise has shown that the basic needs are usually strongly correlated (Ntoumanis, 2005; Standage et al., 2005) and that they can be absorbed by a single global factor (Hagger, Chatzisarantis & Harris, 2006).

It is vital to understand how to be able to increase an individual's self-determined motivation to gain more satisfaction and commitment to physical activity. If feelings of competence, autonomy, and relatedness can be enhanced via a task-involving climate, then participation and perhaps adherence to physical activity will increase (Murcia et al., 2008). Table 1 shows the self-determination continuum and its basic parts with brief explanations thereof.

Self-Determination Theory also explains that physical activity such as walking, running, or strength training can be inherently rewarding by contributing to vitality and happiness. This information further demonstrates the importance of exercise as not only being beneficial physically but mentally as well. Being physically active helps individuals feel more energetic by satisfying deep psychological needs which in effect, contribute to an overall sense of wellness (Ryan & Frederick, 1997).

Table 1

The Self-Determination Continuum Showing Types of Motivation with Their Regulatory Styles, Loci of Causality, and Corresponding Processes

Behavior	Nonself-Determined					Self-Determined
Motivation	Amotivation		Extrinsic Motivation			Intrinsic Motivation
Regulatory Styles	Non-Regulation	External Regulation	Introjected	Identified	Integrated	Intrinsic Regulation
Perceived Locus of Causality	*Impersonal*	*External*	*Somewhat External*	*Somewhat Internal*	*Internal*	*Internal*
Relevant Regulatory Processes	Nonintentional Nonvaluing Incompetence Lack of Control	Compliance External Rewards & Punishments	Self-Control Ego-Involvement, Internal Rewards & Valuing	Personal Importance, Conscious Valuing	Congruence, Awareness, Synthesis With Self	Interest Enjoyment Inherent Satisfaction

Note. Adapted from "The What and Why of Goal Pursuits: Human Needs and the Self-Determination of Behavior," by E. Deci and R. Ryan, 2000, *Psychological Inquiry*, 4, p. 237.

In summation, SDT posits that satisfying the three basic needs of autonomy, competence, and relatedness results in higher levels of behavioral self-determination, i. e., behavior, coming from the individual's true self. This higher level of self-determination then is shown by increased levels of intrinsic motivation (enjoying physical activity), identified regulation (recognizing physical activity to be personally important) along with lower levels of amotivation (having little or no desire to exercise), external regulation (exercising only because of pressure or external rewards), and introjected regulation (avoiding negative feelings and/or support conditional self-worth).

All of this results in increased levels of self-determination, thereby facilitating more positive cognitive (concentration), affective (enjoyment of the activity at hand), and behavioral (regular participation in physical activity) outcomes in motivation (Vallerand, 2001). Finally, the three basic psychological needs of autonomy, competence, and relatedness are said to be nonhierarchical, innate, and universal and different from one's conscious or unconscious wants and goals. The three basic psychological needs actually refer to conditions which are vital to psychological growth, and psychological health is said to require all three needs being met (Vlachopoulos & Michailidou, 2006).

Previous Studies

Maltby and Day (2001) examined 227 college students and found that with students who have exercised less than six months, extrinsic motivations for exercise were significantly related to poorer psychological well-being while for those students exercising six months or more, intrinsic motivations were responsible for increased psychological well-being. The students were asked to fill out measures of self-esteem, psychological well-being, stress, and exercise motivation. They concluded that researchers can use self-determination theory to better understand the connection between psychological well-being and exercise motivation.

Levesque et al. (2004) researched the role of autonomy and competence in German and American Universities and found that German students felt significantly more autonomous and less competent than American students. Additional data illustrated that the need for autonomy, competence, and relatedness is cross-cultural and that it is vital for students to experience these basic psychological necessities. In another study on autonomy and SDT, a school-based intervention was designed to change students' physical activity intentions and self-reported leisure-time physical activity behavior over

five weeks with 215 students by Chatzisarantis and Hagger (2009). Their results showed that autonomy-supportive teachers possessed students with stronger intentions to exercise during leisure time than those in the control group. The researchers concluded that SDT provided a useful framework for the development of school-based interventions to help students gain more physical activity out of their free time.

In 2004, Vansteenkiste, Simons, Soenens, and Lens studied 501 Belgian students who were told instructions by experimenters framing activities as useful for either intrinsic or extrinsic goal attainment purposes. Findings showed that future intrinsic goal attainment elicited a positive effect on persistence, autonomous motivation, performance, and effort. Inversely, framing activities with the induction of future extrinsic goal attainment produced a negative effect on aforementioned outcomes in comparison with the control group where no future goals were offered. The researchers go on to say that these findings should have a large implication for PE teachers to stress intrinsic, not extrinsic goals to their students to be obtained in PE classes.

Self-determination was found to have a prominent place in the adoption and maintenance of health-promoting behaviors in young adults in a study of 409 university undergraduates aged 18-30 years by Daley and Duda in 2006. A cross-sectional survey design was used and the researchers discovered that men and women were less self-determined in the early stages of exercise behavior than at the later stages of change. Thus, self-determination seems to increase as time spent pursuing the behavior increases. Further information showed those who were more self-determined were more physically active during the previous three months.

DeLong (2006) researched SDT, the transtheoretical model and college students' motivations to be physically active and found activity levels varied across the stages of

change and that students became increasingly self-determined as they moved across the stages of change. Two hundred and seventy-seven male and female students at a small private college in the South participated via online surveys, and results showed that in regard to required physical activity classes currently used, approaches may not be effective in motivating college students to increase physical activity levels.

Psychosocial theories of behavior change have been shown to be responsible for less than 30% of the variability of exercise behavior according to Baranowski et al. (1998). The researchers' data suggested that more researchers should focus more on gaining a better understanding of the predictors of physical activity as well as interventions designed to elicit change in said predictors of physical activity. Kahn et al. (2002) agreed, advising further research examining the functions of additional psychological constructs to add to current theories relating to changing and predicting exercise behavior.

The theory of planned behavior (TPB) and SDT were examined in relation to physical activity by Fortier, Kowal, Lemyre, and Orpana (2009). One hundred and forty-nine middle-aged women were studied regarding motivation (autonomous and controlled), and autonomous motivation was found to be significantly related to intentions to be physically active in relation to SDT. Future recommendations include examining strategies to help or deter women's ability to become physically active to expose methods to better foster an increase in women levels of physical activity. In another gender-related study, men and women were found to differ in their motivational behaviors according to Fredrick and Ryan (1993) and Ingledew et al. (1998). Wilson, Rodgers, Fraser, and Murray (2004) agree, claiming men and women possess different exercise regulations and that women have stronger introjected regulations than men.

Identified regulation did prove to be the most important predictor of exercise in both sexes, though.

Chang et al. (2009) studied SDT and Expectation-Confirmation Theory (ECT) using physical education as an example. The researchers stated that because so many students do not care about participating in PE, it is vital to understand how to motivate students to get involved enough to properly increase their physical activity levels. Both theories possess satisfaction as a common theme, and the researchers argue that students who enjoy physical education or appreciate the value it offers will take optional physical education classes in the future whereas those students who feel pressured or disappointed with physical education will not. Self-determination motivation in physical education should thusly enhance students' positive experiences and consequently their participation rates in the future.

Pedagogy, Self-Determination Theory, and Physical Education

What then, is the teacher's role in guiding students along the path to self-determination? How can a teacher best use the science of SDT to optimally influence students to participate and adhere to physical activity? Perlman and Webster (2011) stated it is vital for teachers to understand self-determined motivation and to research pedagogical methodologies to further learning. Teachers are in a position of authority, so they are optimally positioned to influence others' motivation such as students in a physical education class. Grolnick, Ryan, and Deci (1991) stated that authority figures possess the ability to support psychological needs (competence, autonomy, relatedness) by encouraging those under their charge to initiate and make their own choices.

Self-Determination Theory has been shown to offer ways to better motivate students to learn with all educational levels from kindergarten to medical school,

including those with disabilities (Black & Deci, 2000). At present, schools all over the United States are using SDT as a methodology to increase motivation to learn as well as help students take more responsibility for their lives by identifying their needs and develop plans to meet those needs (American Psychological Association, 2004). There is an overwhelming abundance of solid, scientific data supporting the idea that the more self-determined a person becomes, the more that person will adhere to a behavior such as physical activity. Motivation is a key tool teachers can use to influence students to adopt a particular behavior, and SDT offers valuable information as to how best to foster motivation.

People possess different amounts and kinds of motivation. In other words, students can differ in both their level of motivation (i.e., how much motivation) and their orientation of motivation (i.e., what type of motivation). For example, a student may be highly motivated to work hard in a weight-lifting physical education class because of interest and curiosity or simply because he or she seeks approval of a coach, teacher, or parent. With this example, the level of motivation may not change, but the nature and focus of the motivation does (Ryan & Deci, 2000).

Self-Determination Theory declares that people pursue behaviors such as exercise or studying out of intrinsic or extrinsic motivational reasons. Intrinsic motivation drives people to do something (study, run, lift weights) because they love the activity itself. Extrinsic motivation states that people perform a behavior because it leads to a separable outcome such as avoiding guilt. Ryan and Deci (2000) proclaim three decades of research have shown that the quality of experience and performance is much different when performed for intrinsic versus extrinsic reasons. Ryan and Deci further contend that intrinsic motivation leads to high-quality learning and creativity; therefore, it is

important for educators to strengthen the learning environment in a way to foster intrinsic motivation for students. The American Psychological Association (2004) clearly states that vast research shows the importance of self-determination (i.e., autonomy) for all students from elementary school to college to foster better learning as well as to increase outcomes after graduation.

Not every student, however, will possess intrinsic motivation to pursue a behavior such as physical activity. Extrinsic motivation can, though, be used to foster said activity. Students may perform an activity with extrinsically motivated actions such as resentment, resistance, and disinterest or, inversely, with a feeling of willingness that shows an inner acceptance of the value of the behavior at hand. In this case, the student can feel externally pushed into action (classic external motivation) or the extrinsic goal may be self-endorsed with a sense of autonomy. This is important for teachers to understand because, again, not all students will have intrinsic motivation concerning physical activity or learning. This is especially true in education where many tasks assigned to students are not always interesting or enjoyable. After all, there is little challenge for a teacher to lead intrinsically motivated students—it is knowing how to manipulate extrinsic motivational factors to get students to perform a behavior students do not find inherently enjoyable or interesting. This exact problem is addressed by SDT in terms of increasing the internalization and integration of behavioral regulations and values. Internalization refers to taking in a value or regulation while integration refers how students transfer a regulation into their own so that they believe it originates from their own psyche (Deci & Ryan, 1985). This leads into research claiming that the effects of environmental events on intrinsic motivation usually focus on autonomy versus

control. Interestingly, intrinsic motivation appears to become weaker and, thus, less a factor in school with each advancing grade (Ryan & Deci, 2000).

From an educational standpoint, the more autonomy supportive an environment can be made, the better that environment is for the student. Teachers enhance autonomy by asking questions and eliciting input from students in relation to the job at hand. Students should be provided with choices and opportunities for self-direction (Shen, McCaughtry, Martin, & Fahlman, 2009) along with positive feedback and an environment whereby the opinion of the student is considered (Ryan & Deci, 2000). An autonomy-supportive environment concentrates on pedagogical methodologies which enhance students' perceptions of control, choice, and volition (Perlman & Webster, 2011). When people in positions of authority such as teachers, coaches, and parents, take the perspective of the student into consideration this *perspective taking* additionally satisfies the need for relatedness and strengthens a sense of belongingness which is vital according to SDT (Deci et al., 1994; Ryan & Deci, 2000). Furthermore, when a behavior is explained as being important, autonomy is supported. Neutral language (e.g. modal operators such as *may* and *could* instead of *shoulds* and *musts*) enhance an autonomy supportive environment by offering the student choice during inter-personal communication (Deci et al., 1994). Researchers suggest to try not to make the learning environment controlling, and this is achieved by always offering two of the three critical factors, which make up an autonomous environment: (1) rationale; (2) choice; or (3) perspective taking. When those in authority such as coaches and teachers do not offer meaningful rationale or use pressuring language (should, must) and/or pressure students to accept their (the teacher, coach) point of view, then the environment is said to be controlling, thereby lessening self-determination for the students (Deci et al., 1994).

Black and Deci (2000) researched the effects of instructors' autonomy support and students' autonomous motivation with a chemistry class using perspectives of SDT. Questionnaires were administered to 380 students, of which 289 were completed. The researchers found two important pieces of data: (1) the reason the students entered the class was relatively autonomous (vs. controlled), which predicted higher perceived competence, interest, and enjoyment along with lower anxiety and (2) students' perceptions of their instructors' autonomy support predicted increases in autonomous self-regulation and perceived competence along with higher interest and enjoyment and decreased anxiety throughout the semester. In addition, instructor autonomy support also predicted course performance directly.

In a similar study, Wong, (2000) studied SDT, autonomy, and control while studying academic commitment, and academic performance. This was a four-year longitudinal study involving talented high school students (N = 208) using questionnaires. The data showed autonomy orientation was positively related to academic experience for all students.

The more autonomy-supportive teachers are during physical activity classes, the more the students are likely to perceive their teachers as offering choice, thereby being meaningfully related to them. This is important because not all students enjoy physical education, and motivation to learn in class falls as children grow into adolescence (Mowling, Brock, Eiler, & Rudisill, 2004). These students who lack motivation or whose motives are maladapted to a particular program possess a higher probability of being unsatisfied with their learning experiences as well as not being engaged in class and/or being truant (Ntoumanis et al., 2004). Also, students taught by autonomy-supportive teachers report more autonomous motivational styles and then report that physical

education classes are important and likeable as a subject (Chatzisarantis & Hagger, 2009). Chatzisarantis and Hagger (2009) additionally indicated that with their findings regarding SDT, students and physical education can be used in today's educational curricular to aid physical educators to attain goals associated with the advancement of leisure-time activity.

Competence is a main psychological need in facilitating behavior, be it academic or physical in nature. Competence is enhanced when teachers work with students to overcome barriers and to look at failure not always negatively but as a part of the steps of progress towards a larger goal. Ryan et al. (2009) indicated that for a person to be able to act, that person must experience some level of effectiveness and confidence. This confidence may be connected to not only a person's skill and history regarding the behavior at hand, but to the social environment as well. Thusly, when the student's instructor, teammates, coach, parents, or others give positive, meaningful feedback, then feelings of competence can be strengthened and motivation will then increase. Inversely, when those around the student are critical or give continuous negative feedback, feelings of competence shrink, and the student faces increased chance of becoming discouraged and disengaged (Ryan et al., 2009). Ryan (1982) stated that increases in perceived competence are best associated with a sense of autonomy to increase feelings of competence, which then increase intrinsic motivation. Students are more apt to adopt and internalize a goal if they understand the goal and have the necessary skills to succeed at the given goal. Teachers should support competence by offering optimal challenges as well as giving effectance-relevant feedback (Ryan & Deci, 2000).

Puente and Anshel (2010) studied how perceived competence and autonomy affect the relationship between a fitness instructors's teaching style and their students'

motivation to exercise. Two hundred and thirty-eight college students completed questionnaires with results showing that perceived competence and autonomy mediated the relationship between perceived instructors' interacting style and self-determined regulation. Self-determined regulation was also found to be significantly related to exercise enjoyment, positive affect, and frequency of exercise. The researchers concluded that it is important to understand motivational factors and behavioral consequences of physical activity because doing so will partly explain an individual's motives to participate in habitual exercise.

Students also experience competence when challenged and then given quick feedback. Students experience autonomy when they feel supported to explore on their own, take initiative, and find solutions and answers to their own problems. In regard to relatedness, students want others to both listen and respond to them, and when all of these needs are met, then students feel more intrinsically motivated, are eager to learn, and obtain better academic results. When students in sport, exercise, or any physical exertion feel that all three basic needs are supported, then intrinsic motivation is enhanced, which gives more enjoyment and persistence to said activities through need supports (Ryan et al., 2009). In 2003, a study by Gagne, Ryan, and Bargmann established that elite female gymnasts had increased motivation (and vitality) after practices in which they perceived to attain more relatedness, autonomy, and competence. In addition, students who are involved in setting their own educational goals have more potential to reach those goals (American Psychological Association, 2004). Due to the fact that extrinsically motivated behaviors are often boring, the behavior must be stimulated externally by other people to whom the student (in this case) feels close or connected (Ryan et al., 2009). This may come in the form of family, friends, or a team which may give a feeling of belongingness

and connectedness to the person in question. Self-Determination Theory calls this relatedness, and in the classroom environment or in physical education this refers to the students' feeling like they are respected by and cared for by the teacher as well as by others in the class. Relatedness is strengthened by fostering a supportive, open, and non-judgmental environment between the teacher and students (McNelis, 2008). Relatedness is reinforced by the warmth, care, and involvement that others convey (Ryan et al., 2009), giving credence to the old saying in teaching, "*Students don't care what the teacher knows until they know that the teacher cares*." Ryan, Stiller, and Lynch (1994) stated that relatedness to parents and teachers is associated with higher internalization of school-related behavioral regulations by students.

Relatedness can be fostered in a learning environment from the involvement of others via a communication of interest in and enjoyment of activities where a group or individuals share common experiences (Connell, 1991; Connell & Wellborn, 1991). Concerning education, the need for relatedness aids in the process of cultural transmission and internalization of values seen between, teachers and students (Ryan & Powelson, 1991). Self-Determination Theory posits that relatedness is both a need to be satisfied as well as a prerequisite for effective learning (Fleer & Richardson, 2009; John-Steiner & Mahn, 1996).

In summary, the psychological needs of autonomy, competence, and relatedness can foster self-motivation and be pedagogical sources of motivation. Self-Determination Theory states that classroom, exercise, and home environments can help or hinder intrinsic motivation by supporting the three psychological needs. Supporting these needs, however, can be a daunting task in education settings where controlling is vital to both the teaching and learning process. Self-Determination Theory recognizes the controlling

nature of institutionalized education and focuses its constructs around externally imposed regulatory mechanisms to foster learner motivation. Teachers may use controlled motivation in congruence with students' desires for satisfying the needs through academic achievement. In practical terms, the pedagogical significance of SDT is accomplished by a complete understanding of the various forms of externally regulated motivation, which enables learning. In the real world, the basic psychological needs probably will not be equally fulfilled in physical education (Sun & Chen, 2010). The controlling nature of school goes against the basic psychological need for autonomy development which reminds educators of the need to research the necessity to use externally regulated motivation or extrinsic motivation to influence students (Cameron & Pierce, 1994).

CHAPTER III

METHODOLOGY

This chapter provides a description of the methods and procedures used to examine college students' motivation towards physical activity in a physical education class. Demographics, current participation in exercise, current enrollment in other exercise, and information concerning why the course was taken were also examined. The chapter outlines participants, treatment protocol, data collection, instrumentation, procedures, and analysis of data.

Research Design

This study utilized a quantitative methodology involving quasi-experimental research to examine college students' motivations to be physically active before and after a physical education class using perspectives of self-determination theory. A nonequivalent control group, pretest-posttest design was used as the research design. For H_1 the independent variable was teacher strategy and the dependent variables were amotivation, external regulation, introjected regulation, identified regulation and intrinsic regulation. For H_2 the independent variable was teacher strategy and the dependent variables were autonomy, competence and relatedness.

Participants

Participants were undergraduate students enrolled at a university in the Southeast's main campus in the United States. Participants were enrolled in scheduled HPR classes in the fall of 2012 during first session and second session classes. The Institutional Review Board of the University of Southern Mississippi approved the study before data collection (Appendix A). All participants were informed of the purpose and possible risks involved in this study before data collection.

Treatment Protocol

HPR classes were taught at a university in the Southeast in the United States in the fall of 2012. The class used in this study was HPR 101 Weight Training. Two 8-week sessions of HPR 101 were taught with two classes being taught with each session essentially dividing a typical semester into halves. First session classes began August 22 and ended October 16, 2012. Second session classes began October 17 and ended December 6, 2012. This study involved both the first session and second session classes for a total of four classes. During the first day of class all participants were first asked to fill out a general information form, Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) and The Basic Psychological Needs in Exercise Scale (BPNES). Participants were informed of the risks of exercise participation and asked to sign an informed consent form before the intervention. On the last day of class, participants were again asked to fill out the BREQ-2, the BPNES and the Learning Climate Questionnaire (LCQ). The first day of class was orientation (no exercise) and the last day of class involved a final exam (no exercise). During the second class meeting through the second to last class meeting, the instructor used basic psychological needs of SDT (autonomy, competence and relatedness) behavior intervention to increase exercise motivation via class lesson plans and instructional methods made by the researcher. Each class met two times per week and class time was 75 minutes per class for a weekly total of 150 minutes. Data was collected during class times only. Participation in this study was voluntary and those not wishing to fill out questionnaires, the health history form and the informed consent were free not to participate. This intervention was approved by the University of Southern Mississippi's Human Research Ethics Committee for use of human subjects in research before the intervention began.

Data Collection

Instrumentation

This study utilized two primary instruments: (1) Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) and (2) The Basic Psychological Needs in Exercise Scale (BPNES). In addition, a general information form was included to obtain basic demographical participant information (on the first day of the study) while the Learning Climate Questionnaire was used (on the last day of the study) as a manipulation check instrument.

Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2). The BREQ-2 (Markland & Tobin 2004; Mullan et al.,1997) is a 19-item questionnaire which employs a 5-point Likert scale to measure levels of self-determination to be physically active. This instrument has become one of the most frequently used measures concerning the field of exercise psychology research (BREQ-2, 2008). Mullan et al. (1997) developed the original BREQ to measure external (e. g., "I exercise because other people say I should"), identified ("I value the benefits of exercise"), introjected ("I feel guilty when I don't exercise"), and intrinsic ("I exercise because it's fun") regulations (not integrated regulation however). Integrated regulation is not assessed because in the developing stages of the BREQ-2 researchers discovered it impossible to distinguish empirically between integration and identified regulation on one hand, as well as intrinsic regulation on the other hand (Markland & Tobin, 2004). Measures of amotivation were originally included but later taken away because of high skewness as well as a restricted response range in the development sample. The BREQ-2 is the modified version of the original, which includes measures of amotivation responses ("I don't see why I should have to exercise") as the researchers found that with more general samples amotivation might

well be an issue worth exploring (Markland & Tobin 2004). Subscales can be studied individually or combined into one measure—the Relative Autonomy Index (RAI). The RAI lists an index of the degree to which the responding subjects feel self-determined. The RAI uses a simple formula: 2(intrinsic motivation) + identified regulation – introjected regulation – 2(external regulation). The original BREQ has been researched and shown to be valid and reliable in predicting motives of exercise behavior (Mullan & Markland, 1997; Wilson & Rodgers, 2002; Wilson, Rodgers, & Fraser, 2002). When using the BREQ-2 as a multidimensional instrument separate scores are used for each subscale. Scoring is done by performing a simple calculation of the mean scores for each set of the following question numbers: Amotivation [5, 9, 12, 19], External regulation [1, 6, 11, 16], Introjected regulation [2, 7, 13], Identified regulation [3, 8, 14, 17], and Intrinsic regulation [4, 10, 15, 18]. Markland and Tobin (2004) stated that with the BREQ-2 the amotivation items were still skewed, but confirmatory factor analysis using the Satorra-Benter (1994) scaling correction to x^2 showed an excellent model fit (Satorra-Bentler Scaled Chi Square = 136.49, df = 125, p = .23; CFI = .95; RMSEA = .02, 90% CI = .00 - .04; SRMR = .05). Markland and Tobin (2004) stated Cronbach's alpha reliabilities for the BREQ-2 are as follows for each subscale: .83 for amotivation, .79 for external regulation, .80 for introjected regulation, .73 for identified regulation, and .86 for intrinsic regulation. The researchers went on to add that the BREQ-2 can be helpful to researchers wanting to assess amotivation to help discover a more thorough understanding of the motivation to exercise.

The Basic Psychological Needs in Exercise Scale (BPNES). The BPNES (Vlachopoulos & Michailidou, 2006) is an 11-item, domain-specific, self-report instrument rated on a 5-point Likert scale with anchors of "I don't agree at all" to "I

completely agree" used to measure perceptions of the basic psychological needs of Self-determination Theory of autonomy (e. g., "The way I exercise is in agreement with my choices and interests"), competence ("I feel I perform successfully the activities of my exercise program"), and relatedness ("My relationships with the people I exercise with are close") in relation to exercise (Deci & Ryan, 2000). Autonomy is measured via questions 2, 5, 8 and 11; competence is measured via questions 1, 3, 6 and 9, and relatedness is measured via questions 4, 7 and 10. Vlachopoulos and Michailidou (2006) attempted to validate the psychometric properties of the instrument and stated that results demonstrated an adequate factor structure, internal consistency, generalizability of the factor dimensionality across the calibration and the validation samples, discriminant validity and predictive validity along with acceptable stability of the BPNES scores over four weeks of a conducted study. In the instrument validation study Cronbach's alpha values were .84 for autonomy, .81 for competence, and .92 for relatedness. Factor loadings ranged from .60 to .86 for autonomy, from .59 to .78 for competence, and from .80 to .91 for relatedness. All correlation values were significant ($p < .05$, $N = 508$) except for the first competence item. The authors went on to say that in the study of the instrument scale scores were found to be largely unaffected by socially desirable responding and specifically the tendency for impression management (Vlachopoulos & Michailidou, 2006).

General Information Form. This is a generic form (made by the researcher) asking simple demographic information such as date of birth, age, sex, current exercise information, if the student is currently enrolled in any other activity course, reason for taking the course and an identification number (last 5 digits of phone number) to protect subject identity.

The Learning Climate Questionnaire (LCQ; Williams & Deci, 1996). The LCQ is a 15-item questionnaire used to carry out a manipulation check. This instrument assesses the perceptions of individuals about the degree to which a particular social context is autonomy supportive versus controlling (Williams & Deci, 1996). This study used the LCQ to assess how the students found the HPR101 instructor's level of autonomy-supportive behavior. The LCQ was adapted by Williams and Deci (1996) from the Health-Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996). Questions are answered on a 7-point Likert scale ranging from a 1 of "Strongly Disagree" to a 7 of "Strongly Agree," about the degree to which their instructor supports their autonomy (e.g., "My instructor listens to how I would like to do things"). The LCQ has a single underlying factor with high internal consistency (Williams & Deci, 1996), and the score for leader autonomy support is the sum of the 15 items. Across domains, the alpha coefficient of internal consistently is virtually always above 0.90 (Black & Deci, 2000).

Procedures

HPR classes were taught at a university in the Southeast of the United States in the fall of 2012. The class used in this study was HPR 101 Weight Training. Two 8-week sessions of HPR 101 were taught with the first session beginning August 22 and ending October 16, 2012. Second session classes began October 17 and ended December 6, 2012. This study involved both sessions. Two classes were taught each session with one randomly being designated as the control group and the other as the experimental group. During the first class of each session all participants were first asked to fill out a General Information Form, Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2), and The Basic Psychological Needs in Exercise Scale (BPNES). Participants were

informed of the risks of participation in the study and asked to sign an informed consent form before the intervention. During the last class of each session, participants were again asked to fill out the BREQ-2, the BPNES, and additionally, the Learning Climate Questionnaire (LCQ). Before the intervention began, the HPR 101 class instructor was trained via the researcher on the essential aspects of SDT and how to apply them pedagogically. Participants assigned to the experimental group received the following treatment, which is defined next. Treatment: The instructor aimed to create a need supportive environment in the experimental group. Starting on the second class and ending on the second to last class the physical activity class instructor used basic psychological needs (competence, autonomy and relatedness) behavior intervention to increase exercise motivation via class lesson plans and instructional methods made by the researcher. The psychological need of competence was enhanced via the instructor administering lesson plans, which instills knowledge. The instructor asked and answered throughout each lesson in a detailed and enthusiastic manner (also fostering relatedness), increasing student's knowledge of weightlifting (competence). Technique of exercise was thoroughly gone over in a detailed and enthusiastic manner with questions being taken and answered. The psychological need of autonomy was enhanced by the students being offered choices: (1) in different weight training programs (beginner, intermediate, advanced), (2) the ability to change exercises within the program, and (3) having the freedom to choose a weight training partner. The psychological need of relatedness was enhanced by (1) contact time with the exercise instructor and the other students and (2) being allowed to choose a workout partner (also fostering autonomy). Participants in the control group were taught normal environment. They were assigned a workout partner and an exercise program and were not allowed to switch exercises within the assigned

exercise program (not being given choices), which lowers autonomy. Each class met two times per week for 75 minutes each class period. The class times were from (1:00-2:15 pm and 2:25-3:40 pm both on Tuesday and Thursday) for a total of 150 minutes per week. Data was collected during class times only. Participation in this study was voluntary and those not wishing to fill out questionnaires, the general information form, and the informed consent were free not to participate. This intervention was approved by the University of Southern Mississippi's Human Research Ethics Committee for use of human subjects in research before data collection began.

Data Analysis

In order to test the primary hypothesis (Students in the experimental group will demonstrate a significantly greater increase in self-determination as measured by the relative autonomy index [RAI] as measured by the BREQ-2 than students in the control group) a mixed-design MANOVA was conducted where scores on the RAI (pre and post) were the within factor and treatment group was the between factor. By using this statistical testing, the differences in means among the two factors were assessed. After data collection was completed, however, statistical analyses showed a Cronbach's alpha of .276 for the subscale of indentified regulation, which is needed to use RAI to test self-determination. [The RAI = 2(intrinsic motivation) + identified regulation – introjected regulation – 2(external regulation)]. The researcher, therefore, dismissed the subscale of identified regulation and chose to assess the remaining subscales separately in order to acquire more specific insight into each variable collected. These subscales were: amotivation, external regulation, introjected regulation and intrinsic regulation. The independent variable was teacher strategy while the dependent variables were amotivation, external regulation, introjected regulation and intrinsic regulation. The

second hypothesis (Students in the experimental group will demonstrate a significantly greater increase in autonomy, relatedness, and competence related to exercise as measured by the BPNES than students in the control group) was tested using the mixed-design MANOVA. The independent variable was teacher strategy while the dependent (repeated) variables were autonomy, competence, and relatedness. The alpha level was set at .05.

Pilot Study Results

The pilot study was carried out during the first five-week term (5-30-2011 through 6-28-2011) during the summer of 2011 at a university in the Southeast in the United States for a total of five weeks. This study sought to collect information regarding pedagogy in college physical activity courses. Therefore, HPR 101 Weight Training was chosen in order to pilot instruments and lesson plans. The study was carried out in the Payne Center, in the weight room, and on the second floor on the track. HPR 101 Weight Training had twenty undergraduate students enrolled as of May 30, 2011. The first 5-week term began May 30, 2011 and ended June 28, 2011. HPR 101 Weight Training met 10 times with each class meeting two times per week (Tuesday & Thursday). The class time was from 10:20 am until 12:30 pm for a total of 130 minutes per class, for a total of 260 minutes per week. Data was collected during class times only. On the first day of class, the researcher, provided informed consent forms (Appendix B) to students and read the information to the students. Participants were informed that participation was purely voluntary and that those not wishing to participate would not be penalized in any way. Students who agreed to participate were asked to complete a General Information Form (Appendix E), Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) (Appendix D), and The Basic Psychological Needs in Exercise Scale (BPNES) (Appendix C). The

questionnaires took about 15 minutes to complete. Course content was delivered via the course physical education instructor using lesson plans developed by the researcher. Self-Determination Theory basic psychological needs were provided via lesson plans which include autonomy (choices), competence (knowledge & skills), and relatedness (groups or partners). Following the delivery of each lesson (N = 10), the instructor provided a reflection (Appendix I) on the lesson content, length, class participation, and clarity. At the beginning of the final class meeting (class 10) participants were again asked to fill out the Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) and The Basic Psychological Needs in Exercise Scale (BPNES) by the researcher. On the first day of data collection, 18 students chose to participate (out of 20), and on the last day, 15 (out of 15) chose to participate; however, data could only be collected from 10 participants (on the last day) as five did not enter any identification data. Pilot study data results showed Cronbach's alpha for the BREQ-2 was .827. Cronbach's alpha for the BPNES all variables was .756 and the subscales were: .833 for Autonomy, .941 for Competence and .941 for Relatedness.

CHAPTER IV

ARTICLE ONE

SELF-DETERMINATION THEORY, MOTIVATION, AND COLLEGE PHYSICAL EDUCATION CLASSES

Abstract

Physical activity levels of young people in modern industrialized nations are well below those necessary to promote fitness and fight diseases associated with being sedentary (Standage, Gillison, Ntoumanis, & Treasure, 2012). Traditionally, research concerning physical activity has centered on physical rather than psychological methodologies with disparaging results (Kilpatrick, Hebert, & Bartholomew, 2005). Increased physical activity begins with a behavioral change and the constructs of self-determination theory (SDT; Deci & Ryan, 1985) may be related to the behavior demonstrated in physical education classes. School-based physical education offers a medium where health, social, and psychological gains associated with physical activity can be endorsed to large numbers of students (Chang, Hsu, & Lin, 2009). Class procedures and activities were designed according to SDT to meet the purported basic psychological needs and motivational regulations to attempt to increase self-determination for physical activity. College students (n = 69) enrolled in weightlifting classes served as the sample for the present study. The purpose of this study was to change pedagogical strategy to reflect self-determination theory in order to determine the effects on individual's motivation to exercise. This study utilized two questionnaires: (1) Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) and (2) Basic Psychological Needs in Exercise Scale (BPNES). Results from both questionnaires showed insignificant differences between control and experimental groups. The Learning

Climate Questionnaire (LCQ) used as a manipulation check suggested students did not perceive a strong difference in treatment methodology between the control and experimental groups.

Introduction

Humans now live in a seated, vicarious society. Video games, smartphones, computers and television occupy much time in contemporary life. Instead of actually participating in a physical activity, many people would rather sit and be involved via a computer game or television (Ryan, Williams, Patrick, & Deci, 2009). The intense physical labor once required to accomplish activities of daily living have almost vanished due to ever-increasing technological advancements. The result is far less physical activity and the subsequent rise of chronic disease levels (Kilpatrick et al., 2005).

In spite of the well-known health benefits of regular physical activity, both American adults and young people are becoming increasingly sedentary (U. S. Department of Health & Human Services [USDHHS], 2000, 2008). Regular physical activity plays a key role in the prevention of major chronic diseases such as cardiovascular disease, diabetes, cancer, obesity, depression, hypertension, and osteoporosis (Warburton, Nicol, & Bredin, 2006). In addition, regular physical activity has been shown to offer substantial mental and physical health benefits (Franco et al., 2005; Warburton et al., 2006). As such, increasing physical activity among college students is crucial as increased physical activity may lead to improved physical and psychological well-being (Ferrara, 2009). In light of this evidence, national organizations (e.g. Centers for Disease Control and Prevention [CDC], 1997) advise that physical education (PE) classes serve an increasing role in promoting physical activity among young people (Ntoumanis & Standage, 2009).

Data from the Behavioral Risk Factor Surveillance Survey (BRFSS) indicate the greatest increases in obesity occur between ages 18-29 years, corresponding to the transition from adolescence to adulthood when many attend college (CDC, 2009). The American College Health Association National College Health Assessment II (ACHA-NCHA II) indicates students meeting the recommendation for moderate-intensity exercise (cardio for 30 minutes on five days or more per week), vigorous-intensity exercise (cardio for 20 minutes on three or more days per week), or a combination of both was 52.3% for males, 43.6% for females with a combined total of 46.7% (ACSM, 2010; AHA, 2013). Haasse, Steptoe, Sallis, and Wardle (2004) researched college students in 23 countries and found physical activity to be below recommendations. Ferra (2009) added that college campuses are thus an excellent place where promotion of healthy lifestyle habits can be established. Only 40% of college students engage in any type of physical activity while 30% or more do not engage in any exercise at all on a regular basis (Huang et al., 2003; Keating, Guan, Pinero, & Bridges, 2005; Lowery, Galuska, Fulton, Wechsler, Kahn, & Collins, 2000; Pinto & Marcus, 1995; Racette, Deusinger, Strube, Highstein, & Duesinger, 2005; Suminski, Petosa, Utter, & Zhang, 2002).

Research concerning physical activity has long examined physiological variables. Biddle and Mutrie (2001) state that psychological influences also influence physical activity. This led behavioral scientists to research the factors which contribute to the uptake and maintenance of regular exercise (Hagger & Chatzisarantis, 2005). Many factors contribute to physical activity including social, environmental, cultural and psychological (Burton, Turrell, Oldenburg, & Sallis, 2005; King, 2001). As a psychological factor, motivation compels humans to act, and theories based upon

motivation can guide interventions to increase exercise and ameliorate the risk factors associated with chronic illness. One prominent theory in motivation is Self-Determination Theory (Hagger & Chatzisarantis, 2008).

Self-Determination Theory

Self-Determination Theory (SDT; Deci & Ryan, 1985) is a theoretical perspective of human motivation and personality which has often been used to research motivation in physical education (Ntoumanis & Standage, 2009). Self-Determination Theory makes an excellent fit in relation to motivation and physical activity as its framework is highly applicable to physical education. Ntoumanis and Standage (2009) state that Self-Determination Theory possesses major propositions and constructs, which are highly relevant to physical education. The satisfaction of meeting the basic psychological needs of autonomy, competence and relatedness is related to important outcomes in physical education such as students' concentration, preference for challenging tasks and positive affect in class (Standage, Duda, & Ntoumanis, 2005). Comprised of a meta-theory, SDT states that humans are by nature inclined to motivate themselves or others to act. Self-Determination Theory itself is based upon three mini-theories, which were each developed to describe motivationally based phenomena evolving from field and laboratory research (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000). The three mini-theories are briefly described in the subsequent paragraphs.

Cognitive evaluation theory. Cognitive Evaluation Theory (CET) involves the social contexts of intrinsic motivation and how factors such as rewards, interpersonal controls, and ego-involvements interplay with intrinsic motivation. Cognitive Evaluation Theory states the importance of competence and autonomy supports in increasing

intrinsic motivation which is critical for behavior such as sport involvement (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

Organismic integration theory. Organismic Integration Theory (OIT) is concerned with extrinsic motivation and its regulations. These types of behavioral regulation consist of external regulation, introjection, identification, and integration and fall along a continuum called internalization. Amotivation describes a state of apathy where one does not enjoy or value an activity or behavior or feels incompetent to perform it (Ryan & Deci, 2000). Amotivation describes a totally non self-determined state of behavior. Next is what could be described as partially-self determined forms of behavior called extrinsic motivation of which there are four levels. External regulation is the least self-determined and describes performing an action solely to satisfy external pressures or gain external rewards (Markland & Tobin, 2004). Introjected regulation is the next step from external regulation towards intrinsic motivation and involves an internalization of external controls in which the individual applies via self-imposed pressures to avoid guilt, for ego or pride. Identified regulation is yet another step toward intrinsic motivation and refers to a behavior that involves personal importance and conscious value. Identified regulation represents the first step along the continuum in which personal value to the behavior at hand is established (Blankenship, 2008). Lastly, and next to intrinsic motivation (but still a part of extrinsic motivation) is integrated regulation which occurs when behaviors are performed when identified regulations have been fully assimilated to the self. Integrated regulation is very close to intrinsic motivation except that with integrated regulation the action is performed as a means to an end and not out of the pure joy of doing so as with intrinsic motivation).

The more internalized the extrinsic motivation becomes, the more autonomous the individual becomes concerning the behavior at hand. Autonomy and relatedness are seen as vital aspects of supporting internalization (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

National organizations such as the CDC (1997) have recommended that PE classes should be a primary means of increasing physical activity in young people (Ntoumanis & Standage, 2009). Interest levels, physical ability, and effort of various students within PE classes can be very different, thus, understanding student participation in this setting should be important to both researchers and practioners. Self-Determination Theory and its sub-theories like OIT are widely used to study motivation in PE, which makes sense as its major propositions and constructs are well suited to PE.

Basic psychological needs theory. Basic Psychological Needs Theory (BPNT) involves the psychological needs of autonomy, competence, and relatedness and their importance to well-being and psychological health. Deci and Ryan (2000) stated that autonomy is best described as *being in control of your life*, while competence can be explained as *succeeding in what you do*. Lastly, relatedness is *connecting with others.* Environments that thwart or support the three needs are vital to wellness. These three needs must all be met; if any are missing, then distinct functional costs will arise (Deci & Ryan 1985, 2000; Ryan & Deci, 2000). This study was designed to meet all three psychological needs in a college physical activity course to increase student self-determination via a teaching methodology utilizing Self Determination Theory. Competence was enhanced through weight lifting instruction and technique, relatedness was enhanced through student partners, and the instructor and autonomy was enhanced through choices (selecting a partner and choice of weightlifting programs).

Self-Determination Theory explains intrinsic and extrinsic sources of motivation and the natural differences people possess. Cultural and social variables are stated to increase or decrease an individual's sense of self-determination in addition to the quality of actions and well-being. Environments which increase an individual's degree of autonomy, competence and relatedness are thought to increase motivation, persistence and performance. Inversely, environments which thwart an individual's degree of autonomy, competence and relatedness thereby lessen motivation, persistence and relatedness. AS such, SDT can be used to structure a need-supportive environment in which educators can use to foster motivation to physical activity. This in turn has a major impact on wellness in that environment (Deci, 1971).

Self-Determination Theory and Exercise Behavior

Using SDT to help understand the causes for exercise participation is particularly interesting because it specifies the various reasons for and meanings of behavioral engagement and the resulting consequences of endorsing various motives concerning particular domains (Deci & Ryan, 1985, 2000). Basically, SDT suggests that human motivation changes to the degree in which it is autonomous (self-determined) or controlling (Edmunds, Ntoumanis, & Duda, 2006). Seen early on as being extremely valuable in the explanation of exercise motivational behavior, SDT and its potential has gained support and praise over time (Hagger & Chatzisarantis, 2007). Self-Determination Theory has a proven, lengthy track record describing motivation in exercise and sport outcome, especially in relation to behavior. In the future, knowledge gained from studying exercise behavior and SDT could help physical educators better understand the significance of recommending different regulatory styles in the exercise

context thereby helping improve pedagogical design of college physical activity courses (Wilson, Rodgers, Blanchard, & Gessell, 2003).

This study involved using SDT to create an environment in which motivation would hopefully be increased from pre- to post-test. The researcher aimed to structure a learning environment of autonomy, competence and relatedness for the students via lesson plans administered by the class instructor.

Physical education weight training classes have a high attendance rate at many universities (Gao, 2008) and weight lifting itself is a very popular physical activity among college students (Suminski et al., 2002). Therefore, a beginning weight training class, at a university was chosen as the context for this study.

College physical activity courses offer an excellent platform in which to use SDT as an intervention and fits well with pedagogy. Teaching styles are malleable. Therefore it is important to educate PE teachers about fulfilling students' basic psychological needs. This is accomplished by giving opportunities for choice and input, understanding the students' perspective, creating/demonstrating peer learning groups and supporting cooperation. Then teachers can help create PE classes in motivationally adaptive ways. Not all students will be interested in all activities so the teacher could use autonomy-supportive methods such as (1) offering rationale as to the importance of performing an activity (e.g. health benefits), (2) allowing the students' to express feelings and perspective about an activity, and (3) using language that expresses choice, not control (e.g. "you may want to", as opposed to "you have to"; Ntoumanis & Standage, 2009).

The purpose of this study was to change pedagogical strategy to reflect self-determination theory in order to determine the effects on an individual's motivation to exercise. Specifically, the study explored the effects of a teaching methodology utilizing

SDT on reported levels of self-determination and exercise motivation among the participants. This study contained two hypotheses. $H_{1:}$ Students in the experimental group would demonstrate a significantly greater increase in self-determination as measured by the relative autonomy index (RAI) as measured by the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) than students in the control group, and $H_{2:}$ Students in the experimental group would demonstrate a significantly greater increase in autonomy, relatedness, and competence related to exercise as measured by the Basic Psychological Needs in Exercise Scale (BPNES) than students in the control group.

Methods

This study utilized a quantitative methodology involving quasi-experimental research to examine college students' motivations to be physically active before and after a physical education class using perspectives of self-determination theory. A nonequivalent control group, pretest-posttest design was used.

Participants

Participants were undergraduate students enrolled at a university in the southeast United States. Physical activity courses are not required of all students at this university. All procedures were approved by the institutional review board at the university and all participants were informed of the purpose and possible risks involved in this study before data collection, prior to consenting. There were 71 participants originally; however two failed to list identification information (making it impossible to connect pre and post data) leaving 69 (30 females, 39 males) participants with complete data. Participants were between the ages of 18 and 31 years of age (M= 21.15, SD= 2.47). Thirty-six students were in the control group and 33 were in the experimental group. Two classes were taught during each 8-week period (two 8-week periods for a total of four classes)

with one class in each period being randomly designated as the control group and the other as the experimental group.

Instrumentation

Basic demographic data was collected from each participant including date of birth, age, and sex. This study involved two primary instruments: Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) and Basic Psychological Needs in Exercise Scale (BPNES). The Learning Climate Questionnaire (LCQ) was used post-study as a manipulation check.

Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2). The BREQ-2 (Markland & Tobin 2004; Mullan, Markland, & Ingledew, 1997) is a 19-item questionnaire which employs a 5-point Likert scale (0 = 'not true for me,' 4 = 'very true for me,') to measure levels of self-determination to be physically active. This instrument has become one of the most frequently used measures concerning the field of exercise psychology research (BREQ-2, 2008). Integrated regulation is not assessed because in the developing stages of the BREQ-2 researchers discovered it was impossible to distinguish empirically between integration and identified regulation on one hand as well as intrinsic regulation on the other hand (Markland & Tobin, 2004). Measures of amotivation were originally included but later taken away because of high skewness as well as a restricted response range in the development sample. The BREQ-2 is the modified version of the original, which includes measures of amotivation responses ("I don't see why I should have to exercise") as the researchers found that with more general samples amotivation might well be an issue worth exploring. Subscales can be studied individually or combined into one measure—the Relative Autonomy Index (RAI). The RAI lists an index of the degree to which the responding subjects feel self-determined.

The RAI uses the following formula: 2(intrinsic motivation) + identified regulation – introjected regulation – 2(external regulation). When using the BREQ-2 as a multidimensional instrument separate scores are used for each subscale. Scoring is done by performing a simple calculation of the mean scores for each set of the following question numbers: Amotivation [5, 9, 12, 19], External regulation [1, 6, 11, 16], Introjected regulation [2, 7, 13], Identified regulation [3, 8, 14, 17], and Intrinsic regulation [4, 10, 15, 18]. Markland and Tobin (2004) stated that with the BREQ-2 the amotivation items were still skewed, but confirmatory factor analysis using the Satorra-Benter (1994) scaling correction to x^2 showed an excellent model fit (Satorra-Bentler Scaled Chi Square = 136.49, df = 125, p = .23; CFI = .95; RMSEA = .02, 90% CI = .00 - .04; SRMR = .05). Markland and Tobin (2004) stated Cronbach's alpha reliabilities for the BREQ-2 are as follows for each subscale: .83 for amotivation, .79 for external regulation, .80 for introjected regulation, .73 for identified regulation and .86 for intrinsic regulation.

The Basic Psychological Needs in Exercise Scale (BPNES). The BPNES (Vlachopoulos & Michailidou, 2006) is an 11-item, domain-specific, self-report instrument rated on a 5-point Likert scale (1= "I don't agree at all," 2 = "I agree a little bit," 3 = "I agree somewhat," 4 = "I agree a lot," 5 = "I completely agree,") used to measure perceptions of the basic psychological needs of Self-Determination Theory of autonomy (e. g., "The way I exercise is in agreement with my choices and interests"), competence ("I feel I perform successfully the activities of my exercise program"), and relatedness ("My relationships with the people I exercise with are close") (Deci & Ryan, 2000) in relation to exercise. Autonomy is measured via questions 2, 5, 8 and 11; competence is measured via questions 1, 3, 6 and 9, and relatedness is measured via

questions 4, 7 and 10. Vlachopoulos and Michailidou (2006) attempted to validate the psychometric properties of the instrument and stated that results demonstrated an adequate factor structure, internal consistency, generalizability of the factor dimensionality across the calibration and the validation samples, discriminant validity and predictive validity along with acceptable stability of the BPNES scores over four weeks of a conducted study. In the instrument validation study, Cronbach's alpha values were .84 for autonomy, .81 for competence, and .92 for relatedness. Factor loadings ranged from .60 to .86 for autonomy, from .59 to .78 for competence, and from .80 to .91 for relatedness. All correlation values were significant ($p < .05$, $N = 508$) except for the first competence item. The instrument scale scores were found to be largely unaffected by socially desirable responding and specifically the tendency for impression management (Vlachopoulos & Michailidou, 2006).

The Learning Climate Questionnaire (LCQ). The LCQ (Williams & Deci, 1996) is a 15-item questionnaire used to carry out a manipulation check. This instrument assesses the perceptions of individuals about the degree to which a particular social context is autonomy supportive versus controlling (Williams & Deci, 1996). This study used the LCQ to assess the students' perceptions of the instructor's level of autonomy-supportive behavior. The LCQ was adapted by Williams and Deci (1996) from the Health-Care Climate Questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996). Questions are answered on a 7-point Likert scale ranging from a 1 of "Strongly Disagree" to a 7 of "Strongly Agree," about the degree to which their instructor supports their autonomy (e.g., "My instructor listens to how I would like to do things"). The LCQ has a single underlying factor with high internal consistency with an alpha of 0.93 (Black & Deci, 2000), and the score for leader autonomy support is the sum of the 15 items.

Across domains, the alpha coefficient of internal consistently is usually above 0.90 (Black & Deci, 2000).

Manipulation Check

The LCQ (used a manipulation check, post-treatment) demonstrated a Cronbach's alpha of .95. According to Williams and Deci (1996), the LCQ has a high internal consistency. Items on the LCQ were measured on a seven-point scale. Per the instrument's instructions, item 13 was reversed before any calculations. First, responses to each question were averaged together for each respondent. Then, an overall mean was computed for each group by averaging together those means for each respondent. The mean for the control group was 6.07 and 6.42 for the experimental group. Higher average scores represent a higher level of perceived autonomy support. An independent t-test was computed to test for a statistically significant difference, $t(68) = 1.327$, $p = .189$. Therefore, there was no statistically significant difference in perceived autonomy support between the groups during post-testing.

Intervention

The instructor aimed to create a need supportive environment in the experimental group. The instructor used basic psychological needs (competence, autonomy and relatedness) behavior intervention to increase exercise motivation to the students. This was performed via instructional methods made by the researcher. Each lesson plan included a psychomotor objective (improving motor skill), cognitive objective (learning facts about weight training), and affective objective (interaction with others). Examples of lessons plans include explaining how weight training is beneficial, basic weight training language and protocol, and basic nutrition concerning weight training.

Technique of exercise was thoroughly discussed in a detailed manner with questions being taken and answered.

In the experimental group the psychological need of autonomy was enhanced by the students being offered choices: (1) in different weight training programs (beginner, intermediate, advanced), (2) the ability to change exercises within the program, and (3) having the freedom to choose a weight training partner. The psychological need of relatedness was enhanced by (1) contact time with the exercise instructor, (2) being allowed to choose a workout partner (also fostering autonomy) and (3) contact time with other students in the class. Students in the control group were taught in normal classroom environment (less autonomous). They were assigned a workout partner and an exercise program and were not allowed to switch exercises, programs or partners during the 8-week program

Procedures

Subjects were informed of the risks of participation in the study and asked to sign an informed consent form before the intervention. Then, all consenting participants were first asked to fill out the pre-measure consisting of demographic information and the BREQ-2. Participation in this study was voluntary and those not wishing to fill out questionnaires, the general information form, and the informed consent were free not to participate. Two classes were taught during each 8-week session with one randomly being designated as the control group and the other as the experimental group. Before the study began, the instructor was trained via the researcher on the essential aspects of SDT and how to apply them pedagogically. Each week the instructor administered lesson plans (in both experimental and control groups) with a psychomotor objective (e.g., becoming more skilled at exercise technique), cognitive objective (e.g., learning about

weight training injuries), and affective objectives (e.g., interacting with others). During the last class of each session students were again asked to fill out the BREQ-2, the BPNES and only post-study, the LCQ.

Data Analysis

The first hypothesis stated "students in the experimental group will demonstrate a significantly greater increase in self-determination as measured by the relative autonomy index (RAI) as measured by the BREQ-2 than students in the control group." The reliability of the following subscales were adequate for research purposes at .70 or higher including: amotivation .764, external regulation .734, introjected regulation .794, and intrinsic regulation .860. Identified regulation showed a low Cronbach's alpha of .276. Therefore, the researcher chose not to use identified regulation. The independent variable was teaching strategy while the dependent variables were amotivation, external regulation, introjected regulation and intrinsic regulation. A mixed-design MANOVA was conducted where the subscores (amotivation, external regulation, introjected regulation, intrinsic regulation) both pre and post were the within factor and treatment group was the between factor. By using this statistical testing, the differences in means among the two factors of treatment (control and experimental) and time (pre and post) were assessed.

The second hypothesis stated, "students in the experimental group will demonstrate a significantly greater increase in autonomy, relatedness, and competence related to exercise as measured by the BPNES than students in the control group." The reliability of the following subscales was adequate for research purposes at .70 or higher including: autonomy .766, competence .799 and relatedness .841. The second hypothesis was also tested using a mixed-design MANOVA.

Results

H_1: A mixed-design MANOVA revealed the four subscales (amotivation, external regulation, introjected regulation, intrinsic regulation) varied statistically significantly between groups, with the experimental group outscoring the control group in all subscales (amotivation, external regulation, introjected regulation and intrinsic regulation). There was not a statistically significant interaction of group and time, Hotelling's Trace = .029, $F(4,62) = .446$, $p = .775$. There was a significant group effect (Hotelling's Trace = .173, $F(4,62) = 2.682$, $p = .04$) and a significant time effect, Hotelling's Trace = .223, $F(4,62) = 3.461$, $p = .013$. There was an increase in all four sub-scales between the pre and post tests for both the control and treatment groups. The experimental group was higher than the control in intrinsic regulation, introjected regulation, and external regulation while (as expected) being lower in amotivation. These means and standard deviations for the four subscales are presented in Table 2.

The independent variable was teaching strategy while the dependent variables were amotivation, external regulation, introjected regulation and intrinsic regulation. Box's test did show that the variances of the two treatment groups on the dependent measures were not equal. However, due to comparable sample sizes of the treatment groups, the MANOVA should be robust to this violation of the assumption of homogeneity of variance (Hair et al., 2006).

Table 2

Means and Standard Deviations for Amotivation, External, Introjected, Identified and Intrinsic Regulation

Variable	Group	Pre-test		Post-test	
		Mean	SD	Mean	SD
Amotivation	Control	.21	.34	.43	.75
	Experimental	.05	.16	.13	.29
External Regulation	Control	.43	.52	.68	.90
	Experimental	.49	.53	.59	.66
Introjected Regulation	Control	1.91	1.13	2.11	1.27
	Experimental	1.97	1.13	2.18	1.13
Identified Regulation	Control	2.93	.72	3.16	.62
	Experimental	3.12	.66	3.25	.57
Intrinsic Regulation	Control	2.85	.77	3.07	.80
	Experimental	3.27	.67	3.42	.60

Note. n = 34 for Control & n = 33 for Experimental. 0 = 'Not true for me' while 4 = 'Very true for me.'

H_2: The independent variable was teaching strategy while the dependent, repeated (pre and post), variables were autonomy, competence, and relatedness. The alpha level was set at .05. Box's test showed no issue with equality of variances.

There was not a statistically significant interaction, Hotelling's Trace = 0.06, $F(3,63) = 1.376$, $p = .258$. The results of the mixed-design MANOVA showed that there was a statistically significant difference between groups, Hotelling's Trace = 0.16,

$F(3,63) = 3.36$, $p = .024$ and time, Hotelling's Trace = .592, $F(3,63) = 12.424$, $p < .001$. Autonomy, competence and relatedness significantly increased between pre and posttest with both control and experimental groups. The experimental group was significantly higher in autonomy, competence and relatedness than the control group. The means and standard deviations for autonomy, competence, and relatedness are presented in Table 3.

Table 3

Means and Standard Deviations for Autonomy, Competence, and Relatedness

Variable	Group	Pre-test		Post-test	
		Mean	SD	Mean	SD
Autonomy	Control	3.79[a]	.81	4.30[c]	.59
	Experimental	4.30[b]	.61	4.57[c]	.42
Competence	Control	3.67[a]	.95	4.28[c]	.66
	Experimental	4.04[b]	.56	4.36[c]	.45
Relatedness	Control	3.68[a]	.98	4.12[c]	.71
	Experimental	4.13[b]	.73	4.52[c]	.55

Note. N = 34 for Control & N = 33 for Experimental. Means with different letters are significantly different (p <.05).

Discussion

The first hypothesis states, "students in the experimental group will demonstrate a significantly greater increase in self-determination as measured by the relative autonomy index (RAI) as measured by the BREQ-2 than students in the control group." After data collection was completed, however, statistical analyses showed a Cronbach's alpha of .276 for the subscale of identified regulation, which is needed to use RAI to test self-determination. Therefore, the subscale of identified regulation was dismissed while the

remaining subscales were assessed separately in order to acquire more specific insight into each variable collected. These subscales were amotivation, external regulation, introjected regulation, and intrinsic regulation. The researcher expected students in the experimental group to demonstrate a decrease in amotivation and external regulation while experiencing an increase in introjected regulation and intrinsic regulation. Amotivation represents the least amount of self-determination. External regulation is the least self-determined form of extrinsic motivation. The treatment was expected to diminish amotivation and regulation; however, it did not. Introjected regulation and intrinsic regulation were expected to increase due to treatment and they did. The treatment elicited in the study was expected to cause a decrease in amotivation and external regulation via attempts to increase student levels of competence, autonomy and relatedness.

The LCQ was used as a manipulation check and showed students not to perceive a difference in treatment between the control and experimental groups. This is the primary reason the hypothesis was non-confirmed. The treatment was simply not strong enough to elicit a significant change between the control and experimental groups.

Other possibilities exist as to why amotivation and external regulation did not decrease with the treatment. Mathematically, the subscales of the BREQ-2 are orthogonal; in other words, they are unrelated to one another and hence can vary independently. The data show that the intervention group may have increased their scores for fun, enjoyment, and pleasure but also increased their scores for not seeing why they should exercise. Possibly, they had a good time but came out of the intervention less convinced about why they were doing the weight training. The data collected could also be anomalous and not truly represent the real effects of the weight training program.

Other possible reasons for amotivation and external regulation increasing include that people report greater amotivation when the days get shorter and it starts getting cold outside (data was collected in a fall semester) (Ntoumanis, Pensgaard, Martin & Pipe, 2004). The BREQ-2 used in this study included measures of amotivation because developers Markland and Tobin (2004) thought amotivation might be an issue worth exploring. Researchers Shen, Wingert, Li, Sun, and Rukavina (2010) stated amotivation in physical education is multidimensional and may emanate from several different sources. Deci and Ryan (2000) state that the process of integration is important in the maintenance of adaptive behavioral engagement, which occurs when individuals start to assimilate, reconstitute, and internalize more extrinsic reasons for engaging in physical activity and then become more self-determined which takes time. Although a lengthier treatment time (one full semester vs. the half semester used) may have caused an interaction not seen here (Daley & Duda, 2006), the lack of treatment effect was still the primary issue in this study. Participants did not perceive a difference in the classes (control vs. experimental). Not enough differences between the treatment of the control and experimental groups simply weakened the treatment effect.

The second hypothesis states, "students in the experimental group will demonstrate a significantly greater increase in autonomy, relatedness, and competence related to exercise as measured by the BPNES than students in the control group." The researcher expected autonomy, relatedness, and competence to rise in the experimental group (and they did), but these variables also rose in the control group. Autonomy, competence, and relatedness had a statistical increase from pre to post. The treatment group was higher than the control, but it should be noted that it was higher to begin with. The primary reason (as with the first hypothesis) was shown by the Learning Climate

Questionnaire. This instrument showed students not to perceive a difference in treatment between the control and experimental groups. The treatment was not strong enough to elicit a significant change between the control and experimental groups. Therefore, the hypothesis was non-confirmed.

In this study (in both control and experimental groups), autonomy may have risen because the students felt that they made the voluntary choice to take the class (HPR 101) in the first place. Simply completing the class may cause a person to feel better about themselves and thus more competent (able to complete a task), which leads to feelings of autonomy and self-control. Competence may have also risen because of the experience of weightlifting itself (Gao, 2008). Some or many of the students may not have ever participated in weightlifting before the class. If so, most had probably never been involved in professional instruction as in HPR 101. The half semester program of weightlifting being taught twice per week may have increased student's competence via both the instructor and other students (with prior experience/knowledge), transferring their knowledge in the program even in the control groups. As time is spent pursuing an activity, increases may occur in self-determination, competence and intrinsic motivation (Daley & Duda, 2006; LaGuardi & Ryan, 2002; Maltby & Day, 2001). Mazzetti et al. (2000) found that when athletes are supervised when trained (by a coach, trainer, partner, teacher), further strength gains are made which should foster competence. Knowing that the criterion for completion of the course has been met in and of itself may promote competence and autonomy. Relatedness was likely established thorough contact time with the instructor and other students in the class. Again, as with the first hypothesis, a lengthier treatment time (one full semester vs. the half semester used) may have caused an interaction not seen during this study (Daley & Duda, 2006). As with the first

hypothesis, though, the treatment was not strong enough as shown by the manipulation check, the LCQ. Participants did not perceive a variance in the classes (between control and experimental groups). Not enough differences between the control and experimental groups simply weakened the treatment effect.

Conclusions and Future Directions

Although the hypotheses in this study were not confirmed, key information was obtained regarding motivation and physical education in a collegiate setting. Improvements (in self-determination) were made to both the control and experimental groups in self-determination during each of the two eight-week studies. There was a statistically significant difference seen in time as well as a significant difference between groups. There was, however, no interaction, suggesting structuring a stronger treatment in the experimental group may have produced a significant change not seen in this study.

While previous studies have shown an effect of SDT interventions in the physical education setting (Daley & Duda, 2006; Edmundset al., 2006; Ntoumanis & Standage, 2009), the present study did not. Pedagogy can be better structured to enhance the learning environment for students as they interact with peers and teachers (Ryan et al., 2009).

Taylor and Ntoumanis (2007) examined how teachers' choice of motivational strategies affects students' motivation in PE. A sample of 787 British PE students were taught by 51 PE teachers and multilevel modeling analyses showed that students' perceptions of teachers' use of autonomy support, structure, and involvement positively predicted the students' own autonomous motivation in PE, as mediated by satisfaction of autonomy and competence. This study also showed that teachers' perceptions of students' motivation was only moderately related to the students' own reports of their

motivation (Taylor, Ntoumanis, & Smith, 2009) and that the relationship between PE teachers' and students' reports of autonomy support, structure, and involvement possessed a small-to-moderate magnitude possibly explained by the teachers' teaching experience, social desirability bias, and/or teaching within a specific class. In comparison to what Taylor, Ntoumanis (and Smith) found, this study demonstrated students' perceptions of the pedagogical environment to be weak in comparison of the experimental to control group.

Implications for future studies include designing studies with a stronger treatment methodology between the control and experimental groups. The Learning Climate Questionnaire showed that students did not perceive the environments to be different between the control and experimental groups. Longer, more detailed lesson plans, more teacher to individual student interaction, and asking more questions of each student may promote a stronger treatment not seen in this study. Offering more choices, valuing the student's opinion, and establishing value in exercises many students may not initially find interesting are all important pedagogical strategies according to SDT. Finally, Dr. Ed Deci (2012) advised that when thinking of using SDT as a motivational methodology do not think of how to use the theory to influence individuals but rather how to structure the environment so individuals will motivate themselves.

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CHAPTER V

ARTICLE TWO

STRUCTURING PHYSICAL EDUCATION CLASSES USING SELF DETERMINATION THEORY

Abstract

Motivation is key to student participation and success in physical education. A primary theory used to explain learner motivation in physical education is Self-Determination Theory (SDT). Institutionalized education is and has been predominantly carried out in a controlling environment, which impedes motivation. Self-Determination Theory serves as a guide for pedagogy to enhance motivation by satisfying the basic human needs for competence, relatedness, and autonomy. By creating a less threatening environment for the student through the use of choices, improvement of skills, and fostering relationships with fellow students and teachers, motivation for physical activity can be increased. Self-Determination Theory works well with physical education pedagogy by offering a framework to foster student motivation. Lesson plans utilizing SDT principles and National Association for Sport and Physical Education (NASPE) standards are presented for three age groups. Physical education (PE) classes can be better structured to establish physical activity patterns to ensure a lifetime of physical activity.

Structuring Physical Education Classes Using Self-Determination Theory

School-based physical education provides a setting in which health, social and psychological gains associated with physical activity can be provided to a multitude of students. This provides an opportunity to establish health-related behaviors early in life with the hopes of maintaining these behaviors across the lifespan. Because the K12

schools provide a captive audience, physical education is the ideal setting to provide knowledge and skills needed to motivate students to be physically active for a lifetime.

Studies of physical activity have long examined physiological variables. The initiation and adherence of physical activity begins, however, with a behavioral change, which has led behavioral scientists to research what factors contribute to starting and maintaining regular physical activity. Numerous factors contribute to physical activity including social, environmental, cultural and psychological motivation. Motivation compels people to act, and, therefore, theories based on motivation can guide interventions to increase physical activity (Sun & Chen, 2010).

Self-Determination Theory

Self-Determination Theory (SDT; Deci & Ryan, 1985) is a theory of human motivation, development, and wellness, which suggests that human motivation changes based upon the extent to which it is autonomous (self-determined) or controlling. In relation to physical activity, people may be intrinsically and/or extrinsically motivated. SDT proposes that all people possess three innate psychological needs which foster self-motivation, and when these three needs are met, optimal growth and function occur. The need for competence, relatedness, and autonomy are three needs which must all be met to best offer self-motivation. The purpose of this article is to suggest how the principles of SDT can be integrated into a physical education classroom.

Self-Determination Theory as a Pedagogical Methodology

The basic psychological needs can be used to increase motivation in a pedagogical environment such as physical education. Competence is best described as the belief that one can be successful to accomplish the task at hand and affects physical self-worth and physical activity. Because students are more motivated to engage in

activities in which they can be successful, it is imperative to modify tasks so all students can demonstrate some form of competency. For example, students who are unable to successfully serve a volleyball over the net from the baseline could participate in a modified version of the task (e.g. serving from the middle of the court or lowering the net). Providing opportunities for success fosters the student's competency, leading to more self-determined behavior related to physical activity.

Relatedness describes feeling cared for, feeling for others, feeling understood, and having fun with others. Incorporating relatedness into a physical education class is easily accomplished by allowing students to choose a partner, which also strengthens a student's connection with the class itself. Quality contact time with the teacher and other students and being included in a group causes increased adherence compared to exercising alone (Dishman & Buckworth, 1996).

Autonomy is the freedom to choose a specific behavior or activity as well as the need to experience oneself as the originator of the action. People simply want to be in control of themselves rather than feeling as if they are being controlled from an outside source. Offering choices in a physical education class instills autonomy. For example, allowing students the freedom to choose a lesson on offensive free throwing skills or a defensive play such as zone defense in basketball can increase a student's sense of autonomy.

Motivation affects several variables of a student's decision to engage in physical activity such as effort, adherence, and even the type of activity selected. Human motivation can be visualized as flowing along a continuum with several forms of behavioral regulation, which vary in degrees of self-determination as related to physical activity (Deci & Ryan, 1985). Self-determination can be thought of as a viewpoint of

motivation within human beings who want to improve themselves by participating in things (driven by behaviors) they deem as important or meaningful for personal development. Human motivation differs in the degree from which it is autonomous (self-determined) or controlling. At the top of the list is intrinsic motivation which is the most self-determined behavioral regulation and describes pursuing a behavior for the sheer joy and pleasure of it, not for any external reward of any kind. Running for the fun, enjoyment, and satisfaction of running is an example of intrinsic motivation. Amotivation is the total opposite of intrinsic motivation and describes a lack of desire to perform an activity. In-between intrinsic motivation and amotivation (along the continuum) are four levels of extrinsic motivation.

Extrinsic motivation describes performing a behavior such as physical activity for some type of reward, which shows low self-determination. There are four levels of extrinsic motivation. First along the continuum of extrinsic motivation is external regulation. External regulation is the least self-determined and describes performing an action only because of external pressure or to obtain a reward. An example could be a student in a physical education running class who only shows effort to avoid punishment such as receiving a poor grade. The next step is introjected regulation, which involves performing a behavior because of ego, pride or to avoid guilt. A martial arts student who works hard and shows no fear in front of other students and/or the teacher may be motivated by introjected regulation. Identified regulation is another step toward intrinsic motivation and refers to a behavior that involves personal importance and conscious value. This is the first step of external motivation along the continuum evolving from an intrinsic choice. In a beginning weightlifting class, a student who works hard to get stronger to become fitter is an example. Lastly, and next to intrinsic motivation (but still

a part of extrinsic motivation) is integrated regulation which occurs because the behavior at hand has been fully assimilated to the self. This step differs from true intrinsic motivation in the fact that with integrated regulation the action is performed as a means to an end and not out of pure joy and fun, which describes intrinsic motivation. Exercising because a student believes in the health values of exercise that have been conveyed by a physical education class is an example of integrated regulation. Table 4 shows a schematic diagram of the SDT continuum.

Table 4

The Self-Determination Continuum Showing Types of Motivation with Their Regulatory Styles, Loci of Causality, and Corresponding Processes

Behavior	Nonself-Determined					Self-Determined
Motivation	Amotivation		Extrinsic Motivation			Intrinsic Motivation
Regulatory Styles	Non-Regulation	External Regulation	Introjected	Identified	Integrated	Intrinsic Regulation
Perceived Locus of Causality	*Impersonal*	*External*	*Somewhat External*	*Somewhat Internal*	*Internal*	*Internal*
Relevant Regulatory Processes	Nonintentional Nonvaluing Incompetence Lack of Control	Compliance External Rewards & Punishments	Self-Control Ego-Involvement, Internal Rewards & Valuing	Personal Importance, Conscious Valuing	Congruence, Awareness, Synthesis With Self	Interest Enjoyment Inherent Satisfaction

Note. Adapted from "The What and Why of Goal Pursuits: Human Needs and the Self-Determination of Behavior," by E. Deci and R. Ryan, 2000, *Psychological Inquiry*, 4, p. 237.

When planning physical education based upon SDT research, it is important to remember that all three psychological needs (competence, relatedness, autonomy) should be met at once to obtain the best behavioral engagement. Through careful design of lesson plans, physical educators can address the NASPE standards, as well as the elements of SDT (see Tables, 5, 6 and 7).

Table 5

Elementary School Lesson Plan

Task: Jumping a Long Rope

NASPE Standards: 1, 2, 3, 4, 5

Competence	Autonomy	Relatedness
Track number of consecutive jumps	Choosing your own goal for the types of jumps	Partner counts
Perform different types of jump	Each student can choose their own jumping pattern or style	Mirroring a partner
See how many successful jumps can be completed in a time frame	Each student can choose their own partner	Varying speed/cooperate with other thrower

Table 6

Secondary School Lesson Plan

Task: Basic Martial Arts

NASPE Standards: 1, 2, 3, 4, 5

Competence	Autonomy	Relatedness
Successfully complete basic kicks (front, rear, roundhouse)	Choose what technique to practice	Choose a practice partner
Successfully complete basic punches (reverse, palm heal, ridge-hand		Contact time with head instructor
Demonstrate basic fall ability		

Table 7

College Lesson Plan

Task: Basic Weight Training

NASPE Standards: 2, 5

Competence	Autonomy	Relatedness
Learn basic weight training terminology and protocol	Choose a partner	Interact with your partner
Learn safety tips concerning weight weight training	Choose your own workout plan (beginner, intermediate, advanced)	Contact time with the training instructor
Learn about the physical and mental benefits of weight training		

Lesson plans can easily be designed using principles of SDT. The basic psychological needs of autonomy, competence and relatedness can readily be put into any physical education lesson plan thereby enhancing student motivation and hopefully participation. Internalization is a pathway many physical education students take because many physical activities are not initially interesting or fun. SDT suggests, however, that motivation can change as time goes by, resulting in a higher level of self-determination and, thus, participation in physical activity. Practically, SDT allows physical educators to get students to go from a psychological state of *having to* to one of *wanting to* in relation to developing a physically active lifestyle (Sun & Chen, 2010).

Table 8

NASPE Standards

Standard	Characteristic
Standard 1	The physically literate individual demonstrates competency in a variety of motor skills and movement patterns.
Standard 2	The physically literate individual applies knowledge of concepts, principles, strategies and tactics related to movement/ performance
Standard 3	The physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness.
Standard 4	The physically literate individual exhibits responsible personal and social behavior that respects self and others.
Standard 5	The physically literate individual recognizes the value of physical activity for health, enjoyment, challenge, self-expression, and/or social interaction.

Note. Adapted from "Standards and Position Statements," by the National Association for Sport and Physical Education website 2014. http://www.aahperd.org/naspe/standards/nationalStandards/index.cfm

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APPENDIX A

IRB APPROVAL

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **12042402**
PROJECT TITLE: **Self-Determination Theory as a Pedagogical Foundation for Collegiate Physical Activity Courses**
PROJECT TYPE: **Dissertation**
RESEARCHER/S: **Scot Edward Long**
COLLEGE/DIVISION: **College of Health**
DEPARTMENT: **Human Performance & Recreation**
FUNDING AGENCY: **N/A**
IRB COMMITTEE ACTION: **Exempt Approval**
PERIOD OF PROJECT APPROVAL: **05/01/2012 to 04/30/2013**

Lawrence A. Hosman, Ph.D.
Institutional Review Board Chair

APPENDIX B

GENERAL INFORMATION FORM

Last 5 digits of your phone number_____

Date of Birth_____ Age_____ Sex_____

Are you currently participating in any form of exercise outside of this Course? Yes or No

Are you enrolled in any activity course this summer? Yes or No

Why did you choose to take this course?

1. **Interested in the topic**
2. **I was advised to**
3. **Need one more credit hour**
4. **Other_____**

APPENDIX C

EXERCISE REGULATIONS QUESTIONNAIRE (BREQ-2)

Age: _____ years **Sex: male female (please circle)**

Last 5 digits of your phone number_____

WHY DO YOU ENGAGE IN EXERCISE?

We are interested in the reasons underlying peoples' decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

	Not true for me		Sometimes true for me		Very true for me
1. I exercise because other people say I should	0	1	2	3	4
2. I feel guilty when I don't exercise	0	1	2	3	4
3. I value the benefits of exercise	0	1	2	3	4
4. I exercise because it's fun	0	1	2	3	4
5. I don't see why I should have to exercise	0	1	2	3	4
6. I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7. I feel ashamed when I miss an exercise session	0	1	2	3	4
8. It's important to me to exercise regularly	0	1	2	3	4

	Not true for me		Sometimes true for me		Very true for me
9. I can't see why I should bother exercising	0	1	2	3	4
10. I enjoy my exercise sessions	0	1	2	3	4
11. I exercise because others will not be pleased with me if I don't	0	1	2	3	4
12. I don't see the point in exercising	0	1	2	3	4
13. I feel like a failure when I haven't exercised in a while	0	1	2	3	4
14. I think it is important to make the effort to exercise regularly	0	1	2	3	4
15. I find exercise a pleasurable activity	0	1	2	3	4
16. I feel under pressure from my friends/family to exercise	0	1	2	3	4
17. I get restless if I don't exercise regularly	0	1	2	3	4
18. I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
19. I think exercise is a waste of time	0	1	2	3	4

APPENDIX D

THE BASIC PSYCHOLOGICAL NEEDS IN EXERCISE QUESTIONNAIRE (BPNES)

Instructions. The following sentences refer to your overall experiences in exercise as opposed to any particular situation. Using the 1-5 scale below, please indicate the extent to which you agree with these statements by circling one number for each statement.

Last 5 digits of your phone number_____

	I don't agree at all	I agree a little bit	I somewhat agree	I agree a lot	I completely agree
1. I feel I have made a lot of progress in relation to the goal I want to achieve.	1	2	3	4	5
2. The way I exercise is in agreement with my choices and interests.	1	2	3	4	5
3. I feel I perform successfully the activities of my exercise program.	1	2	3	4	5
4. My relationships with the people I exercise with are very friendly.	1	2	3	4	5
5. I feel the way I exercise is the way I want to.	1	2	3	4	5
6. I feel exercise is an activity which I do very well.	1	2	3	4	5
7. I feel I have excellent communication with the people I exercise with.	1	2	3	4	5
8. I feel that the way I exercise is a true expression of who I am.	1	2	3	4	5
9. I am able to meet the requirements of my exercise program.	1	2	3	4	5
10. My relationships with the people I exercise with are close.	1	2	3	4	5
11. I feel that I have the opportunity to make choices with regard to the way I exercise.	1	2	3	4	5

APPENDIX E

LEARNING CLIMATE QUESTIONNAIRE

Last 5 digits of your phone number_____

This questionnaire contains items that are related to your experience with your instructor in this class. Instructors have different styles in dealing with students, and we would like to know more about how you have felt about your encounters with your instructor. Your responses are confidential. Please be honest and candid.

Question	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
1. I feel that my instructor provides me choices and options.							
2. I feel understood by my instructor.							
3. I am able to be open with my instructor during class.							
4. My instructor conveyed confidence in my ability to do well in the course							
5. I feel that my instructor accepts me.							
6. My instructor made sure I really understood the goals of the course and what I need to do.							
7. My instructor encouraged me to ask questions.							
8. I feel a lot of trust in my instructor.							
9. My instructor answers my questions fully and carefully.							
10. My instructor listens to how I would like to do things.							

Question	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7
11. My instructor handles people's emotions very well.							
12. I feel that my instructor cares about me as a person.							
13. I don't feel very good about the way my instructor talks to me.							
14. My instructor tries to understand how I see things before suggesting a new way to do things.							
15. I feel able to share my feelings with my instructor.							

APPENDIX F

WEIGHT TRAINING LESSON PLANS

University of Southern Mississippi
Fall 2012
Scot E. Long

Weight Training Lesson Plan
Lesson 1 (Thursday, August 23)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Complete their first workout.
Cognitive Objective(s): Learn class rules, guidelines and benefits of weight training.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Introduce themselves	Introduce themselves			
Handout the syllabus	Listen and ask questions as appropriate			
Explain class rules, syllabus	Listen and ask questions as appropriate			
Explain how weight training is beneficial	Listen and ask questions as appropriate		Learn about the physical and mental benefits of weight training	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Ask students why they choose to take this class	Explain why they chose to take class	Fosters autonomy through choice to take said class		
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on	Start their warm-up			

treadmill, bike, etc..				
Ask students to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc..	Start their cool-down			

Explain How Weight Training is Beneficial

Contemporary society exists in a sedentary world. Humans do not have to use muscle power to accomplish daily tasks like plowing, building by hand or cutting trees with an axe as our ancestors did. Because of this hypokinetic (low-movement) lifestyle our bodies simply do not receive enough physical activity to stay strong and healthy. In other words, because of a current lack of physical activity humans now need to replace this lack of movement with structured exercise such as weight training to stay strong and healthy. No, you don't need to train like a bodybuilder (or look like one for that matter) but rather, to simply have adequate strength to accomplish daily tasks such as housework or sports like softball. The bonus is, weight training helps you become not only more fit but healthier as well.

Weight training burns calories which helps combat obesity, builds both muscle and bone strength and helps increase self-esteem through gains in strength and body appearance. Weight training can also help reduce injuries that might be caused by other sports and activities and despite a common myth—will not make you big, inflexible or bulky. As a person ages a process called 'sarcopenia' takes place whereby humans actually start to lose muscle tissue usually starting in the mid to late twenties. This may lead to chronic aches and pain and once easy tasks now become increasingly difficult. Scientifically, muscle tissue is muscle tissue and fat is fat, however, age, coupled with our sedentary lifestyle, causes humans to lose muscle and gain fat. This is not good for our fitness, health, self-esteem or ability to perform daily physical tasks.

In addition to the aforementioned variables, weight training can:

- Increase power (a 'quick' form of strength—like hitting a baseball)
- Increase muscular endurance (tennis, chopping wood, etc.)
- Improve balance

- Improve coordination
- Help decrease body fat (through building muscle which increases metabolism)
- Promote a feeling of well-being

Sandler, D. (2010). *Fundamental Weight Training. 102 Exercises to Start Training.*

Champaign, IL: Human Kinetics

Weight Training Lesson Plan
Lesson 2 (Tuesday, August 28)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more adept with their chosen protocol.
Cognitive Objective(s): Learn language, protocol and gym safety and how to warm-up and cool-down.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review benefits of weight training	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: Basic weight training language and protocol	Listen and ask questions as appropriate		Learn basic weight training terminology and protocol	
Explain gym safety	Listen and ask questions as appropriate		Learn safety tips concerning a weight training gym	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			

Ask students to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc..	Start their cool-down			

Basic Weight Training Language and Protocol

To be comfortable in a certain environment like a gym you must understand that environment. With weight training, understanding that environment starts with learning weight room language and protocol. Simply starting a weight training program at a gym is intimidating in-and-of itself and is high on the list of reasons as to why more people don't work out in a gym.

Clothing:

- Wear loose, comfortable clothing and definitely—**NO Sandals!** Wear shoes such as sneakers that cover your whole foot.
- Be cautious of wearing jewelry, especially rings which may pinch your fingers when lifting.
- Weight lifting gloves are not necessary unless you want to prevent calluses from forming.
- Avoid using wrist straps, weight belts (not necessary unless lifting VERY heavy) or knee wraps. They are not needed.

Gym Etiquette:

- Don't walk in front of someone who is lifting
- Give plenty of space to those around you
- Look around you before you grab something like a bar or plate so you won't run into someone
- Put your weights up after using them (rack them)—DO NOT leave them out for someone else to trip over or have to put up
- Clean up the equipment after you use it—no one wants to lie in your sweat on the bench press
- Share, help others (spot) and be polite. Let other people use the equipment. Don't be an equipment 'hog'

Weight Room Language:

- Reps and Sets: A rep is one individual movement of an exercise like an arm curl. A set is the collection of the reps. Such as 1 set of 10 reps on the leg press
- Load: The amount of weight you are using on the machine, dumbbells, etc.
- Rest: Amount of time in-between sets, usually about 30 seconds to 1 minute for beginners.
- Volume: Weight x reps x sets = volume
- Spot: Assisting another lifter

Sandler, D. (2010). *Fundamental Weight Training. 102 Exercises to Start Training.*

Champaign, IL: Human Kinetics

Weight Training Lesson Plan
Lesson 3 (Tuesday, September 4)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more adept with their chosen protocol.
Cognitive Objective(s): Learn differences between free weight and machines.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review previous lesson on basic weight training language and protocol	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: Types of resistance training	Listen and ask questions as appropriate		Learn types of resistance training such as machines and free weights—decide which is best for them individually	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			

Ask students to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc..	Start their cool-down			

Types of Resistance Training

Typically, when someone mentions weight training two types of this training come to mind—free weights or machines. These are the basic and traditional 'tools' of the weight training industry. While that is certainly still true, today many other types of resistance training can easily be found such as: Kettlebells, medicine balls, resistance bands, and using one's own bodyweight as resistance as with pull-ups or push-ups. There is no real right or wrong, it mainly depends upon your needs and what is available to you.

Types of Resistance	Pros	Cons
Free Weights	Develops balance & stability & offers a challenge	May require a partner and more skill
Machines	Easier to use, may use alone, great for rehab	May not be challenging enough, doesn't develop stabilizer muscles
Bands and tubes	Great for rehab, working out alone, can move in any direction, great for explosive movements	My not provide enough resistance, hard to measure the gains
Medicine ball	Adds variety, great for increasing range of motion, great for explosive training	Hard to control, can't isolate muscles, hard to measure the gains
Kettlebell	Excellent for rehab, working out alone, can move in many directions	Requires skill, may cause lost emphasis of exercise in trying to balance weight and move evenly
Body weight	Great for muscular endurance training, develops muscle completely along the entire strength curve	May not offer enough resistance, may provide too much resistance in some instances

Sandler, D. (2010). *Fundamental Weight Training. 102 Exercises to Start Training.*

Champaign, IL: Human Kinetics

Weight Training Lesson Plan
Lesson 4 (Tuesday, September 11)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more skilled at their routine.
Cognitive Objective(s): Learn proper warm-up/cool-down procedures and benefits.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review previous material on free weights and machines	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: How to perform a warm-up and cool-down and the benefits	Listen and ask questions as appropriate		Learn how to warm-up and cool-down and the benefits of doing so	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			
Ask student to start their workout	Begin their workout			

Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc.	Start their cool-down			

Warming-Up, Cooling-Down, and the Benefits

Warming-up before exercise and cooling-down afterwards carries big physical and psychological benefits. Physically, warming-up prepares the body for the physical task of weight training (or cardio) by increasing heart rate, increasing body core temperature, altering hormonal status thereby lessening the chance of injury. Psychologically, warming-up prepares the mind for the task at hand. Inversely, cooling-down lowers body temperature and heart rate in addition to returning the body's hormonal status to normal (homeostasis), easing the body out of a hard workout. Psychologically, cooling-down helps relax the mind after a workout.

A proper warm-up involves about 5 to 10 minutes of light to moderate cardio such as walking, biking, the treadmill or stationary bike. Start slow and go a little faster as the warm-up proceeds. A cool-down should begin fairly fast (walking, stationary bike, treadmill, etc.) and then slow down as the cool-down proceeds. Think of going up a staircase as a warm-up, walking across the stage as the actual workout (weight training) and then walking down the opposite end of the stage as the cool-down.

A warm-up will:

- Help prepare you both mentally and physically for the workout
- Help prevent injuries
- Help improve your performance

A cool-down will:

- Help ease you out of the workout both physically and mentally
- Aid in your recovery (physically) from the workout
- Perhaps lessen some potential soreness

Sandler, D. (2010). *Fundamental Weight Training. 102 Exercises to Start Training.* Champaign, IL: Human Kinetics

Weight Training Lesson Plan
Lesson 5 (Tuesday, September 18)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more skilled at their routine.
Cognitive Objective(s): Learn about basic nutrition as it relates to weight training.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review warming-up and cooling-down	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: Basic nutrition concerning weight training			Learn about basic nutrition as it applies to weight training	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			

Ask students to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc..	Start their cool-down			

Basic Nutrition Concerning Weight Training

Food fuels the body for exercise as well as helping the body recover from the exercise session itself. Weight training actually causes microtrauma to the muscle fibers of the body (which is necessary and good) and afterwards the body repairs itself to be stronger. This process utilizes nutrients in the form of fats, carbohydrates and protein such as bread, orange juice, beef and avocados. Without proper nutrition, you can neither make it through a demanding workout with enthusiasm and vigor, or properly repair the slight damage done to your muscles through the actual workout itself.

Before you exercise, a proper breakfast will work wonders to help you through your routine. If you weight train in the morning a good breakfast will help you be at your best for your exercise session. Some people can eat soon before a workout, others need to wait at least an hour or two after they eat before they can exercise. The usual recommendation is to eat an hour or two before you exercise. Orange juice, cereal, oatmeal, pancakes, eggs, toast and fruit are examples of breakfast foods which are healthy and helpful to exercise. Yogurt is also a healthy favorite among weightlifters as it tastes great, has lots of muscle-building protein, some energy in the form of carbohydrates and sometimes a little, if any fat. Yogurt also digests easily and quickly (unless you are lactose intolerant) and can usually be eaten with no complications right before you exercise.

After exercise, some people may need a light snack such as juice or fruit to replace calories lost during exercise and to help bring their blood sugar back up. Chocolate milk is also a favorite post-workout food after exercise be it weight training or cardio such as jogging. People vary in what they like, how soon before exercise and after they like to eat, as well as how much they eat. The typical weight training session burns

about 300 calories or so depending on your individual size and how long and intensely you worked out. Even if trying to lose weight (fat) please be aware that you need to eat before you work out, especially if the workout is in the morning and you have not eaten since the day before.

McArdle, W. D., Katch, F. I., & Katch, V. L. (2005). *Sports & exercise nutrition.* Baltimore, MD: Lippincott Williams & Wilkins.

Weight Training Lesson Plan
Lesson 6 (Tuesday, September 25)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more skilled at their routine.
Cognitive Objective(s): Learn about basic weight training injuries and what to do about them.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review nutrition tips from previous lesson	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: Basic weight training injuries and what to do about them	Listen and ask questions as appropriate		Learn about basic weight training injuries and what to do about them	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			

Ask student to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc.	Start their cool-down			

Weight Training Injuries

Most people do **not** get injured while weight training. With a proper warm-up, cool-down and with good instruction and technique the chance of injury is very small. Take it slow, don't attempt a lift you are not familiar with and don't attempt to lift more than you comfortably can. The usual rate of progression per week is 5%. In other words if last week you bench pressed 100 lbs. for say, 10 reps, try 105 lbs this week.

Many beginners do however, get sore. An extreme form of soreness is called DOMS which stands for Delayed Onset Muscle Soreness. Although some soreness is inevitable, if you don't try to lift too much or for too long you probably won't get DOMS. If you do encounter DOMS, a hot bath or shower may help and time will certainly lessen the pain. Usually DOMS occurs a day after your weight training session and then lessens two or three days after.

Joint injuries such as the knee, hip or shoulder do occur. The rotator cuff (shoulder) may become damaged from improper technique and/or too heavy a weight. The back can also be a source of pain as LBP (lower back pain) is now second only to headache as the number one cause of missed work, although proper weight training will help prevent this common problem. Years ago, before exercise science was as progressed as it is today, improper lifting such as pushing and pulling behind the head (shoulder press, military press) caused many rotator cuff problems.

Weight lifting is not checkers or chess—you can get injured. Just as with the stock market, with potential gain does come some risk. Today though, with advances in technique and instruction and with so many degreed professionals teaching, the chances are far less than just a few years ago. If you do experience an injury, please see a sports medicine professional like an ATC (Athletic Trainer Certified) or your family physician.

Baechle, T. R., & Earle, R. W. (2008). *Essentials of strength training and conditioning.* Champaign, IL: Human Kinetics.

Weight Training Lesson Plan
Lesson 7 (Tuesday, October 2)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more skilled at their routine.
Cognitive Objective(s): Learn about the various types of weight training.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review basic injuries	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: The basic 4 types of weight training: Olympic; Bodybuilding; Powerlifting; Weight Training for Fitness	Listen and ask questions as appropriate		Learn about the various types of weight training	
Ask students to choose a partner(s)	Choose a partner(s)	Choosing a partner(s) fosters autonomy		Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			

Ask student to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc.	Start their cool-down			

The Basic 4 Types of Weight Training

Just as a farm may have several different vehicles (tractor, truck, car) which individually serve different functions, different types of weight training serve different functions. The type of weight lifting most people at the YMCA or a typical health club perform is called weight training for general fitness. This involves lighter weight for higher reps (10 +) and light to medium-heavy weight. Generally, a mixture of machines and some free weights are used with light to moderate intensity levels.

Bodybuilding involves medium to heavy weights, very short rest periods (60 sec or less) and at least 4 sets per exercise. Many 'isolation' exercises are used involving many free weights with minimal machine usage. The intensity level is very high and in addition to weight training much cardio is performed along with a super-strict diet.

Powerlifting mainly involves three lifts: the bench press, the squat and the deadlift. Powerlifters typically lift very heavy weight for few reps (6 or less) with multiple sets of 3 or more. Powerlifters rest much longer between sets, sometimes 4 minutes or more and eat just about whatever they want. Powerlifters lift for performance while bodybuilders lift for cosmetic appearance—two totally different results and methods of training.

Finally, there are the very elite—the Olympic weightlifters. Two lifts are involved: the clean and jerk and the snatch. Both are very explosive (ballistic) lifts involving much strength, power and athleticism. These lifts are also excellent training for many sports requiring power such as martial arts, football and basketball. This is the type of weightlifting you see at the summer Olympics. Heavy weights (though usually not as heavy as powerlifters) are used with multiple sets and varying rest periods, though they

tend to be longer like powerlifters. Usually little (if any) cardio is performed as it may hurt performance just as with powerlifters.

Baechle, T. R., & Earle, R. W. (2008). *Essentials of strength training and conditioning.* Champaign, IL: Human Kinetics.

Weight Training Lesson Plan
Lesson 8 (Tuesday, October 9)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Become more skilled at their routine.
Cognitive Objective(s): Learn how to make a life-long program.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review previous lesson on types of weight training	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: The basics of a life-long weight training program	Listen and ask questions as appropriate		Learn how to make themselves a basic weight training program for life	
Ask students to choose a partner(s)	Choose a partner(s)			Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			

Ask student to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on treadmill, bike, etc.	Start their cool-down			

A Life-Long Weight Training Program

Now that you have begun a weight training program it is important to learn how to continue the hard work you have been performing after this class is over. The American College of Sports Medicine (ACSM) advises strength training just like they do aerobic exercise for a lifetime of fitness and health. The ACSM recommends weight training to take place two to three times per week throughout the lifetime of the individual. Fitness weight training is advisable utilizing about 8 exercises or so. Generally two to three sets of about 8-12 repetitions using exercises which cover the major muscle groups of the body such as the leg press, hamstring curls, lat-pulldown, chest press, and an abdominal and lower-back exercise.

From time to time you may want to vary your exercise routine by incorporating medicine balls, kettlebells, bands or body weight exercises into your routine for both fun and progression. A good personal trainer at your local gym could be of help, just be sure he or she is well-educated, experienced and has a solid reputation. Don't forget aerobic exercise, which is also important for heart-health and weight management. The ACSM recommends aerobic exercise three to five times a week for periods of 30 to 60 minutes each time. You can do cardio and weight training on the same or separate days and it really doesn't matter which you perform first. A typical weekly program may look as follows:

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Weights		Weights		Weights		
	Cardio		Cardio	Cardio	Cardio	

ACSM's Guidelines for Exercise Testing and Prescription (8th ed.). (2010). Baltimore, MD: Wolters Kluwer/Lippincott Williams & Wilkins.

Weight Training Lesson Plan
Lesson 9 (Spare Lesson—if needed)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____ Psychomotor Objective(s):
Perform advanced lower-body exercises.
Cognitive Objective(s): Learn the value of advanced lower-body exercises.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review previous lesson on types of weight training	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: Advanced lower-body exercises	Listen and ask questions as appropriate		Learn about advanced lower-body exercises	
Ask students to choose a partner(s)	Choose a partner(s)			Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			
Ask students to start their workout	Begin their workout			
Ask students to cool-down: 5-10 minutes around track, on	Start their cool-down			

treadmill, bike, etc..				

Advanced Lower-Body Exercises

It is not uncommon for a weight lifter to concentrate on their upper body, seldom, if ever, training their legs. Even in a so-called ‘upper-body’ sport movement like a golf swing, baseball bat swing or a punch in boxing, the lower body is utilized. The legs serve as a base and humans push hard through their legs to accomplish many of the aforementioned sport activities. Therefore, knowing a few advanced lower body exercises is valuable for those needing that extra ‘push’ as well as those wanting additional strength for lifting and carrying items on a daily basis.

The exercises we will look at are:

- The squat
- The step-up

The squat has often been called the greatest of all exercise because it works so much of the body and serves a very practical function—helping one rise from a seated or ‘squatted’ position. The squat works all four quad muscles as well as the glutes and hamstrings to a degree. It is also a big calorie burner and excellent for strengthening the legs for sports or everyday activities.

To begin go to a power or squat rack and set a 7 ft. Olympic bar across the rack with the desired weight or perhaps only the bar to learn with (the bar weighs 45 lbs by itself).

1. Step under the bar and place it across your upper back (NOT your neck!). Then slowly step backwards a step or two but stay in the rack for safety sake. Arch your lower back and keep your chest out while placing your feet about shoulder-width apart, toes slightly out.

2. Lower your body as if sitting down in a chair until the thighs are roughly parallel to the floor. Keep you abdominal muscles tight and try not let your knees go out past your toes. Keep your chin level and don't let your back (upper) become rounded (kyphosis).
3. Hold for about a 2-count at the bottom of the movement and thrust though your hips, legs and feet through the floor (so-to-speak) as you return to the top (standing erect) part of the exercise. Try not to lock your knees (keep them slightly bent at the top of the movement).

The step-up is excellent not only because it builds leg strength and burns many calories but because it requires very little equipment and requires no spotter.

1. Find a step-up bench or platform that when you place your foot on it your thigh is roughly parallel to the ground. Make sure your WHOLE foot (don't hang any part of your foot off the bench or platform) is on the surface of the bench or platform and step up using your leg on the platform—in other words, do NOT push up with your other leg.
2. Step all the way up and then back. Perform 10 reps with one leg BEFORE switching to the other.
3. As you step up with one leg bring the other knee up high (works hip flexors) as if performing a high knee strike in martial arts for added effect and intensity!

Sandler, D. (2010). *Fundamental Weight Training. 102 Exercises to Start Training.* Champaign, IL: Human Kinetics

Weight Training Lesson Plan
Lesson 10 (Spare Lesson—if needed)

Teacher _____ Date _____ Lesson Start Time:_____ End Time: _____

Psychomotor Objective(s): Perform advanced upper-body exercises.
Cognitive Objective(s): Learn the value of advanced lower-body exercises.
Affective Objective(s): Interact with their weight training partner(s).

The teacher will	The student will	Autonomy	Competence	Relatedness
Review previous lesson on types of weight training	Listen and ask questions as appropriate		Reviewing material previously learned increases knowledge and reinforces skills	
Introduce the lesson: Advanced upper-body exercises	Listen and ask questions as appropriate		Learn about advanced upper-body exercises	
Ask students to choose a partner(s)	Choose a partner(s)			Having a partner(s) fosters relatedness
Provide students with 3 workout plans: Beginner; Intermediate; Advanced	Listen and ask questions as appropriate	Choosing your own workout plan fosters autonomy		
Ask students to warm-up: 5-10 minutes around track, on treadmill, bike, etc..	Start their warm-up			
Ask students to start their workout	Begin their workout			
Ask students to cool-down: 5-	Start their cool-down			

10 minutes around track, on treadmill, bike, etc..				

Advanced Upper-Body Exercises

There are literally hundreds, if not thousands of upper body exercises. An exercise, however, should be functional (meaning it helps you in the real world—outside of the gym) in addition to making you look better. The close-grip bench press and standing hammer curls are two such exercises. These exercises will improve the muscular strength and muscular endurance of the arms (biceps and triceps) being very functional, helping you lift things and be more powerful in sports movements.

The close-grip bench press is excellent for developing the back of the upper arms—the triceps. This will greatly aid in pushing movements and make your arms look tight and toned.

1. To get started choose a flat bench press and a regular Olympic bar. You will use about the same form as a regular bench press as far as your positioning on the bench itself.
2. Grip the bar more narrowly than you would the traditional bench press. This means closer than shoulder-width. Some lifters actually place their hands about 3 thumb-lengths apart. Not too narrow though or you will have no balance.
3. Then take the bar from the rack and over the chest like you would a traditional bench press. Lower the weight and keep you elbows in (not flared out) and down to your chest.
4. Pause at the bottom for a count or two and then press upward. You do not have to lock the arms out.

Standing hammer (dumbbell) curls are another excellent upper body exercise for both developing toned arms and strong functional arms for work or play.

1. Select two dumbbells you can comfortably control (maybe 10-15 lbs) and remain standing.
2. Then raise BOTH dumbbells just off the hips and raise them (keep elbows by your side) to the top (biceps flexed) position and lower—but NOT all the way down until your arms are straight as this may hurt your elbows and take tension off the biceps.
3. It helps to keep your knees slightly bent when exercising in the standing position as this keeps blood flow to the brain (as military people about fainting when standing at attention) and it helps keep excessive stress off the lower back.

Sandler, D. (2010). *Fundamental Weight Training. 102 Exercises to Start Training.* Champaign, IL: Human Kinetics

Beginner Weight Training Workouts

- **All students** in HPR 101 (Weight Training) should begin with a 5 minute warm-up such as walking around the track, on a treadmill or bike and end like-wise—with a 5 minute cool-down. This is in accordance with ACSM (American College of Sports Medicine) guidelines.
- There are 16 workout days in this class, therefore 16 workouts. Each will be a total-body workout as this is appropriate for beginners.
- Each exercise (unless otherwise noted) should consist of 2 sets (in the beginning) to 3 sets of about 8-12 repetitions (up to 15 is fine though) as advised by the American College of Sports Medicine. A rest period of 2 to 3 minutes between sets is recommended but some may not want to wait that long between their sets.
- Go lighter instead of heavier when trying to choose a weight if you are uncertain!

Workout Protocol

3 separate workouts will be provided: Beginner, Intermediate or Advanced.

- Beginners have either never worked out with weights or are very new to weight training.
- Intermediates have 6 + months of training.
- Advanced participants have been lifting for at least one full year and feel confident in what they do.

Workout # 1, Thursday, August 23

1. Leg press: 2 sets of 8-12 reps
2. Leg curl (lying or seated): 2 sets of 8-12 reps
3. Lat-pulldowns: 2 sets of 8-12 reps
4. Chest-press machine: 2 sets of 8-12 reps
5. Abdominal machine: 2 sets of 15 reps
6. Lower back machine: 2 sets of 8-12 reps

Workout # 2, Tuesday, August 28

1. Leg extension: 2 sets of 8-12 reps
2. Lat-row machine: 2 sets of 8-12 reps
3. Chest press machine: 2 sets of 8-12 reps
4. Shoulder press machine: 2 sets of 8-12 reps
5. Abdominal machine: 2 sets of 15 reps
6. Lower back machine: 2 sets of 8-12 reps

Workout # 3, Thursday, August 30

1. Lat-row machine: 2 sets of 8-12 reps
2. Dumbbell bench press: 2 sets of 8-12 reps
3. Planks (front, R & L side): 2 sets of 10-15 seconds each
4. Step-ups: 2 sets of 10 reps each leg
5. Shoulder press machine: 2 sets of 8-12 reps
6. Lower back machine: 2 sets of 8-12 reps

Workout # 4, Tuesday, September 4

1. Lat-pulldowns: 2 sets of 8-12 reps
2. Dumbbell bench press: 2 sets of 8-12 reps
3. Leg press: 2 sets of 8-12 reps
4. Leg curl (lying or seated): 2 sets of 8-12 reps
5. Lower back machine: 2 sets of 8-12 reps
6. Abdominal machine: 2 sets of 812 reps

Workout # 5, Thursday, September 6

1. Step-ups: 2 sets of 15 reps
2. Leg extension: 3 sets of 8-12 reps
3. Chest press machine: 3 sets of 8-12 reps
4. Lat-row machine: 3 sets of 8-12 reps
5. Planks: (front, R & L side): 2 sets of 10-15 seconds each
6. Abdominal machine: 3 sets of 15 reps

Workout # 6, Tuesday, September 11

1. Leg press: 3 sets of 8-12 reps
2. Leg curls (lying or seated): 3 sets of 8-12 reps
3. Dumbbell bench press: 3 sets of 8-12 reps
4. Lat-pulldowns: 3 sets of 8-12 reps
5. Lower back machine: 3 sets of 8-12 reps
6. Abdominal machine: 3 sets of 15 reps

Workout # 7, Thursday, September 13

1. Lunges (walking): 2 sets of 10 reps (each foot)
2. Step-ups: 3 sets of 10 reps
3. Shoulder press machine: 3 sets of 8-12 reps
4. Lat-row machine: 3 sets of 8-12 reps
5. Barbell bench press: 3 sets of 10 reps
6. Planks: (front, R & L side): 3 sets of 10-15 seconds each

Workout # 8, Tuesday, September 18

1. Leg press: 3 sets of 8-15 reps
2. Leg curls (lying or seated): 3 sets of 8-15 reps
3. Dumbbell bench press: 3 sets of 8-12 reps
4. Lat-pulldowns: 3 sets of 8-15 reps
5. Lower back machine: 3 sets of 8-12 reps
6. Abdominal machine: 3 sets of 15 reps

Workout # 9, Thursday, September 20

1. Barbell bench press: 3 sets of 8-15 reps
2. Lat-rows: 3 sets of 8-15 reps
3. Planks: (front, R & L side): 3 sets of 10-15 seconds each
4. Step-ups: 3 sets of 10-15 reps
5. Leg press: 3 sets of 10-15 reps

6. Lower back machine: 3 sets of 10-15 reps
7. Shoulder press machine: 3 sets of 10-15 reps

Workout # 10, Tuesday, September 25

1. Leg curls (lying or seated): 3 sets of 8-15 reps
2. Leg extensions: 3 sets of 10-15 reps
3. Abdominal machine: 3 sets of 10-15 reps
4. Lower back machine: 3 sets of 10-15 reps
5. Dumbbell bench press: 3 sets of 10-15 reps
6. Lower back machine: 3 sets of 10-15 reps
7. Standing dumbbell shoulder press: 3 sets of 10 reps

Workout # 11, Thursday, September 27

1. Lunges (walking): 2 sets of 10 reps (each foot)
2. Step-ups: 3 sets of 10 reps
3. Shoulder press machine: 3 sets of 8-12 reps
4. Lat-row machine: 3 sets of 8-12 reps
5. Barbell bench press: 3 sets of 10 reps
6. Planks: (front, R & L side): 3 sets of 10-15 seconds each

Workout # 12, Tuesday, October 2

1. Leg press: 3 sets of 8-15 reps
2. Leg curls (lying or seated): 3 sets of 8-15 reps
3. Dumbbell bench press: 3 sets of 8-12 reps
4. Lat-pulldowns: 3 sets of 8-15 reps
5. Lower back machine: 3 sets of 8-12 reps
6. Abdominal machine: 3 sets of 15 reps

Workout # 13, Thursday, October 4

1. Barbell bench press: 3 sets of 8-15 reps
2. Lat-rows: 3 sets of 8-15 reps
3. Planks: (front, R & L side): 3 sets of 10-15 seconds each
4. Step-ups: 3 sets of 10-15 reps
5. Leg press: 3 sets of 10-15 reps
6. Lower back machine: 3 sets of 10-15 reps
7. Shoulder press machine: 3 sets of 10-15 reps

Workout # 14, Tuesday, October 9

1. Leg curls (lying or seated): 3 sets of 8-15 reps
2. Leg extensions: 3 sets of 10-15 reps
3. Abdominal machine: 3 sets of 10-15 reps
4. Lower back machine: 3 sets of 10-15 reps
5. Dumbbell bench press: 3 sets of 10-15 reps
6. Lower back machine: 3 sets of 10-15 reps
7. Standing dumbbell shoulder press: 3 sets of 10 reps

Workout # 15, Thursday, October 11 (FALL BREAK)

1. Barbell bench press: 3 sets of 8-15 reps
2. Lat-rows: 3 sets of 8-15 reps
3. Planks: (front, R & L side): 3 sets of 10-15 seconds each
4. Step-ups: 3 sets of 10-15 reps
5. Leg press: 3 sets of 10-15 reps
6. Lower back machine: 3 sets of 10-15 reps
7. Shoulder press machine: 3 sets of 10-15 reps

Workout #16, Tuesday, October 16

1. Leg curls (lying or seated): 3 sets of 8-15 reps
2. Leg extensions: 3 sets of 10-15 reps
3. Abdominal machine: 3 sets of 10-15 reps
4. Lower back machine: 3 sets of 10-15 reps
5. Dumbbell bench press: 3 sets of 10-15 reps
6. Lower back machine: 3 sets of 10-15 reps
7. Standing dumbbell shoulder press: 3 sets of 10 reps

ACSM's Guidelines for Exercise Testing and Prescription (8th ed.). (2010). Baltimore, MD: Wolters Kluwer/Lippincott Williams & Wilkins.

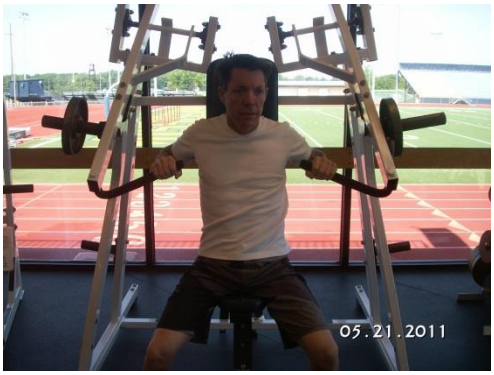
Beginner Weight Training Workout

Leg Press

Seated Leg Curl

Lying Leg Curl

Lat Pull-downs



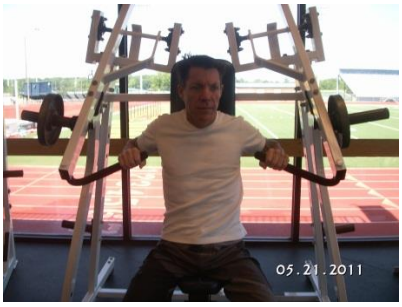
Chest Press Machine

Abdominal Machine

Lower Back Machine

Leg Extension

Lat Row Machine

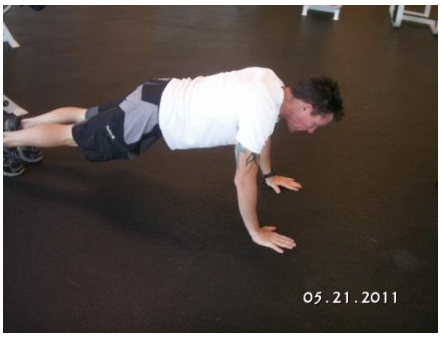


Chest Press Machine

Shoulder Press Machine

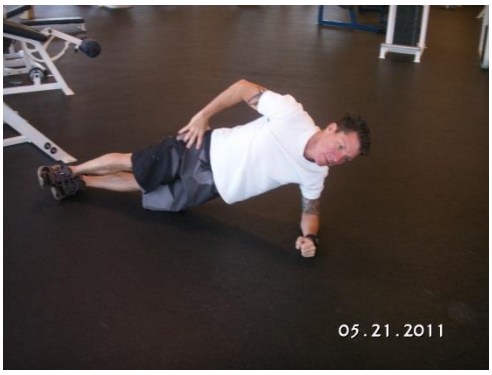
Abdominal Machine

Dumbbell Bench Press

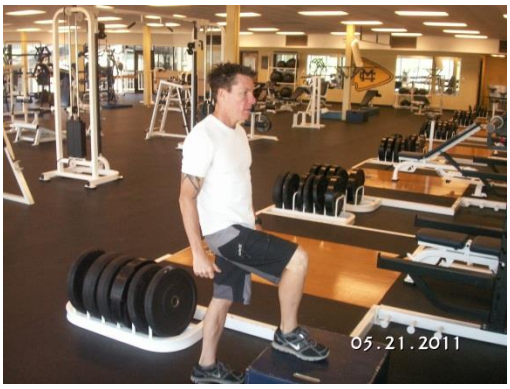


Plank (front)

Plank (right)



Plank (left)

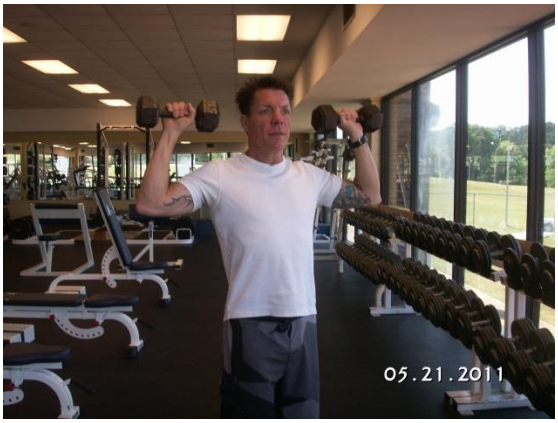


Step –Up (start)

Step-Up (finish)

Lunges

Barbell Bench Press



Standing Dumbbell Shoulder Press

Intermediate Weight Training Workouts

- **All students** in HPR 101 (Weight Training) should begin with a 5 minute warm-up such as walking around the track, on a treadmill or bike and end like-wise—with a 5 minute cool-down. This is in accordance with ACSM (American College of Sports Medicine) guidelines.
- There are 16 workout days in this class, therefore 16 workouts. Each exercise (unless otherwise noted) should consist of 3 sets of about 8-12 repetitions (up to 15 is fine though) as advised by the American College of Sports Medicine. A rest period between sets of 2 to 3 minutes is recommended but some may not want to wait that long between their sets.
- Go lighter instead of heavier when trying to choose a weight if you are uncertain!

Workout Protocol

3 separate workouts will be provided: Beginner, Intermediate or Advanced.

- Beginners have either never worked out with weights or are very new to weight training.
- Intermediates have 6 + months of training.
- Advanced participants have been lifting for at least one full year and feel confident in what they do.

Workout # 1, Thursday, August 23

1. Lat-pulldowns: 3 sets of 8-15 reps
2. Standing dumbbell concentration curls: 3 sets of 8-12 reps
3. Dumbbell bench press: 3 sets of 8-15 reps
4. Standing cable tricep pressdowns: 3 sets of 10-15 reps
5. Leg press: 3 sets of 10-15 reps
6. Leg curl (lying or seated): 3 sets of 10-15 reps
7. Planks (front, R & L): 3 sets each w/15 second hold
8. Lower back machine: 3 sets of 10-15 reps

Workout # 2, Tuesday, August 28

1. Dumbbell incline chest press: 3 sets of 8-15 reps
2. Dumbbell 1-arm rows: 3 sets of 8-12 reps
3. Standing barbell shoulder press: 3 sets of 8-12 reps
4. Standing dumbbell hammer curls: 3 sets of 10-15 reps
5. Standing cable tricep pressdowns: 3 sets of 10-15 reps
6. Step-ups: 3 sets of 10 reps (each leg)
7. Abdominal machine: 3 sets of 15 reps
8. Side-slides: 3 sets of 8-10 reps (each side—R & L)

Workout # 3, Thursday, August 30

1. Leg extensions: 3 sets of 10-15 reps
2. Lying leg curls: 3 sets of 10-15 reps
3. Leg press: sets of 10-15 reps

4. Standing barbell shoulder press: 3 sets of 10-15 reps
5. Side-slides: 3 sets of 8-10 reps (each side—R & L)
6. Standing abdominal cable crunch: 3 sets of 10-15 reps
7. Dumbbell 1-arm rows: 3 sets of 8-12 reps
8. Dumbbell bench press (flat): 3 sets of 10-15 reps

Workout # 4, Tuesday, September 4

1. Lower back machine: 3 sets of 10-15 reps
2. Planks (front, R & L): 3 sets each w/15 second hold
3. Standing dumbbell hammer curls: 3 sets of 10-15 reps
4. Standing cable tricep pressdowns: 3 sets of 10-15 reps
5. Step-ups: 3 sets of 10-12 reps (each leg)
6. Standing dumbbell shoulder press: 3 sets of 10-15 reps
7. Barbell bench press: 3 sets of 10-15 reps
8. Lat-pulldowns: 3 sets of 10-15 reps

Workout # 5, Thursday, September 6

1. Seated Russian twists (medicine ball or plate): 2 sets of 40 reps
2. Super man: 2 sets with a 15 second hold
3. Leg press: 3 sets of 10-15 reps
4. Lying leg curls: 3 sets of 10-15 reps
5. Incline barbell bench press: 3 sets of 8-12 reps
6. Lat row (horizontal): 3 sets of 8-12 reps
7. Standing cable-tricep pressdowns: 3 sets of 10-15 reps
8. Standing dumbbell Hammer curls: 3 sets of 10-15 reps

Workout # 6, Tuesday, September 11

1. Step-ups: 3 sets of 10-12 reps (each side—R & L)
2. Planks (front, R & L): 3 sets each w/15 second hold
3. Standing barbell shoulder press: 3 sets of 10-15 reps
4. Dumbbell chest press (flat): 3 sets of 10-15 reps
5. Dumbbell 1-arm rows: 3 sets of 8-12 reps
6. Side-slides: 3 sets of 8-10 reps (each side—R & L)
7. Standing dumbbell shoulder press: 3 sets of 8-12 reps
8. Super man: 3 sets with a 15 second hold

Workout # 7, Thursday, September 13

1. Lat-pulldowns: 3 sets of 8-15 reps
2. Dumbbell 1-arm rows: 3 sets of 8-12 reps
3. Barbell bench press: 3 sets of 8-12 reps
4. Dumbbell incline press: 3 sets of 8-12 reps
5. Standing Dumbbell shoulder press: 3 sets of 8-12 reps
6. Abdominal machine: 3 sets of 10-15 reps
7. Lower back machine: 3 sets of 8-12 reps
8. Side-slides: 3 sets of 8-10 reps (each side—R & L)

Workout # 8, Tuesday, September 18

1. Planks (front, R & L): 3 sets each w/15 second hold
2. Side-slides: 3 sets of 8-10 reps (each side—R & L)
3. Leg press: 3 sets of 10-15 reps
4. Lying leg curl: 3 sets of 10- 15 reps
5. Leg extensions: 3 sets of 10-15 reps
6. Standing dumbbell hammer curls: 3 sets of 10-15 reps
7. Standing cable-tricep pressdowns: 3 sets of 10-15 reps
8. Standing dumbbell shrugs: 3 sets of 10 reps

Workout # 9, Thursday, September 20

1. Step-ups: 3 sets of 10-12 reps (each side—R & L)
2. Leg extensions: 3 sets of 10-12 reps
3. Leg press: 3 sets of 10-15 reps
4. Standing dumbbell concentration curls: 3 sets of 10-15 reps
5. Standing (overhead) tricep cable presses: 3 sets of 10-15 reps
6. Standing dumbbell shoulder presses: 3 sets of 10-15 reps
7. Standing dumbbell shrugs: 3 sets of 10 reps
8. Side-slides: 3 sets of 8-10 reps (each side—R & L)

Workout # 10, Tuesday, September 25

1. Planks (front, R & L): 3 sets each w/15 second hold
2. Side-slides: 3 sets of 8-10 reps (each side—R & L)
3. Super man: 3 sets with a 15 second hold
4. Lat-pulldowns: 3 sets of 8-15 reps
5. Dumbbell 1-arm rows: 3 sets of 8-12 reps
6. Barbell bench press: 3 sets of 8-12 reps
7. Dumbbell incline press: 3 sets of 8-12 reps
8. Standing dumbbell shoulder presses: 3 sets of 10-15 reps

Workout # 11, Thursday, September 27

1. Lower back machine: 3 sets of 10-15 reps
2. Planks (front, R & L): 3 sets each w/15 second hold
3. Standing dumbbell hammer curls: 3 sets of 10-15 reps
4. Standing cable tricep pressdowns: 3 sets of 10-15 reps
5. Step-ups: 3 sets of 10-12 reps (each leg)
6. Standing dumbbell shoulder press: 3 sets of 10-15 reps
7. Barbell bench press: 3 sets of 10-15 reps
8. Lat-pulldowns: 3 sets of 10-15 reps

Workout # 12, Tuesday, October 2

1. Step-ups: 3 sets of 10-12 reps (each side—R & L)
2. Planks (front, R & L): 3 sets each w/15 second hold
3. Standing barbell shoulder press: 3 sets of 10-15 reps
4. Dumbbell chest press (flat): 3 sets of 10-15 reps
5. Dumbbell 1-arm rows: 3 sets of 8-12 reps

6. Side-slides: 3 sets of 8-10 reps (each side—R & L)
7. Standing dumbbell shoulder press: 3 sets of 8-12 reps
8. Super man: 3 sets with a 15 second hold

Workout # 13, Thursday, October 4

1. Planks (front, R & L): 3 sets each w/15 second hold
2. Side-slides: 3 sets of 8-10 reps (each side—R & L)
3. Leg press: 3 sets of 10-15 reps
4. Lying leg curl: 3 sets of 10- 15 reps
5. Leg extensions: 3 sets of 10-15 reps
6. Standing dumbbell hammer curls: 3 sets of 10-15 reps
7. Standing cable-tricep pressdowns: 3 sets of 10-15 reps
8. Standing dumbbell shrugs: 3 sets of 10 reps

Workout # 14, Tuesday, October 9

1. Lower back machine: 3 sets of 10-15 reps
2. Planks (front, R & L): 3 sets each w/15 second hold
3. Standing dumbbell hammer curls: 3 sets of 10-15 reps
4. Standing cable tricep pressdowns: 3 sets of 10-15 reps
5. Step-ups: 3 sets of 10-12 reps (each leg)
6. Standing dumbbell shoulder press: 3 sets of 10-15 reps
7. Barbell bench press: 3 sets of 10-15 reps
8. Lat-pulldowns: 3 sets of 10-15 reps

Workout #15, Thursday, October 11 (FALL BREAK)

1. Step-ups: 3 sets of 10-12 reps (each side—R & L)
2. Planks (front, R & L): 3 sets each w/15 second hold
3. Standing barbell shoulder press: 3 sets of 10-15 reps
4. Dumbbell chest press (flat): 3 sets of 10-15 reps
5. Dumbbell 1-arm rows: 3 sets of 8-12 reps
6. Side-slides: 3 sets of 8-10 reps (each side—R & L)
7. Standing dumbbell shoulder press: 3 sets of 8-12 reps
8. Super man: 3 sets with a 15 second hold

Workout # 16, Tuesday, October 16

1. Lat-pulldowns: 3 sets of 8-15 reps
2. Dumbbell 1-arm rows: 3 sets of 8-12 reps
3. Barbell bench press: 3 sets of 8-12 reps
4. Dumbbell incline press: 3 sets of 8-12 reps
5. Standing Dumbbell shoulder press: 3 sets of 8-12 reps
6. Abdominal machine: 3 sets of 10-15 reps
7. Lower back machine: 3 sets of 8-12 reps
8. Side-slides: 3 sets of 8-10 reps (each side—R & L)

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Intermediate Weight Training Workout

Lat Pull-Downs

Standing Dumbbell Concentration Curls

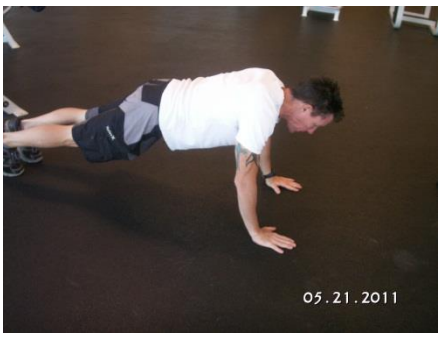
Dumbbell Bench Press

Standing Triceps Cable Press-down

Leg Press

Seated Leg Curl

Lying Leg Curl



Plank (front)

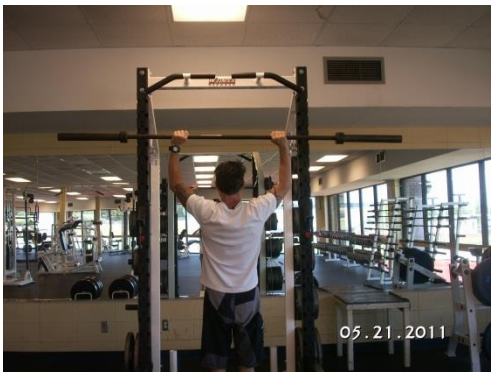
Plank (right)

Plank (left)

Lower Back Machine

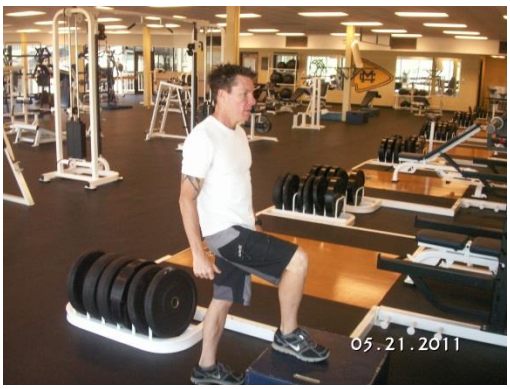
Dumbbell Incline Bench Press

Dumbbell 1-Arm Rows



Standing Barbell Shoulder Press

Standing Dumbbell Hammer Curls



Step-Ups (start)

Step-Ups (finish)

Abdominal Machine

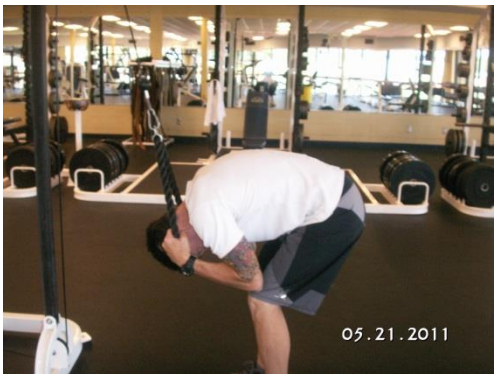
Side-Slide (start) 1

Side-Slide: 2

Side-Slide: 3

Leg Extension

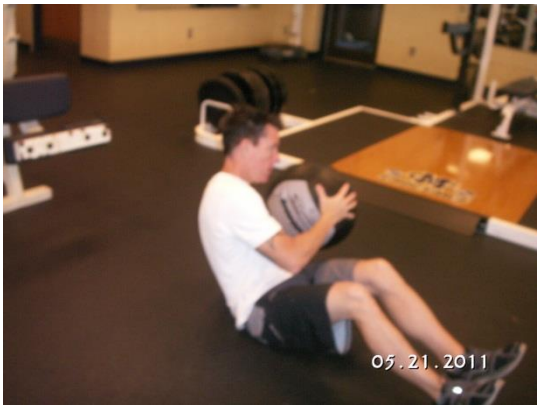
Standing Abdominal Cable Crunch (start)



Standing Abdominal Cable Crunch (finish)

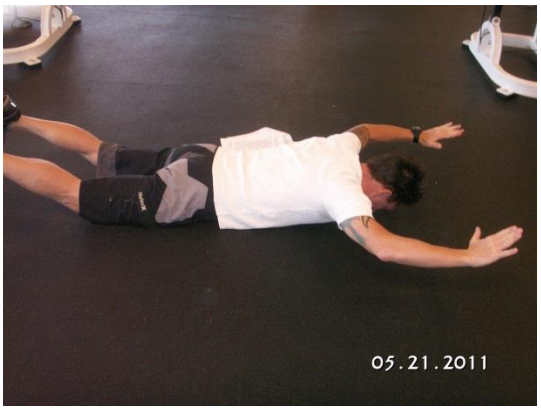
Standing Dumbbell Hammer Curls

Standing Dumbbell Shoulder Press



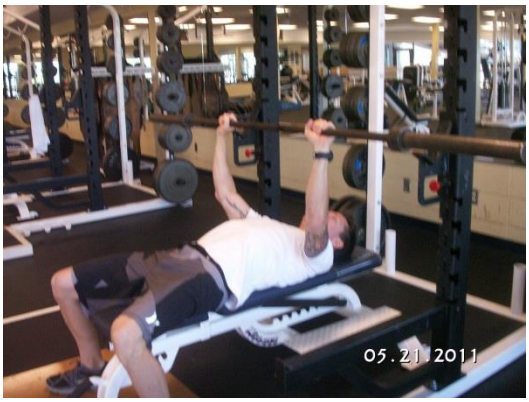
Russian Ab-Twists (medicine ball)

Russian Ab-Twists (plate)



Superman

Lat Row (horizontal)



Barbell Bench Press

Standing Dumbbell Shoulder Shrugs

Advanced Weight Training Workouts

- **All students** in HPR 101 (Weight Training) should begin with a 5 minute warm-up such as walking around the track, on a treadmill or bike and end like-wise—with a 5 minute cool-down. This is in accordance with ACSM (American College of Sports Medicine) guidelines.
- There are 16 workout days in this class, therefore 16 workouts. Each exercise (unless otherwise noted) should consist of 3 sets of about 8-12 repetitions (up to 15 is fine though) as advised by the American College of Sports Medicine. A rest period of 2 to 3 minutes between sets is recommended but some may not want to wait that long between their sets. These workouts involve upper body one workout, and lower the next, which is appropriate for advanced lifters. It is *assumed* that advanced lifters attempting this program will have at least one year's weight training behind them and that they are fit enough and experienced to attempt these lifts.
- Advanced lifters often *PYRAMID* their lifts meaning they increase the weight and decrease the reps as the sets go on. For example for squats: 1st set 135 lbs x 15 reps; 2nd set 180 lbs x 12 reps; 3rd set 225 lbs x 8-10 reps, etc.
- Go lighter instead of heavier when trying to choose a weight if you are uncertain!

Workout Protocol

3 separate workouts will be provided: Beginner, Intermediate or Advanced.

- Beginners have either never worked out with weights or are very new to weight training.
- Intermediates have 6 + months of training.
- Advanced participants have been lifting for at least one full year and feel confident in what they do.

Workout # 1, Thursday, August 23

1. Squats: 3 sets (15, 12, 10 reps)
2. Leg press: 3 sets (15, 12, 10 reps)
3. Lying leg curls: 3 sets (15, 12, 10 reps)
4. Calf raises: 3 sets (15, 12, 10 reps)
5. Russian ab twists: 3 sets (70, 60, 50 reps)
6. Side-slides: 3 sets (15, 12, 10 reps)
7. Standing barbell shoulder press: 3 sets (15, 12, 10 reps)
8. Standing barbell shrugs: 3 sets (12, 10, 8 reps)
9. Standing barbell curls: 3 sets (15, 12, 10 reps)

Workout # 2, Tuesday, August 28

1. Barbell bench press: 3 sets (15, 12, 10 reps)
2. Incline dumbbell bench press: 3 sets (15, 12, 10 reps)
3. Lat-pulldowns: 3 sets (15, 12, 10 reps)
4. 1-arm dumbbell rows: 3 sets (15, 12, 10 reps)

5. Tricep skull-crushers: 3 sets (15, 12, 10 reps)
6. Planks (front, R & L): 3 sets each w/20 second hold
7. Standing abdominal cable crunch: 3 sets of 10-15 reps
8. Lower back machine: 3 sets of 10-15 reps
9. Calf raises: 3 sets (15, 12, 10 reps)

Workout # 3, Thursday, August 30

1. Deadlifts: 3 sets (15, 12, 10 reps)
2. Stiff-legged deadlifts: 3 sets (15, 12, 10 reps)
3. Calf raises: 3 sets (15, 12, 10 reps)
4. Leg extensions: 3 sets (15, 12, 10 reps)
5. Russian ab twists: 3 sets (70, 50, 60 reps)
6. Side-slides: 3 sets (15, 12, 10 reps)
7. Standing dumbbell shoulder press: 3 sets (15, 12, 10 reps)
8. Standing barbell shrugs: 3 sets (15, 12, 10 reps)
9. Standing barbell curls: 3 sets (15, 12, 10 reps)
10.

Workout # 4, Tuesday, September 4

1. Yates rows: 3 sets (15, 12, 10 reps)
2. 1-arm dumbbell rows: 3 sets (15, 12, 10 reps)
3. Dumbbell flat bench press: 3 sets (15, 12, 10 reps)
4. Incline barbell bench press: 3 sets (15, 12, 10 reps)
5. Close-grip bench press: 3 sets (15, 12, 10 reps)
6. Calf raises: 3 sets (15, 12, 10 reps)
7. Superman: 3 sets with a 20 second hold each time
8. Standing abdominal cable crunch: 3 sets of 10-15 reps
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 5, Thursday, September 6

1. Leg extensions: 3 sets (15, 12, 10 reps)
2. Lying leg curls: 3 sets (15, 12, 10 reps)
3. Leg press: 3 sets (15, 12, 10 reps)
4. Calf raises: 3 sets (15, 12, 10 reps)
5. Standing dumbbell concentration curls: 3 sets (15, 12, 10 reps)
6. Standing dumbbell Arnold presses: 3 sets (15, 12, 10 reps)
7. Standing barbell shrugs: 3 sets (15, 12, 10 reps)
8. Planks (front, R & L): 3 sets each w/20 second hold
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 6, Tuesday, September 11

1. Standing abdominal cable crunch: 3 sets of 10-15 reps
2. Lower back machine: 3 sets of 10-15 reps
3. Calf raises: 3 sets (15, 12, 10 reps)
4. Horizontal rows: 3 sets (15, 12, 10 reps)
5. Lat-pulldowns: 3 sets (15, 12, 10 reps)
6. Incline dumbbell bench press: 3 sets (15, 12, 10 reps)

7. Decline barbell bench press: 3 sets (15, 12, 10 reps)
8. Cable tricep pressdowns: 3 sets (15, 12, 10 reps)
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 7, Thursday, September 13

1. Squats: 3 sets (15, 12, 10 reps)
2. Leg press: 3 sets (15, 12, 10 reps)
3. Lying leg curls: 3 sets (15, 12, 10 reps)
4. Calf raises: 3 sets (15, 12, 10 reps)
5. Standing barbell curls: 3 sets (15, 12, 10 reps)
6. Standing dumbbell shoulder presses: 3 sets (15, 12, 10 reps)
7. Russian ab twists: 3 sets (70, 50, 60 reps)
8. Planks (front, R & L): 3 sets each w/20 second hold
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 8, Tuesday, September 18

1. Yates rows: 3 sets (15, 12, 10 reps)
2. 1-arm dumbbell rows: 3 sets (15, 12, 10 reps)
3. Dumbbell flat bench press: 3 sets (15, 12, 10 reps)
4. Incline barbell bench press: 3 sets (15, 12, 10 reps)
5. Tricep skull-crushers: 3 sets (15, 12, 10 reps)
6. Standing abdominal cable crunch: 3 sets of 10-15 reps
7. Lower back machine: 3 sets of 10-15 reps
8. Side-slides: 3 sets (15, 12, 10 reps)
9. Calf raises: 3 sets (15, 12, 10 reps)

Workout # 9, Thursday, September 20

1. Deadlifts: 3 sets (15, 12, 10 reps)
2. Stiff-legged deadlifts: 3 sets (15, 12, 10 reps)
3. Calf raises: 3 sets (15, 12, 10 reps)
4. Leg extensions: 3 sets (15, 12, 10 reps)
5. Standing dumbbell curls: 3 sets (15, 12, 10 reps)
6. Standing dumbbell Arnold presses: 3 sets (15, 12, 10 reps)
7. Russian ab twists: 3 sets (70, 50, 60 reps)
8. Planks (front, R & L): 3 sets each w/20 second hold
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 10, Tuesday, September 25

1. Horizontal rows: 3 sets (15, 12, 10 reps)
2. Lat-pulldowns: 3 sets (15, 12, 10 reps)
3. Incline dumbbell bench press: 3 sets (15, 12, 10 reps)
4. Decline barbell bench press: 3 sets (15, 12, 10 reps)
5. Close-grip bench press: 3 sets (15, 12, 10 reps)
6. Calf raises: 3 sets (15, 12, 10 reps)
7. Standing abdominal cable crunch: 3 sets of 10-15 reps
8. Lower back machine: 3 sets of 10-15 reps

9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 11, Thursday, September 27

1. Yates rows: 3 sets (15, 12, 10 reps)
2. 1-arm dumbbell rows: 3 sets (15, 12, 10 reps)
3. Dumbbell flat bench press: 3 sets (15, 12, 10 reps)
4. Incline barbell bench press: 3 sets (15, 12, 10 reps)
5. Tricep skull-crushers: 3 sets (15, 12, 10 reps)
6. Standing abdominal cable crunch: 3 sets of 10-15 reps
7. Lower back machine: 3 sets of 10-15 reps
8. Side-slides: 3 sets (15, 12, 10 reps)
9. Calf raises: 3 sets (15, 12, 10 reps)

Workout # 12, Tuesday, October 2

1. Deadlifts: 3 sets (15, 12, 10 reps)
2. Stiff-legged deadlifts: 3 sets (15, 12, 10 reps)
3. Calf raises: 3 sets (15, 12, 10 reps)
4. Leg extensions: 3 sets (15, 12, 10 reps)
5. Standing dumbbell curls: 3 sets (15, 12, 10 reps)
6. Standing dumbbell Arnold presses: 3 sets (15, 12, 10 reps)
7. Russian ab twists: 3 sets (70, 50, 60 reps)
8. Planks (front, R & L): 3 sets each w/20 second hold
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 13, Thursday, October 4

1. Horizontal rows: 3 sets (15, 12, 10 reps)
2. Lat-pulldowns: 3 sets (15, 12, 10 reps)
3. Incline dumbbell bench press: 3 sets (15, 12, 10 reps)
4. Decline barbell bench press: 3 sets (15, 12, 10 reps)
5. Close-grip bench press: 3 sets (15, 12, 10 reps)
6. Calf raises: 3 sets (15, 12, 10 reps)
7. Standing abdominal cable crunch: 3 sets of 10-15 reps
8. Lower back machine: 3 sets of 10-15 reps
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 14, Tuesday, October 9

1. Squats: 3 sets (15, 12, 10 reps)
2. Leg press: 3 sets (15, 12, 10 reps)
3. Lying leg curls: 3 sets (15, 12, 10 reps)
4. Calf raises: 3 sets (15, 12, 10 reps)
5. Standing barbell curls: 3 sets (15, 12, 10 reps)
6. Standing dumbbell shoulder presses: 3 sets (15, 12, 10 reps)
7. Russian ab twists: 3 sets (70, 50, 60 reps)
8. Planks (front, R & L): 3 sets each w/20 second hold
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout #15, Thursday, October 11 (FALL BREAK)

1. Standing abdominal cable crunch: 3 sets of 10-15 reps
2. Lower back machine: 3 sets of 10-15 reps
3. Calf raises: 3 sets (15, 12, 10 reps)
4. Horizontal rows: 3 sets (15, 12, 10 reps)
5. Lat-pulldowns: 3 sets (15, 12, 10 reps)
6. Incline dumbbell bench press: 3 sets (15, 12, 10 reps)
7. Decline barbell bench press: 3 sets (15, 12, 10 reps)
8. Cable tricep pressdowns: 3 sets (15, 12, 10 reps)
9. Side-slides: 3 sets (15, 12, 10 reps)

Workout # 16, Tuesday, October 16

1. Deadlifts: 3 sets (15, 12, 10 reps)
2. Stiff-legged deadlifts: 3 sets (15, 12, 10 reps)
3. Calf raises: 3 sets (15, 12, 10 reps)
4. Leg extensions: 3 sets (15, 12, 10 reps)
5. Standing dumbbell curls: 3 sets (15, 12, 10 reps)
6. Standing dumbbell Arnold presses: 3 sets (15, 12, 10 reps)
7. Russian ab twists: 3 sets (70, 50, 60 reps)
8. Planks (front, R & L): 3 sets each w/20 second hold
9. Side-slides: 3 sets (15, 12, 10 reps)

ACSM's Guidelines for Exercise Testing and Prescription (8th ed.). (2010). Baltimore, MD: Wolters Kluwer/Lippincott Williams & Wilkins.

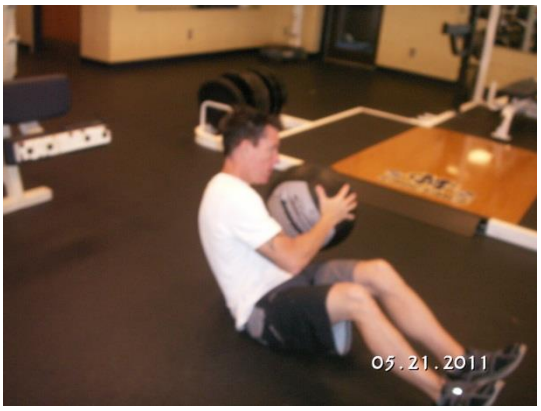
Advanced Weight Training Workout

Squats

Leg Press

Lying Leg Curls

Calf Raises



Russian Ab-Twist (medicine ball)

Russian Ab-Twist (plate)

Side-Slide (start) 1

Side-Slide: 2

Side-Slide: 3

Standing Barbell Shoulder Press

Standing Barbell Shrugs

Standing Barbell Curls

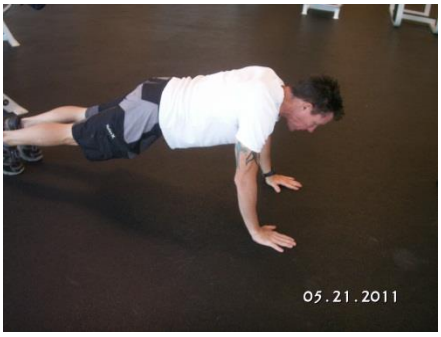
Bench Press (barbell)

Incline Dumbbell Bench Press

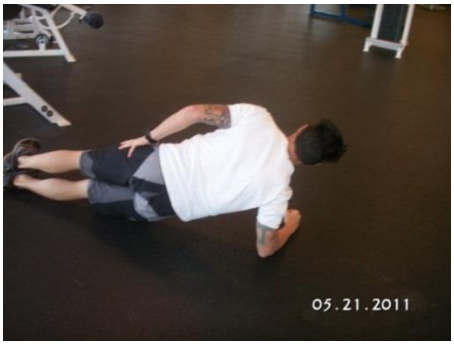
Lat Pull-Downs

1-Arm Dumbbell Rows

Tricep Skull-Crushers



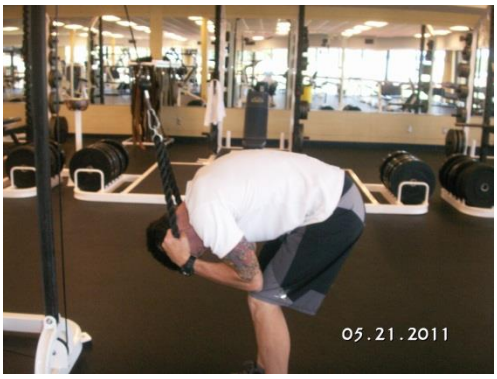
Plank (front)



Plank (right)

Plank (left)

Standing Abdominal Cable-Crunch (start)



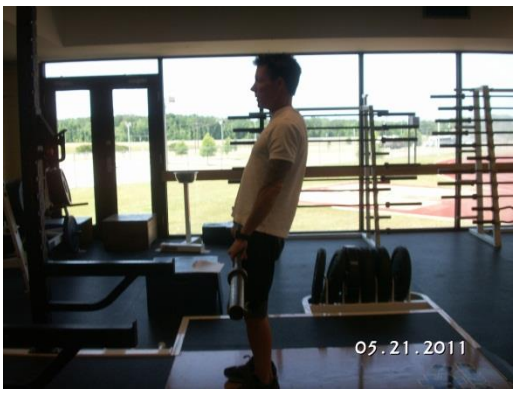
Standing Abdominal Cable-Crunch (finish)

Lower Back Machine

Calf Raise

Deadlift (start)

Deadlift (finish)



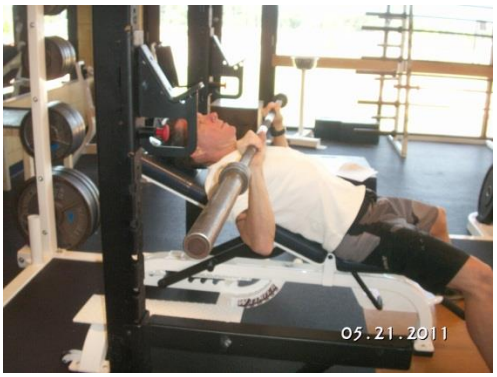
Stiff-Legged Deadlift

Stiff-Legged Deadlift

Yates Row (start)

Yates Row (finish)

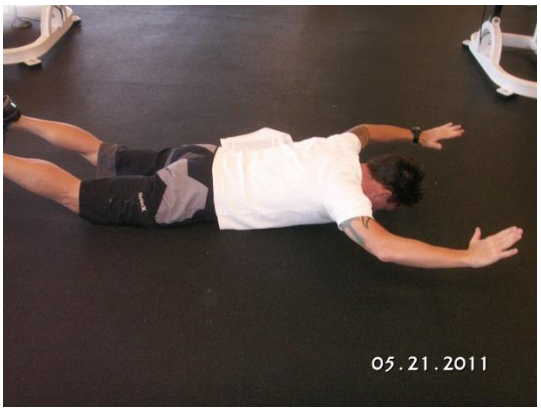
Dumbbell Flat Bench Press



Incline Barbell Bench Press

Close-Grip Bench Press

Close-Grip Bench Press



Superman

Standing Dumbbell Concentration Curls

Standing Arnold Presses

Standing Arnold Presses

Standing Barbell Shrug

Horizontal Rows

Decline Barbell Press

Cable Triceps Press-Down

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