1-1-2015

The role of self-regulation, self-efficacy, and outcome expectancy value on physical activity of former division I student athletes

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THE ROLE OF SELF-REGULATION, SELF-EFFICACY, AND OUTCOME EXPECTANCY VALUE ON PHYSICAL ACTIVITY OF FORMER DIVISION I STUDENT ATHLETES

A Dissertation Submitted to the Faculty of the Graduate School

at the University of Mississippi in Partial Fulfillment

of the Requirements for the

Degree Doctor of Philosophy

by

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Oxford, MS
2015

ABSTRACT

In an effort to acknowledge the needs of student athletes after college, the NCAA designed the Challenging Athletes Minds for Personal Success (CHAMPS) Life Skills program to assist student athletes with this transition. In this program personal development outside of occupational skills is often ignored. Though physical activity appears to be of little focus of the CHAMPS Life Skill program, recent research revealed that student athletes' physical activity patterns surpass those of their peers while in college but this difference is not maintained among alumni student athletes and their peers (Sorenson, 2012). Self-regulation interventions have successfully mediated and predicted physical activity in different populations including college students, adults, older adults and adolescents (Hallam & Petosa, 2004; Hortz & Petosa, 2008; Petosa et al., 2003; Stadler et al., 2009; Wadsworth & Hallam, 2010). Self-efficacy has routinely been found to be a predictor of physical activity in different populations (Anderson et al, 2006; Rovniak et al., 2002; Wadsworth & Hallam, 2010; Umstattd & Hallam, 2007). The purpose of this study was to examine self-regulation, self-efficacy, outcome expectancy values and physical activity of former student athletes. One hundred and twenty former student athletes completed the online questionnaire measuring the selected Social Cognitive Theory variables and self-reported physical activity. The questionnaire was designed to assess the selected SCT variables and physical activity. Mediation analysis was used to examine whether self-regulation mediated the relationship between self-efficacy, outcome expectancy value and physical activity. Baron and Kenny's (1986) approach to mediation analysis was used to examine

theoretically plausible effects consistent with mediation. The purpose for mediation in this study is to examine whether self-regulation and outcome expectancy value mediates the relationship between self-efficacy and physical activity. A mediating effect of self-regulation and outcome expectancy value was found. The mediating effect shows that there is a third variable contributing to the effect exercise self-efficacy has on physical activity. Though a mediating effect was found, forty five percent of participants did not meet the USDHHS and ACSM physical activity guidelines. The results from this study can be used to inform the development of physical activity programs that will facilitate participation in a physically active lifestyle for college student athletes beyond their college years. The results provide a good starting point for a better understanding a social cognitive perspective on explaining exercise behavior in former student athletes.

DEDICATION

This work is dedicated to the women whose shoulders I now stand upon, Ella B Scruggs, Bessie May Scruggs, Doris Davis, Lizzie Kate Tillman and Patricia Ann Armour.

ACKNOWLEDGEMENTS

I would like to thank my mentor, educational father and friend Dr. Jeff Hallam for his dedication to my graduate career and this document. I would like to also thank the other committee members Dr. Jay Garner, Dr. Allison Ford Wade and Dr. Melinda Valliant for their support during this process. I would also like to thank Sheryl Chatfield and Erin Griff for their assistance and support. Thanks to the University of Mississippi Athletic Department and Clay Cavett at the University of Mississippi Alumni Affairs. Thanks to everyone who helped along the way, you know who you are. Last but not least thank God from whom all blessings flow.

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CHAPTER I

INTRODUCTION

The collegiate athlete faces different challenges that non-athlete students. In particular, once student athletes' careers are completed they must transition from reliance on a structured physical training environment to self-management of physical activity. In the past most athletic support systems fail to consider the student athletes as they transitioned from the college environment. To address this issue the NCAA launched the Challenging Athletes Minds for Personal Success (CHAMPS) Life Skills program in 1994. The purpose of this program is to support student athlete's personal development and success within the university setting.

One of the aims of the CHAMPS Life Skills program is to use athletics as preparation for success in life. Another aim is to promote ownership by student-athletes of their academic, athletic, personal and social responsibilities. The CHAMPS Life Skills program has several commitment statements, one of which is a commitment to personal development. The personal development commitment is to support the development of a well-balanced lifestyle for student-athletes, encouraging emotional well-being, personal growth and decision-making skills.

Though it is not specifically listed in the NCAA CHAMPS/Life Skills program guide (NCAA, 2008), the researcher believes physical activity should be included in the personal development commitment. It is understood that a well-balanced lifestyle should include being physically active. Intercollegiate athletes participate in routine, organized training and are considered among the most active of regular exercisers during their collegiate athletic careers.

Studies have found NCAA athletes report higher health related quality of life (HRQL) compared to general population, except when injured (Sorenson, 2012).The benefits of physical activity participation extends beyond the college years. For example, Frisch, Albright, Albright, and Schiff (1986) found former female athletes' long-term athletic activity was associated with a significantly lower risk of diabetes. Frisch et al. (1985) found a relationship between physical activity and breast cancer. The former college student athletes in their study had lower risk of breast cancer than non-athletes and this remained at the 15 year follow up (Wyshak & Frisch, 2000). A Finnish study by Sarkna, Sahl, Koskenvuo, and Kario (1993) found that life expectancy on male elite athletes was significantly higher than the referent groups. Over sixty percent of the athletes in the group reported engaging in regular physical activity during their entire adult life while only fifteen percent of referent group had done so. The authors suggested the benefits incurred during competitive sporting were likely lost if continued physical activity ceased when once their career ended. Faulkner, Davis, Mendias, and Brooks (2008) reported that for elite athletes and the general population, age-related muscle atrophy begins about 50 years of age. Despite muscle mass loss, elite athletes who maintained an active lifestyle experienced more positive health outcomes while aging, although those who lapsed into inactivity regressed toward general population norms for fitness, weight control and health problems.

CHAMPS Life Skills programs present participating institutions an opportunity to address the physical activity patterns of student athletes. As of June 2008, 330 Division I institution were participating members of the program. However, the researcher did not discover any published research studies about the physical activity of student athletes.

Reifsteck (2013) conducted an online study of former NCAA Division I student athletes and their participation in physical activity. The study included 282 participants. The results

suggested that exercise identity and athletic identity were both positively related to physical activity in former student athletes. Reifsteck (2013) also found that while a large majority of sample reported regular physical activity for at least six months, approximately a quarter of participants reported being sedentary the past six months.

Sorenson (2012) conducted a study on current and former NCAA student athletes from September 2008 to November 2011 to assess holistic lifespan health and health-related quality of life (HRQL). The study included 496 students, student athletes, alumni student athletes and alumni aged 17-84 from a large NCAA Division I university. Sorenson used age and gender matched controls of non-athletes. Sorenson found that current student athletes reported substantially higher volumes of weekly exercise and perceived exercise importance when compared to their non-athlete peers. Yet no such difference was found between alumni student athletes and alumni non-student athletes. In fact, there was evidence of decreased exercise importance among alumni student athletes. Additionally, both younger and older alumni student athletes reported comparable volumes of weekly exercise compared to non-athletes.

Davis and Hallam (2012), in a pilot study, asked former female athletes about their current physical activity. The results show that of 113 females who completed the questionnaire, 55% of respondents met physical activity guidelines as set by the United States Department of Health and Human Services (USDHHS). Of the remaining 45%, roughly 30% did not report exercising in the last seven days. Approximately 15% of those who did not meet recommendations did participate in some physical activity. These results signal a need to understand how to increase the physical activity patterns of this group to meet recommendations.

Theory provides a structure for understanding health behavior across different situations and different populations (McKinnon, 1994). Theory also guides solid interventions by providing constructs that offer program developers target behaviors that led to desired outcomes. Theory based approaches allow for results that provide scientific evidence for the rejection the theory. During the literature review process, it was determined that self-efficacy, self-regulations and outcome expectancy value are Social Cognitive Theory (SCT) constructs are strongly related to physical activity and may effect physical activity/exercise when the variables are modifiable through intervention programming. More research is needed to determine how the selected Social Cognitive Theory variables might contribute to former female athletes maintaining physical activity outside of the structured collegiate environment.

The researcher believes that student athletes may not have sufficient cognitive behavioral skills to manage their physical activity after their collegiate careers. The NCAA, sports administrator, coaches and others are realizing a need for educational and vocational training for student athletes (Harrison & Lawrence, 2004). Yet, the need for self-regulatory skills as it pertains to physical activity after sport is ignored. Student athletes are "other-regulated" during their collegiate athletic career. Once the structure and resources are not available for the collegiate athlete, it is not clear whether student athlete possess adequate skills to participate in self-directed physically activity.

It is believed that involvement in high-level sports may aid the development of self-regulations skills (Jonker, Elferink-Gemser, & Visscher, 2010). Jonker et al. states athletes who compete on a high level are often familiar with goal-directedness and continuously work to improve their performances. This type of behavior is highly related to self-regulation. The current literature examining student athletes' self-regulation skills has focused on athletes' sports

performance (Sun & Wu, 2011; Williams, Donovan & Dodge, 2000; Anshel, & Porter). The results of Sorenson (2012) and Davis and Hallam (2012) show the physical activity patterns of former and current student athletes justifies a need to examine this phenomenon. This research assessed the self-regulation skills related to unstructured physical activity, exercise self-efficacy and the outcome expectancy values current student athletes. Currently no research exists on self-regulation, exercise self-efficacy and outcome expectancy values of student athletes as it pertains to leisure time physical activity.

Purpose of Study

The purpose of this project is to examine self-regulation, self-efficacy, outcome expectancy values and physical activity of former student athletes.

Hypotheses

The following null hypotheses will be tested:

Ho1: Self-efficacy will not be significantly related to total days of exercise.

Ho2: Self-efficacy will not be significantly related to self-regulation.

Ho3: Self-regulation will not be significantly related to total days of exercise.

Ho4: Self-regulation will not mediate the relationship between self-efficacy and total days of exercise.

Ho5: Self-efficacy will not be significantly related to outcome expectancy value.

Ho6: Outcome expectancy value will not be significantly related to total days of exercise.

Ho7: Outcome Expectancy value will not mediate the relationship between self-efficacy and total days of exercise.

The following alternative hypotheses will be considered:

Ha1: Self-efficacy will be significantly related to total days exercise.

Ha2: Self-efficacy will be significantly related to self-regulation.

Ha3: Self-regulation will be significantly related to total days exercise.

Ha4: Self-regulation will mediate the relationship between self-efficacy and total days exercise.

Ha5: Self-efficacy will be significantly related to outcome expectancy value.

Ha6: Outcome expectancy value will be significantly related to total days exercise.

Ha7: Outcome Expectancy value will mediate the relationship between self-efficacy and total days exercise.

Definitions

1. Self-regulation is defined as skills used to carry out exercise intentions and to overcome personal and situational barriers (Hallam & Petosa, 2004).
2. Exercise Self-efficacy is defined as one's perceived confidence to overcome barriers to exercise (Hallam & Petosa, 2004).
3. Outcome expectancy value is defined as the expected outcome of physical activity and the value placed on the outcomes related to physical activity. Outcome expectancy value is the product of outcome expectations and outcome expectancy score (Hallam & Petosa, 2004).
4. Total Days of Exercise is defined in two categories: exercise that is **not exhausting** (e.g. brisk walking, lifting weights, volleyball) or exercise where your **heart beat rapidly** (e.g. running, swimming, cycling). This instrument is found to valid and reliable (Petosa, 1985).
5. Physical Activity is any body movement produced by skeletal muscles that results in energy expenditure (Caspersen et al., 1986).
6. Exercise is a subset of physical activity that is planned, structured and repetitive and has an objective of improvement or maintenance of physical fitness (Caspersen et al., 1985).

Delimitations

The study was delimited to the following:

1. Participants must be former student athletes at NCAA Division I institutions.

Assumptions

The following assumptions apply to this study:

1. It is assumed that former student athletes who participate will reply to the questions honestly and to the best of their ability.

Significance of study

Currently approximately 160,000 student's athletes participate in Division I athletics at NCAA institutions each year. Davis and Hallam (2012) found that 45 % of the former athletes did not meet USDHHS exercise guidelines. Sorenson (2012) found the athletes decreased physical activity patterns after collegiate athletic careers were ended. The proposed research project was used to determine if student athletes possess the cognitive behavioral skills to maintain the physically active lifestyles they experience during college by measuring sociocognitive skills of former athletes. Research on athletes reveals continued physical activity upon the close of one's competitive career has physiological health benefits (Frisch et al., 1985, Frisch et al., 1986, Sarna et al., 1993, Wyshak & Frisch, 2000, Faulkner et al., 2008); it is important this population does not lose said benefits as a result of lack of knowledge or skill. Currently, no research exists on self-regulation, exercise self-efficacy and outcome expectancy values of current of former student athletes as it pertains to leisure time physical activity, thus it will make a substantive contribution to the research literature.

CHAPTER II

LITERATURE REVIEW

This chapter describes the benefits of being physically active and provides an overview of Social Cognitive Theory (SCT). The selected social cognitive variables for this project are briefly discussed followed by a review of the descriptive research. College students, adults, older adults and adolescents are the populations that are reviewed.

Physical Activity

It is documented that physical activity is essential in improving and maintaining health. There are numerous benefits of being physically fit as physical fitness reduces the likelihood of coronary heart disease, diabetes, and obesity (CDC, 2013). Consistent physical activity can assist in keeping one's cognition, learning and judgment skills sharp as they age. It can also reduce ones risk of depression and may assist with sleep (CDC, 2013). Despite the many benefits of physical activity many people lead sedentary lives. In spite of the intentions of those who attempt to be physically active regularly most quit their regimen after a short period of time (Bandura, 1997).

Bandura (1997) states people need a high level of self-regulatory efficacy and positive incentives to override the arduous aspects of being physically active. Unless the individual is highly self-disciplined, competing activities often intrude on time set aside for exercise. Self-regulation taxes adherence unless the activity is invested with personal value and becomes

ingrained as a part of one's lifestyle (Bandura, 1997). In order for people to alter their physical activity, they have to believe that they are capable of making exercise a regular habit.

Social Cognitive Theory

Social Cognitive Theory (SCT) incorporates both the psychosocial dynamics influencing health behavior and the methods of promoting behavior change (Baranowski, 1997). The theory postulates that the person, the environment, and the behavior of that person all influence each other. Within SCT, behavior is depicted as dynamic, depending on the environment and the person, all of which influence each other. This interaction is referred to as reciprocal determinism. SCT's major constructs, include, reciprocal determinism, self-efficacy, the environment, situation, behavioral capability, outcome expectancy values, observational learning, reinforcements, emotional coping responses and self-regulation/self-control.

Self-efficacy is defined as one's perceived confidence in performing a specific behavior. The environment is everything external to the person and may be physical or a cognitive representation. Behavioral capability refers to a person's knowledge and skills to perform a given behavior. Outcome expectancy values are the anticipated outcomes of a behavior and the value one places on a given outcome. Observational learning is the behavioral attainment that occurs by watching the actions of others this is also referred to as vicarious learning. Reinforcements is a behavioral response that increases or decreases the likelihood of a behavior reoccurring. Emotional coping responses are strategies used by a person to deal with emotional stimuli. Self-regulation is defined as the personal regulation of goal-directed behavior. The primary SCT construct this investigation will examine are self-regulation, outcome expectancy value and self-efficacy.

Self-Regulation

Self-regulation of health habits is an ongoing struggle involving the reciprocal interplay of personal, behavioral and situational influences (Bandura, 1997). Bandura states regardless of the behavior people go through stretches where they are good adherers, then experience relapses, and then redouble efforts to reinstate control. Often individuals lose confidence in their capabilities to restore or maintain control and give up. If people are to learn how to motivate themselves to overcome barriers to exercising regularly they must be taught (Bandura, 1997). A major strategy for developing efficacy and the motivational support needed to exercise regularly derives from knowledge of self-regulation. Self-regulatory skills enable individuals to create and execute effective courses of action to manage ever-changing life circumstances (Bandura, 1997). "Social Cognitive Theory offers both predictors and principles on how to inform, enable, guide and motivate people to adapt habits that promote health and reduce those that impair it." (Bandura, 2004) pg. 146

Self-regulation is the personal regulation of goal-directed behavior. Self-regulation includes, reinforcements, social supports, goal setting, time management, self-monitoring, and relapse prevention. Bandura (1986) states people cannot influence their own actions very well if they are not attentive to their behavior. If they want to wield influence over their actions they have to know what they are doing which calls for self-monitoring. Successful self-regulation partly depends on one faithfully and consistently monitoring ones behavior. Self-monitoring serves two important roles in self-regulation. It provides information for setting realistic goals and evaluating progress towards said goals (Bandura, 1991). Goal setting, in turn, enlists evaluative self-reactions that mobilize efforts toward goal achievement. Yet, self-observation may or may not have an effect on one's behavior. The goals people set for themselves and the

strength of their faithfulness to keep them are, in turn, determined by one's perception of their capabilities (Bandura, 1986). An individual's perception of their capabilities is known as ones self-efficacy.

Self-Efficacy

Self-efficacy in SCT is defined as one's perception of one's ability to perform a given behavior. Bandura (1986) states that self-efficacy is not about an individual's skill but about an individual's judgment of what they can accomplish with their skills. According to Bandura (1991), an individual's beliefs in their efficacy influence the choices they make, their aspiration, how much effort they mobilize in a given endeavor and how long they persevere in the face of difficulties and setbacks. Individuals with low self-efficacy need a lot of personal guidance. Individuals with self-doubts about their efficacy and the likely benefits of their endeavors, these individuals quit easily in the face of difficulties. Individuals with high sense of efficacy and positive outcome expectations for behavior change, they can succeed with little guidance to accomplish the desired change (Bandura, 2004).

Outcome Expectancy Value

SCT maintains that the outcomes people expect from their behavior influences their actions. People do not care greatly how they perform in activities that have little significance for them and they extend little effort on devalued activities (Bandura, 1986). In regulating their behavior by outcome expectations, people adopt courses of action that are likely to produce positive outcomes and generally discard those that bring unrewarding or punishing outcomes (Bandura, 2001). The outcomes people expect may be physical, social or self-evaluative. Physical outcomes may be in the form of pleasure and or health benefits (i.e. lower blood pressure, lowered cholesterol). Social outcomes may be in the form of approval or disapproval of

the behavior significant others or individuals in one's social circle. The third outcome is self-evaluative which the positive or negative reaction to one's health behavior and health status (Bandura, 2004).

Review of Descriptive Research

College Students

Petosa, Suminski, and Hortz (2003), conducted a study to test SCT constructs in predicting physical activity among college students. Specifically, the study focused on social support, self-regulation, outcome expectancy value, self-efficacy, exercise role identity, and positive exercise experience. The sample size was 350 college students from a Midwestern university. Participants were enrolled in a personal health course at the university. During the second week of classes, students were recruited and consented to participate. Participants completed a set of the measurement instruments over three class sessions. During the following four weeks participants completed a 7-day physical activity recall instrument.

Self-regulation was measured using a 43-item instrument used to assess behavioral strategies to regulate exercise. This instrument was established to have face and content validity from a 2-stage review with a 5 expert panel. Test/retest reliability for this instrument was demonstrated as r=.92, and internal consistency (*Cronbach's* alpha) for instrument was = .88 (Petosa, Suminski & Hortz, 2003). Outcome expectancy value was measured using a 19-item instrument. Using principal components analysis revealed three factors which were psychological, health and body image; which accounted for 61% of variance. The exercise role instrument consisted of 9-items. A positive-exercise experience subscale of subjective exercise experience was used. This instrument was reviewed by a 17 member panel of experts for face and content validity. Factor analysis was used to test construct validity with three factors

emerging, positive well-being, psychological distress and fatigue. Social support was measured using instrument validated by Trieber (Petosa et al., 2003). Social support subscales were composed of social support for exercise provided by friends and support provided by family. Self-efficacy was measured using a 14-item instrument developed by Garcia and King (1991) which measured an individual's perceived confidence to overcome barriers. Petosa's 7-day physical activity recall instrument was used to assess participant's physical activity. The authors state all SCT variables were supported by this study but the sample mean scores were low on the construct and the majority of the students in the study reported low use of self-regulation skills (Petosa et al., 2003).

Rates of vigorous physical activity for these participants were also low. Petosa et al. (2003) explanation for this was it may have been that previous studies used single point estimates while this study collected multiple measures. Also, recall bias may have been a factor. The instrument used in this study, addressed these concerns and provide a less biased self-report measure of physical activity (Petosa et al., 2003). Hierarchical multiple regression analysis revealed each SCT construct made a contribution to predicting days of vigorous activity. It was also concluded SCT is useful in studying exercise behavior among college students (Petosa et al., 2003).

Rovniak, Anderson, Winett and Stephens (2002) conducted a study to assess the process through which SCT variables influence physical activity by the use of structural equation modeling (SEM). SEM shows a variable's direct, indirect, and total effect on a behavior. The study design was prospective and used a sample of 353 university students. Social supports, self-efficacy, outcome expectations, and self-regulation were measured. Social cognitive measures were assessed at baseline and physical activity was assessed at 8-week follow-up. Students

attended a 30 minute session to complete the initial questionnaire and a week later were asked to return for a 20 minute session to obtain test-retest reliability of the self-regulation and negative-outcome expectations measures developed for this study. Eight weeks after the first assessment 282 students returned to complete a 10 minute session to complete the follow up questionnaire for which they obtained course credit for participation. Participants who returned for follow-up sessions also received coupons to local vendors.

The measures used for social support was a 5-item Friend Support for Exercise Habit Scale, which is a modified version assessing social support during the past month. In order to measure self-efficacy, the Making Time and Resisting Relapse subscales from the 12-item Self-Efficacy for Exercise Behaviors Scale were used. Outcome Expectations was measured using an expanded version of the Benefits of Physical Activity Scale and with the Physical Activity Enjoyment Scale (PACES). The self-regulation instrument used was the Exercise Goal-Setting Scales (EGS) and the Exercise Planning and Scheduling Scale (EPS) which were developed for this study. Lastly, physical activity was measured using the Stages of Change for Exercise Behavior Scale (SOC) and a modified version of the Aerobics Center Longitudinal Study Physical Activity Questionnaire (ACLS). In this study social support had a moderate total effect on physical activity, mediated entirely by self-efficacy. Higher levels of social support led to higher levels of exercise self-efficacy. Self-efficacy had the greatest total effect on physical activity for this study but the total effect of self-efficacy on physical activity was largely mediated by self-regulation. Self-efficacy alone was shown to have a small direct effect on physical activity. Outcome expectation did not have a significant effect on physical activity or self-regulation. Self-regulation, in addition to self-efficacy, exerted a strong total effect on physical activity ($\beta=.48$, $p<.05$). Higher levels of self-regulatory skills directly resulted in higher

levels of physical activity. Rovniak et al. (2002) stated, "Among university students, self-efficacy had a large impact on physical activity, because it led to greater use of self-regulatory strategies. Self- regulation in turn exerted a large total effect on physical activity" (Rovniak et al., 2002, pg. 153). The results suggest that individuals with high exercise self-efficacy are more likely to engage in regular physical activity predominantly because of self-regulatory strategies.

A study by Suminski and Petosa (2006) examined the effects of a 9 week, Web-based program on the knowledge and use of social support, self-efficacy, and self-regulation strategies for promoting physical activity. Students were recruited from a Midwestern university who were enrolled in a health and wellness course. The course was offered in the autumn and winter quarters. Six courses were assigned in the control group, seven courses were assigned to the comparison group and seven courses were delegated to treatment group (Suminski& Petosa, 2006). On the first day of each courses participants completed a demographic questionnaire and several questionnaire concerning the SCT strategies for engaging in regular physical activity. The control group consisted of 178 undergraduate participants in a general health class. The class topics included avoiding cancer, sexuality and AIDS awareness. The class did not cover any material related to exercise, physical activity or fitness. The comparison group consisted of118 students enrolled in a course entitled "Fitness and Exercise". Requirements in this course included, a weekly lecture and three weekly laboratory sections. The lectures covered information on health and fitness topics and information on Social Cognitive Theory (SCT) strategies for promoting and sustaining physical activity. During the laboratories students performed one hour of physical activity which include weight lifting and aerobics at a facility on campus. Laboratory also included weekly reading and writing assignments on aspects of fitness. The treatment group consisted of 127 students enrolled in the same "Fitness and Exercise" class

as the comparison group. The difference in the treatment and the comparison group was the treatment group was required to complete a Web-based program targeting SCT variables. The Web-based component was designed to provide students with cognitive skills to help facilitate behavior change. Web assignments allowed students the opportunity to apply SCT strategies covered by lecture in the comparison group course.

One web assignment was completed each week online and allowed students to examine previous Web assignments and modify their behavior plans. Once assignment windows were closed students were not allowed access to previous weeks. Self-regulation was measured using the 43-item, 5 point Likert-type scale instrument. The instrument assesses the use of self-regulation strategies to regulate exercise. The instrument was found to have face and content validity by a panel of 5 experts. Test retest reliability for the instrument was r=.92 and internal consistency (Cronbach's alpha) was .88 (Suminski & Petosa, 2006). Social support was measured with an instrument by Treber et al. to assess social support provided by family and friends (as cited by Suminski & Petosa, 2006, p. 221). The instrument was found to be reliable and internally consistent. Self-efficacy was measured using Garcia and King's (1991) exercise Self-efficacy instrument which consisted of 16-items. The instrument measured an individual's perceived confidence to overcome barriers to exercise. Test retest reliability was r=.96, p<.001 and the internal consistency was signified by Cronbach's alpha of .97. To test differences in demographic variables between experimental groups a one-way analysis of variance (ANOVA) and chi-square procedures were performed. Comparisons were made between posttest knowledge scores between the treatment and comparison groups using multivariate analysis with Bonferroni correction for multiple comparisons (Suminski & Petosa, 2006). Pre and posttest scores for SCT variable were compared within each group, using a paired *t* test procedure.

ANOVA was also used to compare pre and posttest scores for the SCT variables between the experimental groups (Suminski & Petosa, 2006). In the instances where the pretest scores were significantly different between experimental groups the authors used analysis of covariance. Pretest scores were used as covariates to test the differences in the SCT variables at posttest between the experimental groups (Suminski & Petosa, 2006).

Scheffe's post hoc test was used to determine which groups differed significantly with respect to the SCT variables. No significant differences were found between groups on demographics, BMI, academic rank, course load and work habits. Suminski and Petosa, (2006) assessed the knowledge of the skills taught by the Web assignments in the treatment and the comparison groups following the course. Knowledge of the application of skills was significantly higher for the treatment group than the comparison group. The only skill not significantly different for the 2 groups was knowledge concerning goal-setting. The total knowledge score was significantly correlated with the use of self-regulation skills ($r=.54$) but not with other SCT variables (Suminski & Petosa, 2006). From pretest to posttest the treatment group's use of self-regulation strategies increased ($p<.001$) and social support from friends decreased ($p<.005$). A decrease from pre-to-posttest for self-regulation, social support from family and social support from friends was observed in the control group ($p<.05$). No significant changes were found in the SCT variables in the comparison group. Suminski and Petosa, (2006) found the use of self-regulation skills at pretest was higher in the treatment group than it was in comparison and control groups ($p<.001$). Self-regulation posttest scores were also higher in the treatment group than they were in the comparison and control groups. No other SCT variables were different among the experimental groups at posttest. Students in the treatment group showed significant increases in knowledge concerning SCT strategies and they were more likely to use self-

regulation strategies than students not exposed to the Web program (Suminski & Petosa, 2006). Suminski and Petosa (2006) state that "what is unique in the finding that knowledge about SCT-based strategies for being physically active increase significantly following exposure to the Web program and that higher total knowledge scores were positively associated with the use of self-regulation strategies," (pg.223).

Wadsworth and Hallam (2010) conducted a study to evaluate the effects of a SCT based web intervention on college female's physical activity. Ninety–one female participants were recruited from a 4-year public university in the southeastern United States via a campus wide email. Only female participants were recruited. To be eligible participants must have answered "no" to all questions on the Physical Activity Readiness Questionnaire (PAR-Q); they could not be pregnant and were not participating in an exercise program. The study design was randomized pre-test post-test control group (Wadsworth & Hallam, 2010). Participants participated in a face to face orientation session where they provided informed consent forms, completed the PAR-Q, had their measurements taken, had a dual x-ray absorptiometry (DXA) scan and completed an online questionnaire. The online questionnaire was used to measure self-regulation, outcome expectancy value and self-efficacy along with the International Physical Activity Questionnaire (IPAQ). Participants were randomly assigned to a control and intervention group. Participants in both groups were given information on exercising, including recommendations, safety precautions and resources on campus. Participants in both groups were encouraged to begin participating in moderate physical activity. Individuals in the intervention group were given information on how to use the Web site and contact the e-exercise consultant. The measures used for self-regulation was a 43-item, 5-point Likert type instrument (1=never, 5-most frequent). The instrument contained items on 6 subscales, including, social support, goal setting, time

management and relapse prevention. The self-efficacy instrument used was a 15-item questionnaire Garcia and King (1991).

Outcome expectancy value was assessed by a 19-item instrument, measured on a Likert-type scale developed by Steinhart and Dishman. Outcome expectations are measured on a 5-point Likert scale while the outcome expectancies are measured as being low (1), medium (2), or high (3). The short version of the IPAQ was used to assess physical activity. Post measures were collected at 6 weeks and 6 months. The intervention consisted of emails, Web site access to an e-counselor and access to computer-mediated exercise materials. Participants received six weekly emails directing them to the Web pages that targeted the SCT variables. To ensure participants read and comprehended the information on the Web pages there was a short survey at the end of the Web page. The e-counselor was an exercise physiologist with 5 years of experience in modification and exercise prescription. The e-counselor also completed ten hours of training on effectively delivering computer-mediated materials.

Four multivariate ANCOVAs, with baseline scores as the covariates were used to measure differences in self-regulation, outcome expectancy values, self-efficacy and frequency of moderate physical activity between groups at 6 weeks and 6 months. To exam mediation 3 regression equations were computed, this information is available elsewhere (Wadsworth & Hallam, 2010). This intervention successfully increased moderate physical activity of participants. Physical activity was mediated by self-regulation, though the effect was not maintained at 6 months. This intervention also successfully increased self-regulation skills of participants at 6 weeks. The intervention required subjects to actively participate in self-regulatory skills. Participants were asked during the first web session to set short-term goals which was the construct covered during that session. The results indicate that for college students

to increase physical activity self-regulation skills are vital. The authors state this intervention failed to adequately address self-efficacy and outcome expectancy values (Wadsworth & Hallam, 2010). This study indicates that college student's physical activity intervention can use electronic communication as a medium. The authors state, these interventions should focus on increasing the use of self-regulation skills to sustain physical activity.

Sallis, Calfas, Nichols, Sarkin, Johnson, Caparosa, and Alcaraz, (1999) conducted a study to evaluate Project: Graduate Ready for Activity Daily (GRAD) program. Project: GRAD is an intervention course designed to promote adoption and maintenance of physical activity transitioning from university to adulthood. The intervention was conducted in southern California school which targeted undergraduate seniors who planned to graduate within two semesters of baseline. A list of students who fit the criteria was obtained from the university's office of Admission. Students were then solicited through mass mail outs, telephone calls, flyers and presentations (Sallis et al., 1999). Students were screened via telephone contact using the Physical Activity Readiness Questionnaire. Five hundred and seventy six seniors signed the informed consent to participate. The sample who participated in the intervention consisted of 388 senior students (185 women and 153 men). Students were randomized to control and intervention groups, for "active" and "inactive" classes, after baseline assessments. Sallis et al. (1999) evaluated intervention versus control comparisons measured at the end of the course. The GRAD intervention taught participants self-regulation skills (i.e. self-monitoring, goal setting, self-instruction, relapse prevention). Because the intervention was designed to help students transition from college life to adulthood, there was a pre and post, graduation components. Pre-graduation consisted of a course with weekly lectures led by faculty and laboratory led by trained peers. The post-graduate component consisted of behavioral counseling delivered by phone and

printed mail outs. Sallis et al. (1999) evaluated the pre-graduation component. Lectures were 50 minutes entitled “Fitness as a Lifestyle”, designed to provide education on the benefits and risk of physical activity, physical activity recommendations, injury prevention and behavioral self-management.

Labs were limited to 15 students. They promoted practical application of information acquired during lectures. Each lab consisted of 15 minutes of physical activity demonstration that required no equipment, 25 minutes of behavior change group discussion and 45 minutes of physical activity (aerobics, strength and flexibility exercises). During the 25 minute group session’s student discussed previously set goals and set goals for the following week. Of note physical activity sessions were specifically designed depending on student’s fitness level. “Adopters” were inactive or needed assistance increasing physical activity and “maintainer” was an individual who were meeting physical activity recommendations. In order to measure physical activity, the 7-day Physical Activity Recall (PAR) was administered. A 20 page questionnaire and physiologic measures were completed to determine activity patterns and fitness levels. Post-test questionnaire were administered during the last class session and the 7 day PAR was administered via telephone 2 weeks prior to the end of the semester. An exercise readiness to change measure was used to assess vigorous exercise at baseline and posttest using a 5-point scale. This scale was used to classify participants into active and inactive groups. To obtain physiological measures the DINAMAP portable vital signs monitor was used to assess resting blood pressure and pulse, three readings were taken and averaged. Cardiovascular fitness was measured using the Kasch Three Minute Step Test. Participants body mass and height were measured on a calibrated Health-O-Meter balance beam scale (Sallis et al., 1999). Five scores from the 7-day PAR were used to evaluate the effects of GRAD, which included total leisure

kcal-kg week (KKW), leisure hours per week of vigorous and moderate physical activity and minutes per week of strength exercises.

Three way repeated measures analysis of covariance were computed for each variable. Variables included experimental condition, baseline activity status and time. For men, no evidence of intervention effect was found. For women there was evidence of a significant intervention effect for three of five physical activity measures. There was a three-way interaction for KKW, among the "active" group. Considering vigorous and moderate physical activity there was no intervention effect. There was a significant interaction for strength exercise. Yet, strength exercise declined significantly more for "active" control group than the "inactive" control group. There was no baseline differences by condition for exercise stage of change reported at baseline and posttest. The most significant effect may have been the intervention effect on women's total energy expenditure in leisure time. Initially "active" women increased leisure time physical activity while "inactive" intervention women showed no change. Both "active and "inactive" intervention women substantially increased their time in strength and flexibility exercises, while controls showed no improvements. Sallis et al (1999) state that the implication is that the intervention succeeded in promoting increase in these activities through the behavioral change skills learned in GRAD.

Adults

Stadler, Oettingen, and Gollwitzer (2009) conducted a study to investigate the effectiveness of self-regulation techniques in combination with mental contrasting and implementation intentions in increasing physical activity. Two hundred and fifty six women met the inclusion criteria and were randomly assigned to groups according to a computer-generated blind-randomization list. One hundred and twenty-seven women were allocated to the self-

regulation plus information group and 129 were allocated to information group. The study design was single-blind random control trial with a baseline measure and four follow up measurements in the 1st, 4th, 8th and 16th week after the intervention.

Participants met with a trained interventionist either in small groups or individually. The interventionist delivered a scripted intervention. The information group received information on the importance of regular physical activity and its effects. They also received a multiple choice test about healthy lifestyle and a discussion phase in which participants compared their answers with the correct answers provided by the interventionist. Participants received at diary to record their physical activity similar to the diary they received at baseline. The information plus self-regulation group participants received the same information as the information group and self-regulation techniques. The diaries in this group contained self-regulation techniques encouraging participants to practice self-regulation techniques each day. The items received were in the following order: the most important current wish regarding physical activity, the most positive outcome of realizing the wish, the most critical obstacle; and three implementation intentions. The measure used for physical activity was modeled after the Bouchard Three-Day Physical Activity Record, which consisted of filling out a behavioral diary for 7 consecutive days and 4 follow up times (Stadler, Oettingen, and Gollwitzer, 2009). After participants completed the measure for 7 days, participants reported moderate-to-vigorous physical activity. Physical activity minutes were summed, if the data were skewed, they were square root transformed before data analysis and transformed back to minutes per week. SPSS version 15 was used to estimate the intervention effect with an" intent to treat" approach a mixed-effects model was used to make use of all available data.

Information plus self-regulation group were compared against the information group as the between person factor, follow up time of (1, 4, 8, and 16 weeks after intervention) as the within factor. The effects of the intervention, baseline to follow up one was determined with separate t test for each experimental group. This study found participants in the information plus self-regulation group were twice as physically active as participants in information group. Participants in the self-regulation plus information group participated in approximately one more hour of physical activity than information group. Participants in both groups had high intention to be active, positive attitude and high perceived behavioral control. Only participants in the information plus self-regulation group converted these preconditions into physical activity. Participants in the information groups only showed slight increase in physical activity.

A study conducted by Anderson, Wojcik, Winett, and Williams (2006) examined a more complete social-cognitive model of the determinants of physical activity among larger, racially and age-diverse sample of adults. Nine hundred and ninety-nine participants were recruited from 14 of 23 churches in southwest Virginia. The social cognitive model of physical activity was estimated from variables measured as a part of a baseline assessment in a bigger study. To measure self-regulation, a 5-point "never-repeatedly" scale, was used to report how often in the three months before the assessment, did participants use seven self-regulation strategies related to physical activity (Wojcik, Winett & Williams, 2006). Self-regulation strategies included, setting aside time daily for physical activity, taking breaks for physical activity, walking instead of driving, parking further away to walk, getting together with someone else, writing down on calendar physical activity plans, and making plans for bad weather. In order to measures social support a 3-item, 5-point agree-disagree scale was used to rate participants perceived support from family members for physical activity. Self-efficacy was measured with a 20-item, 10-point

Likert-type scale. The questions were prefaced with the following statement "how certain are you that you can-all or most of the time-for a long time-in a lot of different situations do the following…"

Outcome expectations were measured with a 9-item, 5-point agree-disagree scale, questions included what would happen if you slowly and steadily increased your physical activity, answers included, "I will have to change my normal routine" and "I will sleep better". This construct was also measured with a 5-point not at all-very much scale, in which participants rated how much it would matter if the target outcome occurred for them. Physical activity was measured using pedometers and a "Step Counter and Physical Activity Log." Included in this log participants noted how many minutes the activity lasted and how difficult it was (light, moderate, hard or very hard). Latent variable Structural Equation Modeling was used to test the fit of the social-cognitive model of physical activity. "Fit of the model to the data was evaluated with root-mean-square error of approximation (RMSEA) equal to or less than .05 (p close fit> .99 or p<.01) and chi-square equal to or less than three times the degrees of freedom in deference to our large sample size (Anderson et al., 2006, p 515). The effects on physical behavior were that self-regulation exerted the strongest total effect on physical activity (β total= .36). Participants who set aside time and made arrangements for exercise were more physically active. As for direct and indirect effects, women were more likely to use self-regulation strategies than were men and were more likely to expect positive physical outcomes from physical activity (Anderson, 2006). "Structural equation analysis indicated the theoretical model provided a good fit to the data and explained 46% of the variance of the adults' physical activity level" (p. 518). Overall, church members spent a mean of 21.47 min/day in at least moderate intensity exercise during a recorded week. Seventy three percent did not meet the 30 mins/day recommended by Surgeon General.

Whites took 27% more steps than African American participants with white male and females steps being equivalent. African American males took 19% more steps than did African American women.

Participants responses to social support items revealed they perceived some but not strong support from family. Considering self-efficacy participants perceived strong confidence in their ability to increase daily physical activity. Participants had neutral to low expectation about problems managing their time when increasing physical activity. Participants' responses to outcome expectation items also indicated they had positive expectations that increasing physical activity would improve sleep, feeling less stressed and feeling refreshed. Three months prior to the assessment participants indicated that overall, they seldom or occasionally used self-regulation strategies. Anderson et al. (2006) states that though self-efficacy routinely emerged as a strong predictor of the adoption and maintenance of exercise in some studies, the total effect of self-regulation on physical activity among participants in this study exceeded the total effect of self-efficacy. This study suggests that independent of self-regulatory behaviors, self-efficacy has little effect on physical activity (Anderson et al., 2006). In the model for this study self-regulation was the most influential social-cognitive variable.

A study conducted by Hallam and Petosa (2004) was designed to establish the construct validity of an exercise intervention in a worksite setting and the link between theoretical variables and subsequent behavior. Two page flyers were distributed to all employees of a service-type industry to recruit participants and the stages of change instrument were used to screen employees into the study. The treatment group consisted of the first 60 employees to fit the selection criteria of which 48 employees attended all sessions. The control group consisted of 120 employees who joined the company's on-site fitness center no more than 30 days before the

intervention. Of the control group, only those who were in the contemplation, preparation or action stages of change were included.

The intervention for the treatment group consisted of four 1-hour sessions designed to focus on increasing the use of self-regulation skills; dispelling myths about exercise; identifying the expected outcomes from exercise participation; and teaching how to engage in a safe, efficient and effective exercise program (Hallam & Petosa, 2004). The control group's intervention included an orientation of the facility and instruction in proper use of exercise equipment. Three Social Cognitive Theory variables were measured including self-regulation, outcome-expectancy value and exercise self-efficacy. The self-regulation instrument used in this study was based on six subscales of self-regulation: a) reinforcements, b) social supports, c) goal setting, d) self-monitoring, e) time management and f) relapse prevention (Hallam & Petosa, 2004). A Likert six-point scale was summed for a total self-regulation score. Internal consistency for this instrument of Cronbach's alpha of .88, with internal consistency for the subscales ranging from .82 to .96 (Hallam & Petosa, 2004). Outcome-expectancy value was measured using a 19-item instrument. Internal consistency coefficients ranged from .47 to .78 while test-retest reliability correlations were .66 to .89. Exercise self-efficacy was measured 16- item instrument. Two items were removed as a result of factor analysis resulting in a 14-item instrument which was used to measure an individual's perceived confidence to overcome barriers to exercise (Hallam & Petosa, 2004). Test-retest reliability of the instrument was $r=.96$, $p<.0001$ and internal consistency was Cronbach's alpha, $\alpha=.97$. In order to measure exercise behavior a 7-day recall instrument was used. Participants provided the number of days and minutes engaged in exercise for the previous 7 days in a questionnaire.

To measure the effect of the intervention on the SCT variables and exercise behavior, four separate repeated measures Analysis of Variance (ANOVA) were conducted. Also, change scores were computed for SCT variables and days of exercise. The repeated measures ANOVA for self-regulation reveals a significant group-by-time interaction, $F(3, 64) = 98.74$, $p = .001$, $\eta^2 = 64$, $1-\beta = 1.0$) (Hallam & Petosa, 2004). Differences were found between the groups measured at pretest, 6 weeks, 6 months and 12 months ($p = .001$). No differences were found within the treatment group while the only difference found in the comparison group was the pretest scores were significantly higher than 6 week, 6 month, and 12 months. The repeated measures ANOVA for outcome-expectancy values also revealed a significant group-by-time interaction, $F(3,64) = 45.42$, $p = .001$, $\eta^2 = 41$, $1-\beta = 1.0$. There was a difference between the groups on the pretest observation ($p = .002$). The repeated measures ANOVA for self-efficacy reveals a significant group-by-time interaction, $F(3,64) = 4.07$, $p = .008$, $\eta 2 = .06$, $1-\beta = .84$.No difference were found between groups ($p > .05$) for self-efficacy scores.

Lastly, the repeated measured ANOVA for total days of exercise also shows a significant group-by-time interaction $F(3,64) = 27.07$, $p < .001$, $\eta 2 = 56$, $1-\beta = 1.0$ (Hallam & Petosa, 2004). No significant difference was found between groups at pretest 6 weeks, 6 months but there was a significant difference at 12 months ($p = .04$). The treatment group exercised more days a week at 6 weeks, 6 months and 12 months observations than at pretest. At pretest 50% of treatment group participants exercised at least 3 days a week while at post-test 67% of treatment group participants exercise at least 3 days a week (Hallam & Petosa, 2004). Sixty-eight percent of comparison group participants reported exercising 3 times a week, though these participants showed a decline in exercise percentages at 6 weeks (64%), 6 months (50%) and at 12 months (25%). There was no mediation for self-efficacy and outcome expectancy. Mediation for self-

regulation was found. Conditions for mediation can be found in the article by Hallam & Petosa (2004). The data in this study showed that self-regulation mediated exercise behavior. Hallam and Petosa (2004), show that selected SCT variables are changeable in a brief intervention. Specifically, the use of self-regulation techniques to support regular exercise was found agreeable to change (Hallam & Petosa, 2004).

Older Adults

Umstattd, Saunders, Wilcox, Valois, Dowda (2006) conducted a study to enhance understanding of how socio-demographics, health related and theoretical factors, and physical activity engagement were associated with self-regulation. The sample was a convenience sample of 296 fifty plus adults recruited from two Active for Life (AFL) programs in Ohio and North Carolina. Measures were collected at baseline prior to any intervention. The questionnaire was self-administered with an option for the questionnaire to be read aloud for those with vision issues. Self-regulation was measured using a 43-item questionnaire developed by Petosa (see Appendix). The questionnaire assessed the degree to which self-regulation strategies were used to support physical activity adoption and maintenance (Umstattd, Saunders, Wilcox, Valois, & Dowda, 2006). This instrument has been tested for test-retest reliability (r=.92) and internal consistency (Cronbach's alpha, =.88). Petosa's scale was modified for the study to adapt for the older population through an expert panel and focus group findings though the content of the original scale was not changed.

Self-efficacy for physical activity was measured with a 5-item scale developed by Marcus and colleagues (Marcus et al., 1992). This instrument assessed participant's confidence for physical activity when faced with barriers. Test-retest reliability (r=.90) and internal consistency (α=.82) were high. Social support was measured using a scale derived from Sallis and

colleagues. Test retest reliability ranged between r=0.55 and r=0.79 and internal consistency ranged between r=0.61 and r=0.91. Physical activity was measured using a modified version of the Community Healthy Activities Model Program for Seniors (CHAMPS). This instrument consisted of 29 items. Different CHAMPS items were used to evaluate different types of exercise behavior and moderate-to-vigorous physical activity were also reported. The results revealed that self-regulation skills were used more often by individuals with higher education, higher income, lower BMI, better health, greater self-efficacy, greater social support and higher levels of current moderate to vigorous physical activity (Umstattd et al., 2006). It was also revealed that self-regulation was associated with all forms of physical activity except heavy house and mechanical work. Self-regulatory skills were associated with higher levels of current physical activity.

The hierarchal model in the study revealed self-regulation strategies more often used by women, older individuals, those with higher social supports and higher self-efficacy, and those more physically active (Umstattd et al., 2006). The complete regression model explained 36.47% of the variance in self-regulation, $F(11,271) = 14.14$, adjusted $R2 = .034$, $P \leq 0.0001$ (Umstattd et al., 2006). No independent variables were significant in the model. The theoretical set for socio demographic explained 2.81% of variance. The health status and BMI explained an additional 7.44% of variance in self-regulation, $F(2, 274) = 11.36$, $P \leq 0.01$. The theoretical set for self-efficacy and social support explained 13.07% of variance in self-regulation, $F(2,272) = 23.18$, $p \leq 0.001$. This study's findings support the measurement of self-regulation as a correlate of physical activity.

Umstattd and Hallam, (2007) conducted a study to examine SCT constructs, specifically, self-efficacy, self-regulation, and outcome expectancy value in predicting regular exercise participation among older adults. A sample of sedentary and active older adults was recruited

through local community seniors' organizations and groups. Inclusion criteria were lenient to reach the studies aim of better understanding of planned exercise of older adults. All participants were 60 years or older without self-reported disease or disability limiting daily functioning (Umstattd & Hallam, 2007). Research volunteers were trained on how to administer the questionnaire. Each group received small incentives to encourage participation which was decided collaboratively with each group's program coordinator. One hundred and one of the questionnaires distributed met inclusion criteria. Of participants 52 were inactive while 49 were regularly active. In order to make groups even three inactive questionnaires were randomly selected and excluded to make groups equal, thus the sample size was 98.

A 43-item self-regulation instrument developed by Petosa was used to measure self-regulation, where self-regulation was defined as skills used to carry out exercise intentions and to overcome personal and situational barriers. The instrument examines the degree to which self-regulation strategies, self-monitoring, goal-setting, social support, reinforcement, time management, and relapse prevention are used to support exercise adoption or adherence. (Umstattd & Hallam, 2007). The instrument had been found to be reliable and valid. The internal consistency for this study was excellent ($\alpha = .96$). Self-efficacy was measured using a 15-item instrument developed by Garcia and King. The items asked participants to indicate their confidence to engage in exercise given barriers. The skill ranged from 0% (I cannot do it at all) to 100% (certain I can do it). Test retest reliability ($r=.96$, $p<.0001$) and internal consistency ($\alpha=.97$, Cronbach's alpha) were established for this instrument by Garcia and King (Umstattd & Hallam, 2007). To assess outcome-expectancy value, a 19-item instrument developed by Steinhardt and Dishman was used, test-retest reliability for this instrument ranged from .66 to .89

and internal consistency ranged from .47 to .78. Exercise recall was assessed using a questionnaire that measured moderate to vigorous activity levels over the preceding 7 days.

Levels of activity were measured by minutes per day and type of exercise. Test-retest reliability for this instrument has been reported between .82 and .87 (Umstattd & Hallam, 2007). Multivariate analysis of the variance (MANOVA) and post hoc analyses were used to analyze differences in mean scores for each SCT construct between inactive and regularly active participants (Umstattd & Hallam, 2007). All continuous and categorical independent variables were simultaneously entered in the model. Regular activity was associated with being male, white and married; having higher income, education and self-efficacy; use of self-regulation skills; and outcome-expectancy values.

Since groups differed by ethnicity, gender, marital status, education, and income, these variables were accounted for in the model (Umstattd & Hallam, 2007). Self-regulation was the only SCT variable statistically reliable in distinguishing between active older adult and inactive older adults after controlling for demographic covariates. All three SCT variables were significantly correlated with exercise in bivariate analyses, yet, in multivariate analysis, only self-regulation remained a significant predictor or regular exercise behavior.

Umstattd, Wilcox, Saunders, Watkins, Dowda (2008) used a previous study on the correlation of self-regulation for physical activity among older adults and examined the relationship between self-regulation and physical activity, controlling for socio-demographics and self-efficacy. The sample population was 284 older adults who participated in the Active for Life program in Ohio and North Carolina (Umstattd et al., 2008). Two hundred and eighty-four sedentary, periodically active and regularly active older adults, 50 years and older, were recruited

from 2 Active for Life (AFL) program in Ohio and the Carolinas. Physical activity levels used were defined by the Center for Disease Control and Prevention and American College of Sports Medicine (CDC/ACSM). Individuals who participated in moderate intensity physical activity 30 minutes per day, on 5 days of the week, and in vigorous activity for 20 minutes per day at least 3 days of the week met the CDC/ACSM's recommendation for regular activity.

Sedentary was defined as lack of engagement in any physical activity while being periodically active was participating in physical activity at a level insufficient to meet CDC/ACSM guidelines. AFL is an evidence-based physical activity program practiced at 9 community based organizations across the country. In person questionnaires were administered to participants who met the CDC/ACSM's recommendations during site visits and to sedentary participants via pretesting procedures prior to commencement of the AFL program. As in their previous study (Umstattd et al., 2006), self-regulation for physical activity was measured using a 43-item questionnaire developed by Petosa to assess self-regulation strategies. Self-efficacy for physical activity was measured using a 5-item Likert-type scale, which evaluated participant's confidence in their ability to overcome barriers. Scores ranged from 1 (not at all confident I could do this) to 7 (very confident I could do this). Physical activity was measured using the Community Healthy Activities Model Program for Seniors (CHAMPS) physical activity questionnaire. The CHAMPS questionnaire is a 41-item instrument in which 29-items assess physical activity and 12-items assess other activities. Socio-demographic characteristics were assessed using the Behavioral Risk Factor Surveillance System (BRFFS) including gender, race (responses were collapsed into white versus non-whites), birth date, marital status, education, income height, weight and health status. Body Mass Index (BMI) was computed by self-report, dividing weight by height (Umstattd et al., 2008). All data analysis was performed using SAS

statistical software. Multivariate regression analysis was conducted with self-regulation, self-efficacy and socio-demographic information as independent variables and moderate-to-vigorous physical activity (MVPA) as the dependent variable.

The following variables were identified as significant correlates of MVPA: self-regulation had a large association (r= .52), health was moderate (r= .44) as was self-efficacy (r= .47), and a small association for marital status, race, gender, education and BMI. Having greater self-regulation strategies, higher education and income, lower BMI, better health and greater self-efficacy and being male, white, married or a member of a married couple were related to greater MVPA engagement (Umstattd et al., 2008). Socio-demographic variables and self-efficacy explained a significant portion of the variance in self-regulation. MVPA was regressed on both self-regulation and self-efficacy, and self-regulation remained a significant predictor of MVPA. The authors state that these results partially mediated and potentially fully mediated the relationship between self-efficacy and MVPA (Umstattd et al., 2008). These findings support the importance of self-regulatory strategies for MVPA in young and middle-aged adult populations by showing this relationship in an older population (Umstattd et al., 2008). Umstattd et al. (2008) states these findings propose that in addition to self-efficacy, studies aimed at describing, explaining, predicting or changing MVPA should include and measure use of self-regulatory strategies.

Son, Kerstetter, Mowen, and Payne (2009) conducted a study to examine the relationship between global self-regulation, selective optimization with compensation (SOC), constraint self-regulation, outcome expectations and leisure-time physical activity in later life. A convenience sample of 271 volunteers and visitors at a Midwestern park volunteer agency age 50 and older

created the study sample. Recruitment was from approximately 500 older park volunteers via mail and e-mail, banners posted at special events, and park offices were used.

Questionnaires were distributed at three park visitor centers, a zoo volunteer meeting, and two special events for the general public (Son et al., 2009). Individuals were asked to complete on-site, self-administered questionnaires at two city-wide, free special events hosted by the agency. Group administered survey sessions were conducted at four park centers. Participants had the option of completing the questionnaire on site or taking it home and returning via preaddressed postage-paid envelope. Of the 339 questionnaires distributed, 298 were returned with 271 useful questionnaires returned. Participants were offered incentives such as complimentary refreshments, door and raffle prizes. To measure self-regulation, a 24-item measure was used with 12 target items and 12 distracter items. Three questions focused on elective-based selection, loss-based selection, optimization and compensation. This instrument was a modified instrument of a nine-item SOC index, omitting two elective-based selection items and one loss based selection item (Son et al., 2009). The authors found internal consistency with KR-20 or .72. Examples of some questions include, (optimization): “I make every effort to achieve a given goal,”; “(elective-based): “I always focus on the one most important goal at a given time.”; (loss-based): “When things don’t go as well as before, I choose one or two important goals.”; and (Compensation): “When something doesn’t go as well as it used to, I keep trying other ways of doing it until I can achieve the same results I used to” (Son et al., 2009,p. 313). To measure outcome expectation 2 modified items from Hubbard and Mannell, were combined to form a summed score (Son et al., 2009). The response scale was (1) not at all to (5) very much. Questions were: “I participate or would participate in recreation, sport, or fitness activity for my own immediate enjoyment or pleasure” and I participate or would like to

participate in a recreation, sport, or fitness activity because it is good for my health." (Son et al., 2009).

Constraint self-regulation was also measured using items from Hubbard and Mannell (So et al, 2009). This negotiation strategy scale was modified for consistency with physical activity terms. The modified 33 item negotiation scale had internal consistency (coefficient alpha=.86). Constraint self-regulation included, time and financial management, skill acquisition and interpersonal coordination (Son et al., 2009). Son et al. (2009) measured leisure time physical activity with the Physical Activity Scale for the Elderly (PASE; New England Research Institutes, Inc., 1991). PASE was slightly modified to inquire about participant's recreation, sport, or fitness activity over the past seven days. The questionnaire included questions about intensity, ranging from light to strenuous and muscle strength followed by type of activities. Frequency options ranged from (0) never to (3) often. Lastly, duration was assessed with response options from (1) less than 1 hour, (2) 1 but less than 2 hours, (3) 2-4 hours and (4) more than 4 hours. Hierarchical regression to test the contributions of interactions, and backward stepwise regression to omit non-significant effects, omitting the least significant interaction from the models first were also conducted (Son et al., 2009). To test the possible interaction of outcome expectations and global self-regulation on constraint self-regulation and the physical activity relationships, the authors followed Baron and Kenny's protocol for testing interaction effects (Son et al., 2009). "global self-regulation strategies were positively related to the specific strategies that middle-aged and older adults used to overcome constraints to participate in leisure-time physical activity" (pg. 318-319). Lastly, the results suggest that global self-regulation (goal-oriented life-management strategies) was related to constraint self-regulation (time and financial management, skill acquisition) in spite of low outcome expectations for

health and enjoyment benefits. A limitation of the study was that outcome expectancy values was not measured and global self-regulation had a predisposing influence on the use of specific strategies despite the experience of constraints.

Ayotte, Margrett and Hicks-Patricks (2010) conducted a study to examine the complete Social Cognitive Theory (SCT) model and how it accounts for variance in physical activity levels among middle-aged and young-old adults. Participants consisted of 50 to 75 year old long-term married couples living in Mid-Atlantic region of the United States. Study packets were sent 236 couples (N=472 individuals) recruited through referrals from undergraduate students and other participants. Overall, 272 individual packets were returned of which 256 were from individual whose spouse also returned their packets. Participants received two sets of packets containing Health Information Portability and Accountability Act (HIPPA), consent and authorization forms along with two self-addressed stamped envelopes. Demographic questionnaires consisted of marital status, age, sex, education, income, and health information. Chronic health conditions were assessed using the National Long-term Care Survey, which participants were asked to check any conditions of a list of 31 conditions they had been diagnosed with during the past year (Ayotte et al, 2010). Self-efficacy was measured using a 9-item scale to assess individual's confidence that they could overcome barriers that limit participation in physical activity. Each stem began with the preface, "How confident are you right now that you could exercise three times per week for 20 minutes if…" barriers include bad weather, experiencing pain, time constraint, fatigue etc. A second self-efficacy scale was also a 9-itmes scale related to task self-efficacy in which participants rated their confidence in their

ability to engage in physical activity continuously for increasing increments of time (Ayotte et al, 2010).

Social Support was measured using a 15-item Positive Social Influence Scale to assess the amount of support participants received from their families. Three types of support were assessed, companionship support, informational support and esteem support, participants we asked how often these types of support were provided over the past 12 months. Outcome Expectancies were assessed using the Benefits of Physical Activity Scale (BPA) which consists of 12 positive outcomes of physical activity (Ayotte et al., 2010). Participants rated their likelihood of given outcomes if they participated in regular exercise (e.g. I will improve my heart and lung function). Self-regulatory behaviors measure only assessed planning and goal setting. The Exercise Planning and Scheduling Scale (EPS) which has 10-items related to how people plan and schedule physical activity (Ayotte et al.,2010). Participants were also asked to assessed how well items described them (1) does not describe me to (5) completely describes me. The second measure of self-regulatory was the Exercise Goal-Setting scale. This is a 10-item instrument, which assessed goal development, self-monitoring and problem solving. Perceived barriers to exercise were measured using the Perceived Barriers to Exercise Scale, which assesses personal and environmental barriers. Eighteen statements were rated by participants as to whether they agreed or disagreed with a particular barrier interfering with engaging in physical activity, with a scale of (1) is not a barrier to (5) very much a barrier. Physical activity was assessed using the Paffenbarger Physical Activity Questionnaire (PAQ), the Yale Physical Activity Survey (YPAS) and the self-report walking measure (Ayotte et al., 2010). The PAQ assesses activities performed during previous week, average flight of stairs climbed per day, the average number of blocks walked per day and an open-ended question regarding frequency and

duration of other activities performed. The YPAS required participants to report frequency and duration of five different physical intensity levels including vigorous activity, leisure walks and any type of moving on foot, standing on foot and sitting.

The third measure, measured the extent to which participants walked for exercise, the previous month and the average amount of time spent walking on each occasion. Structural equation modeling was used to exam social cognitive model. The models estimated using the maximum likelihood estimation. Model fit was assessed using chi-square goodness-of-fit statistic, root mean square error of approximation and the comparative fit index (Ayotte et al., 2010). The results indicate that the theoretically driven model accounted for 66% of the variance in physical activity (Ayotte et al., 2010). Self-efficacy was directly associated with all of social cognitive constructs and physical activity. Increased social support was directly related to increased self-efficacy and increased self-regulatory behavior. Self-regulatory behavior was directly related to physical activity (Ayotte et al., 2010). Ayotte et al (2010) state, the model suggest that self-regulatory behaviors are important in accounting for variability in physical activity. Of note, though relatively small in magnitude, the finding's suggests that interventions based on the social cognitive model should consider sex differences in this construct (Ayotte et al., 2010).

Adolescents

Hortz and Petosa (2008) conducted a study to assess the degree to which SCT variables mediated Moderate Intensity Exercise (MIE) among adolescents who participated in the Planning to be Active (PBA) program. The Planning to be Active Program is an intervention designed to promote physical activity among previously sedentary adolescents. Participants in the study were from two rural schools in Ohio. Eligibility for the student required participants to meet three criteria: 1) all participants had to be enrolled in physical education, 2) all participants

needed both parents to sign consent/assent forms and 3) all participants must have attended 80% of physical activity classes during the intervention period. There were 240 participants with 143 subjects in the intervention group and 97 in the comparison group. The majority of participants were freshmen or sophomores with 98% of them being white. Both groups were taught physical education from physical education teacher at the schools. The treatment group was taught a behavioral skill-building curriculum in addition to the regular school curriculum. The SCT curriculum targeted self-regulation, social situation, strength of self-efficacy and outcome expectancy value (Hortz & Petosa, 2008). The interventions goal was to foster regular leisure-time physical activity through the use of self-regulation skills. This group also received information that targeted fitness knowledge and strength of self-efficacy, outcome expectancy and social situation. The measurement instrument used in this study for social situation was developed by Reynolds et al. and it contained 8 items.

The instrument demonstrated construct validity and internal reliability of 0.75 and retest reliability of 0.78 (Hortz & Petosa, 2008). Strength of self-efficacy for exercise instrument demonstrated the predictive validity for fifth-grade boys and girls of 0.23 and 0.27. Retest reliability of this scale was reported to be 0.82. The designer of this instrument was not mentioned by the authors. Outcome expectancy value was assessed 8 dimensions (i.e. relaxation, fitness, competition, social continuation) by 5 items. This instrument was examined for internal reliability ranging from 0.86 to 0.94 (Hortz & Petosa, 2008). The authors also state that the instrument was found to demonstrate construct validity (Hortz & Petosa, 2008). The self-regulation instrument used was a 38-item instrument which measured 5 dimensions: goal setting, self-monitoring, gaining and maintaining social support, planning to overcome barriers and securing reinforcements. Construct validity and internal reliabilities for the 5 dimensions ranged

from 0.78 to 0.94 (Hortz & Petosa, 2008). MIE was measured using previous day physical activity recall (PDPAR) which was designed to measure all activity engaged in throughout a given day. Hortz and Petosa (2008) stat that for this study MIE was measured in days and recorded in 7 consecutive days, in a validation study test retest correlation coefficient of r=.98. Criterion validity was documented using the Caltrac accelerometer, r=.88, pedometer, r=.77 and heart rate measures, r=.44 (Hortz & Petosa, 2008). Instruments were completed one week prior to the interventions implementation and two weeks after. Pretest data collection occurred in January while posttest data were collected in March.

The study design was 2 ×2 mixed factorial Analysis of Variance (ANOVA) which was used to describe interventions effect on behavior and SCT variables (Hortz & Petosa, 2008). For the purpose of this study a mediation analysis was addressed using the mediation frame work proposed by Baron and Kenny (Hortz & Petosa, 2008). The authors found the intervention group increased its MIE to a greater degree than the comparison group (Hortz & Petosa, 2008). Of the SCT variable only self-regulation and social situation were positively impacted by the intervention. As a result the author's state only those variables could possibly mediate posttest MIE (Hortz & Petosa, 2008). From the results of the mediation analyses the mediation model suggests the intervention was mediated by differences in self-regulation and social situation (Hortz & Petosa, 2008). The results found in this study reveal the PBA program was sufficient to produce changes in self-regulation and social situation. The authors state that both self-regulation and social situation mediated PBA program's effect on moderate intensity exercise (Hortz & Petosa, 2008). Hortz and Petosa (2008) state "these results suggest future interventions should continue to target these variables with intervention components" pg. 312. A limitation of was the study group was relatively small, homogeneous and a convenience sample.

A study conducted by Shimon and Petlichkoff (2009) aimed to determine the influence pedometer use and self-regulation strategies had on adolescents' daily physical activity. One hundred and ninety-four 12 to 14 year olds volunteered to participate in a 5 week study. Pedometers were distributed through physical education classes, where students were introduced to pedometers and instructed on proper wear and care. Once students demonstrated proper pedometer use, devices were set to zero and sealed to prevent students taking more steps as a result of viewing the device. Students were told to wear pedometers all day long, removing only for specific circumstances. Daily step counts were monitored over four consecutive days to establish a baseline count and to determine if there were any significant differences between daily step counts before implementation of the intervention (Shimon & Petlichkoff,2009). If pedometer seals were broken when returned, no step count was recorded.

On Friday pedometers were collected, counts recorded, and pedometers were stored until the following Monday before intervention was to begin. Once daily baseline measures were established, each group was randomly assigned to one of three groups, a self-regulation group, open group, and a control group. Students in the self- regulation group participated in short informal discussion session on self-regulation where an emphasis was on setting goals. These participants wore none sealed pedometers and recorded counts at the beginning of physical education class on a weekly recording form. As with the self- regulation group the control group also wore none sealed pedometers and recorder steps before physical education class. Both groups reset their pedometers to zero once records were made. Students in the control group wore sealed pedometers throughout the course of the study and never had a chance to view their counts. Physical education teachers or assistants removed their seals and recorded their numbers.

To deal with absenteeism students data was included only if they missed no more than one day a week during the intervention period. For those who did not meet the above, data replacement method based on student's average step count was used resulting in about 7% of the missing data (Shimon & Petlichkoff, 2009). After data replacement, 113 students met the criteria for useable data. All extreme score were kept. A one-step ANOVA was employed to determine whether there were differences among groups on 4-day step count measures at baseline (Shimon & Petlichoff, 2009). To examine group differences a MANOVA was employed with a mixed-model 3 × 4 (Group × Time). No significant differences were shown to exist among groups on daily counts before the intervention. Significant differences emerged for the self-regulation and open groups when compared with the control.

On average the self-regulation group accumulated 3,763 to 3,883 more daily steps than control groups per week, while the open group differed by 3,510 steps from the control group at week three (Shimon & Petlichkoff, 2009). Results indicated the self-regulation group accumulated more steps during weeks two, three, and four than in week one. However, a slight non-significant decline occurred from week 3 and 4. Students in the self-regulation group emerged with higher step counts than those students in the control group; though self-regulation students did not differ significantly from the open group. Overall, the self-regulation group increased their daily step counts 12% above their baseline levels, while those in the open and control groups increase 7% and 1% respectively (Shimon & Petlichkoff, 2009). During week 3, an irregularity occurred. For no obvious reason the open group accumulated more steps than members of the self-regulation group. An explanation may be a high dropout rate of girls in the open group, which changed the proportion of boys and girls in this group and may have inflated the daily step count (Shimon & Petlichkoff, 2009). In summary, self-regulation strategies had a

positive impact on junior high school students to attain a higher step count. The authors did not discuss how they measured self-regulation in this article thus one must conclude self-regulation may be correlated with the increase in step count but not the cause of results.

Matthews & Moran (2011) conducted a study assessing physical activity and self-regulation strategy use in adolescents. Prior to beginning the study a pilot was conducted to assess the internal consistency of the self-regulation strategy measures. Analysis of the self-regulation strategy measures were found to be internally consistent (goal setting, α=0.89; exercise technique imagery α=0.79; appearance health imagery, =0.89; perceived personal control, =0.78). The study was a convenience sample with a cross-sectional design. Six schools participated in the study, 3 mixed-sex schools, 2 girl's schools and one boy's school. All participants asked to participate in the study were in 10^{th} grade. Information packets with study information and consent forms were provided to teachers. Two hundred and thirty three student's packets were signed by parents and returned. Researchers met with students and gave out measures to complete. In order to assess physical activity the Leisure Time Exercise Questionnaire was used. This instrument consisted of 3 items to assess the frequency of mild, moderate and strenuous activity (Matthew & Moran, 2011). Goal setting was assessed using an amended version of the Test of Performance Strategies (TOPS). The subscale contained 4 items measured on a 5-point Likert scale. The extent of the amendment of items included replacing the word "practice" with the phrase "my physical activity" (e.g. "I have specific goals for practice" to "I have specific goals for my physical activity").

Mental imagery (outcome expectation) was measured using two scales from a 19-item self-report questionnaire, called Exercise Imagery Inventory (EII). The EII used a 7-point Likert scale ranging from 1 (Rarely) to 7 (Often). To measure exercise imagery the appearance health

scale contained 8 items (e.g. “I imagine a leaner me from exercising”). The exercise technique-imagery scale contained 4-items (e.g. When I think about exercising I imagine using the perfect technique). Perceived personal control factors were revised from the Causal Dimension Scale (CDS II) which measured participants’ feeling of control over their recent physical activity behavior. Participants rated their physical activity behavior on a 5-point Likert scale they then listed the main reason for their recent level of physical activity on a 9-point Likert scale. An example, “Is the reason for your recent physical activity behavior something over which you have no power (1) or over which you have power (9)?” Analysis of for this study focused on moderate and strenuous activities.

Independent t-tests were conducted to assess gender differences across self-reported leisure-time physical activity and self-regulation strategy use. “A biserial correlation was conducted to assess the relationship between gender and leisure-time physical activity and Pearson product correlations to analyze the relationship between self-regulation strategies and leisure-time physical activity” (Matthews & Moran, 2011, p. 810). Significantly associated variables were entered into a hierarchical multiple regression (HMR) to explain adolescents’ leisure-time physical activity. Boys reported significantly higher levels of physical activity than girls ($t(231)=4.48$, $P=0.00$). Adolescent boys also reported high use of goal setting ($t(226)=2.52$, $P=0.01$) and technique imagery ($t(228)=2.99$; $P=0.00$) than adolescent girls. Gender was significantly related to leisure-time physical activity ($r= -0.28$, $P<0.01$). Self-regulation strategies of goal setting ($r=0.34$, $P<0.01$); technique imagery ($r=0.34$, $P<0.01$); and perceived personal control ($r=0.18$, $P<0.01$) were associated with self-reported physical activity. Appearance-health imagery ($r=0.02$, $P>0.74$) was not associated with physical activity. The 3 self-regulation strategies that were significantly associated with physical activity were entered in 3 steps. An

overall significant model was found that accounted for 19.2% of variance for leisure-time physical activity (Matthew & Moran, 2011). Self-regulation strategies explained 10.7% of the variance in adolescent's physical behavior. The authors concluded that certain theoretically derived self-regulation strategies were positively associated with adolescent's leisure time physical activity.

Summary

Self-regulation has been found to predict, be correlated with, or mediate physical activity in college students, adults, older adults and adolescents. Rovinak et al. (2002) found self-efficacy had an effect on physical activity by increasing self-regulation in college students. Petosa et al.'s (2003) study showed self-regulation was correlated with physical activity. While Suminski and Petosa (2006) found college students in their web-based program increased in knowledge of SCT strategies and were more likely to use self-regulation strategies than those not exposed to the web-based program. Wadsworth and Hallam (2010) web-based intervention successfully increased self-regulation skills of female college students. Sallis et al. (1999) found their GRAD program succeeded in promoting increases in physical activity through behavioral change skills learned during the intervention with college students.

Anderson et al.'s (2006) study with adults found self-regulation exceeded self-efficacy in predicting physical activity. Stadler, Oettingen, and Gollwitzer's (2009) study with adults found participants who used information and self-regulation in an effort to become physically active were twice as active as information only group. Hallam and Petosa (2004) found adults in their study who received the self-regulation intervention exercised more days a week at posttest than at their pretest.

Considering older adults Umstattd et al. (2006) found that self-regulation was used more often by individuals with high education, higher income, lower body mass index (BMI), better health, greater self-efficacy, greater social support and higher levels of MVPA. Umstattd and Hallam (2007) examined SCT constructs in predicting regular exercise among older adults. They found self-regulation was the only SCT variable statistically reliable in distinguishing between active and inactive older adults after controlling for demographics. Ayotte, Margrett, and Hicks-Patricks (2010) found in their study that self-regulation was directly related to physical activity. In the study the SCT model accounted for 66% of variance in physical activity.

Hortz and Petosa (2008) found in their study of adolescents that the treatment group, which received SCT behavioral skills, increased moderate intensity exercise to a greater degree than the comparison group. Self-regulation was hypothesized by Shimon and Petlichkoff (2009) to increase step-counts in adolescents who received ten minute self-regulation information sessions compared to those in the control group. In all these studies self-regulation was found to either predict, be a mediator or be a correlate of physical activity.

The research reviewed here demonstrates the importance of self-regulation in physical activity interventions. The research also demonstrates that self-regulation can assist in increasing and predicting the physical activity among different age groups. During this review of the literature the researcher did not discover a study that assessed self-regulation and student athletes as it pertains to SCT. The self-regulation literature was often associated with sports performance. Therefore, the purpose of this study is to examine the self-regulation skills, outcome expectations and self-efficacy and physical activity in a population that has not been assess which is the student-athlete.

CHAPTER III

METHODS

This chapter describes the research methods for this project. Included in this chapter are the study design; sample and sampling procedure; and a description of the instruments to be used in this research project. This chapter also includes the research and the procedures to analyze the data.

Design

This study uses a cross-sectional design.

Sample

Participants were recruited from NCAA Division I affiliated colleges and universities. This study includes former student-athletes of all ages.

Sampling

Participants were recruited by e-mail (Appendix E). The e-mail invited participants to click the provided link if interested in participating. Participants who clicked the link were connected to the online questionnaire (Appendix F). To be eligible for the study participants must have participated in sport at a NCAA Division I Institution. Participants were able to identify the years played and the Institution for which they played. If participants played professionally or semi-pro there was an option to mark yes or no to the following question, "I am currently playing sport professionally or semi-professionally?" If the participant chose yes the

survey would be concluded. Fritz and MacKinnon (2007) offers guidelines for researchers in determining the sample size necessary to conduct mediation and achieve statistical power (1–β=0.80). The projected sample size necessary to meet these guidelines was 124 (Fritz & MacKinnon, 2007).

Instrumentation

Data were gathered using an online questionnaire that measured four variables, (1) exercise behavior; (2) exercise self-regulation; (3) exercise outcome expectancy value and (4) exercise self-efficacy. In addition, demographic data were collected. Each participant received instructions for completing the questionnaire via email.

Exercise Self-regulation

There are two versions of this instrument available. The first version of the physical activity self-regulation (PASR-43) instrument consists of 43 items. The PASR-43 questionnaire assesses the degree to which self-regulation strategies are used to support physical activity adoption and adherence. This instrument includes items that represent six types of self-regulation for physical activity strategies: goal setting (9 items), self-monitoring (5 items), time management (4 items), eliciting social support (9 items), reinforcement (9 items) and relapse prevention (7 items) (Wadsworth & Hallam, 2010; Umstattd, Saunders, Wilcox, Valois & Dowda, 2006). Face and content validity for this instrument was established by a 2-stage expert panel review. Test-retest reliability for this total instrument was reported as r=.92, P<.001 and internal consistency (Cronbach alpha) for the instrument as .88 (Wadsworth & Hallam, 2010). Test retest reliability for the subscales ranged from .62 to .88 (p<.0001). Participants are asked to

rate how often they use each strategy on a scale of 1 (never) to 5 (very often). The total instrument scores range is 43-215. A high score indicates frequent use of self-regulation skills.

Exercise Self-regulation (modified version)

Self-regulation PASR-12 is a 12-item version of a physical activity self-regulation instrument revised by Umstattd, Molt, Wilcox, Saunders and Watford (2009). Umstattd et al. (2009) stated the structural validity of the 43-item instrument did not provide an acceptable fit for the self-regulation scale and conducted a specification search that involved model modification with the intent to improve the structural validity of PASR-43. The process involved identifying pairs of items overlapping content, removing one of the two items and testing the modification for an improvement in model data fit (Umstattd et al., 2009).

Umstattd et al. (2009) examined the bivariate relationship between overall and subscale scores for PASR-43 and PASR-12. There was a strong correlation between overall scores from both instruments (r=.96) and between scores from PASR-43 and PASR-12 subscales: goal setting (r=.91), self-monitoring (r=.85), time management (r=.96), social support (r=.79), reinforcement (r=.88) and relapse prevention (r=.80) (Umstattd et al., 2009). The authors also examined the relationship between self-regulation, self-efficacy and physical activity using the two scales. PASR-12 overall scale demonstrated significant moderate-to strong bivariate relationships with self-efficacy (r=.56) and physical activity (r=.60). The PASR-43 demonstrated similar moderate-to-strong bivariate relationship with self-efficacy (r=.50) and physical activity (r=.56) (Umstattd et al., 2009). Umstattd et al. (2009) state that PASR-12 by-and-large captures a large portion of variance of PASR-43 with a reduced item pool. A copy of this instrument is in

Appendix A. Because of time constraints with the population of study the brief version of exercise self-regulation was chosen.

Exercise Outcome Expectancy Value

Outcome expectancy values are the anticipated outcomes of a behavior and the value one places on a given outcome. Outcome-expectancy value was measured using a 19-item instrument developed by Steinhart and Dishman (1989 as cited by Wadsworth & Hallam, 2010). Internal consistency coefficients ranged from .47 to .78 while test-retest reliability correlations were .66 to .89 (Hallam & Petosa, 2004). Hallam and Petosa (2004) state this subscale significantly predicted exercise behavior measured using a 7-day recall instrument (R^2=12-24, $p<.05$). This instrument is divided into outcome expectations and expectancies. Outcome expectations are measured on a 5-point Likert scale while the outcome expectancies are measured as being either low (1), medium (2), or high (3). Outcome expectancy value is a produced by multiplying the outcome expectation scores by the outcome expectancy score (Hallam & Petosa, 2004). The scores range from 19-285. A copy of this instrument is in Appendix C.

Exercise Self-efficacy (Garcia & King, 1991)

Exercise self-efficacy is defined as an individual's perceived confidence to overcome barriers to physical activity. Exercise self-efficacy was measured using a 15-item questionnaire developed by Garcia and King (1991) and revised by Hallam and Petosa (2004). The exercise self-efficacy instrument was revised according to factor analysis. The original self-efficacy instrument included 16-items, 1-item was removed based on factor analysis (Hallam and Petosa, 2004). A mean self-efficacy score is determined by summing responses of items and dividing them by 15. Hallam and Petosa (2004) reported test-retest reliability for the instrument as r=.96,

P<.0001 and internal consistency (Cronbach alpha) for the instrument was α=.97. The range of scores was 0-100. A copy of the instrument is in Appendix B.

Exercise Behavior (Blair et al., 1985)

A 7-day recall instrument developed by Blair et al. (1985) was utilized to measure activity patterns. Respondents recorded the amount of time spent in the past seven days in exercises that were either not exhausting or exercises that made their heart beat rapidly. Not exhausting exercises included, lifting weights, volleyball and water aerobics while heart beats rapid exercises included running, cycling aerobics and basketball. Exercise was placed in two categories not exhausting (moderate) or heart beating rapidly (vigorous) activity. Respondents reported the type of exercise they participated in and the total number of minutes they participated in said exercise. They also reported the days of the week in which they participated in said activities. The examples used are consistent with those used by USDHHS to describe moderate intensity and vigorous intensity exercises (USDHHS, 2012). The test-retest reliability over a 7-week period has been reported as being between .82 and .87 (Blair et al., 1985, as cited by Umstattd & Hallam, 2007, p. 210). A copy of the instrument is in Appendix D.

Procedures

The questionnaire was created on an online survey tool using the validated and reliable versions of the self-regulation, self-efficacy, outcome expectancy and physical activity instrument. Once the questionnaire was complete, it was field tested to identify errors, readability and flow. The questionnaire was corrected and modified in accordance with remarks made by field test participants and resent to another group of participants. Once the questionnaire was

deemed complete participant information which included the link to the questionnaire was sent to administrators in athletics to be disseminated to former student athletes.

Participants were contacted about the project through an email from university athletics administrators, including the University of Mississippi Alumni Foundation email listserv. Participants were also contacted through university faculty and staff from other institutions. The email contained pertinent information see appendix E and a link to the survey. The instruments were completed Spring and Fall of 2014, completion of the survey constituted consent. All data were encrypted by the online questionnaire software program automatically. This study was approved by the University's Institutional Review Board for the Protection for Human Subjects (Protocol Number: 14x-227).

Table 1. Instrumentation

Instruments	Measures	Items	Example Question	Minimum and Maximum Scores
Self-Regulations	Exercise Self-Regulation	12	I purposely plan ways to be physically active during bad weather	12-60
Self-Efficacy	Exercise Self-efficacy	15	Exercise when tired (0-100% confident)	0-100
Outcome Expectance value	Expected outcomes and value on outcomes	19	I exercise to improve my health (frequency & value)	19-285
7-Day Physical Activity Recall	Frequency, duration, and type of physical activity		List the frequency, duration and type of activity on a given day	0-7

Analyses

Questionnaire data were entered and stored in an SPSS v. 20 data base. Descriptive statistics were computed for all variables. The researcher examined associations between self-regulation, outcome expectancy values, self-efficacy sport and demographic variables. Bivariate analysis was used to examine the relationships among the SCT variables and exercise behavior.

Barron and Kenny's (1986) approach to mediation analysis was used to examine theoretically plausible effects consistent with mediation. Mediation analysis was conducted to examine whether self-regulation mediated the relationship between self-efficacy, outcome expectancy value and physical activity. In order to test for mediation Baron and Kenny (1986) specify the following conditions must hold: First, the independent variable must effect the dependent variable in the first equation; second, the independent variable must be shown to affect the mediating variable in the second equation; and third, the mediator must affect the dependent variable in the third equation controlling for the independent variable (Baron and Kenny, 1986). If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the first. Perfect mediation holds if the independent variable has no effect when the mediator is controlled. If all conditions are met then the data are consistent with the hypothesis that the mediating variable completely mediated the independent-dependent variable relationship, and if the first three steps are met but not the step four, then partial mediation is indicated (Kenny, 2013). The Sobel test and bootstrapping were used to assess the statistical significance of the indirect effects.

During the literature review process it was determined that exercise self-efficacy is consistently a predictor of physical activity. Because exercise self-efficacy was found to be a predictor of physical activity it was chosen as the independent value (IV). Self-regulation and

outcome expectancy value were SCT constructs measured in a number of the studies assessing physical activity patterns, as such, these two constructs were chosen as mediating variables (MV). The dependent variable (DV) in this study is total days of exercise. Exercise self-efficacy was the independent variable (IV). Self-regulation and outcome expectancy value were considered the mediating variables (MV). Exercise behavior is the dependent variable (DV).Exercise self-efficacy and self-regulation are hypothesized to be significantly related to the DV. Outcome expectancy value is projected to mediate the relationship between the IV and the DV. Below are the steps completed for the mediation analyses:

Step 1: To show the IV is correlated to the DV, exercise behavior will be regressed on exercise self-efficacy. This step will establish that there is an effect that may be mediated. (Estimate path *c*; X-Y)

Step 2: To show that the IV is correlated with the MV, Self -regulation and outcome expectancy value will be regressed on self-efficacy, separately. (Estimate path *a*; X-M)

Step 3: To show that the mediator affects the DV, self-regulations will be regressed upon exercise behavior controlling for self-efficacy. In a separate equation outcome expectancy value will be regressed upon exercise behavior controlling for self-efficacy. It is not enough to correlate the mediator with the outcome variable because the mediator and outcome may be correlated because they are both caused by the independent variable X. Thus the IV must be controlled in establishing the effect of the mediator on the outcome (Baron & Kenny, 2013). (Estimate path b; M--Y)

Step 4: To establish that MV completely mediates the IV and DV relationship, the effect of IV (X) on DV (Y) controlling for M (path *c'*;) should be zero.

If three steps are met but Step 4 is not, then partial mediation is indicated.

Mediation Model:

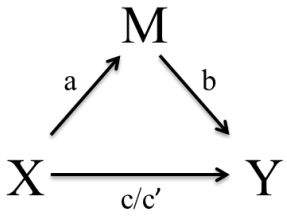

Table 2. Dissertation Timeline

Project Timeline	Spring 2014	Fall 2014	Spring 2015
IRB Approval			
Data Collection			
Data Collection End			
Data Analysis			
Completion of Study			
Reporting Results			

CHAPTER IV

RESULTS

Subjects

Two hundred and fifty-four former athletes responded to the recruitment emails (Appendix E) sent between May 4, 2014 and October 31, 2014. One hundred and eighty participants completed the questionnaire with 120 being useable. Originally, only University of Mississippi former student athletes who participated in sport between 2009 and 2013 were recruited. However, due to the low number of student athletes in that pool, the study was amended to include University of Mississippi former student athletes who participated in sport between 2003 and 2013 were recruited. Again, due to low response rate of this group the study was amended and all former student athletes who participated at a NCAA Division I universities between 2003 and 2013 could participate. Again, response rate was not sufficient thus a final amendment occurred. The questionnaire was opened to all former student athletes from any NCAA Division I institutions who participated during any time period. Descriptive data for the group are shown in Table 3. The questionnaire was distributed through administrators in the athletic departments and snowball sampling. The introduction to the questionnaire invited participants to forward the email to their friends who also participated in sports at the university.

Table 3. Descriptive Group Data

Characteristic			Frequency	Percent
Race				
	Missing		7	5.8
	Black		23	19.2
	Hispanic		1	0.8
	White		89	74.2
		Total	120	100.0
Gender				
	Missing		6	5.0
	Female		64	53.3
	Male		50	41.7
		Total	120	100.0
Age				
	Missing		7	5.8
	20-30		58	48.3
	31-50		37	30.8
	50-74		18	15.0
		Total	120	100.0

Race was consistent with that of NCAA Division I student athletes (NCAA, 2014). The sample was recruited from 22 NCAA Division I institutions located in the United States. The majority of participants were former student athletes at the University of Mississippi (66%), eight percent of participants were from the University of Florida; the University of Georgia and Rice University had the next highest percentage (3% each). Other participating institutions included The Ohio State University, The University of Texas, The University of Pittsburg and The University of Oklahoma. A breakdown of sports is in Table 4. The questionnaires were open for approximately 6-month period.

Table 4. Sports Identified by Participants

Sport	Frequency	Percent
Missing	7	5.8
Baseball	10	8.3
Football	26	21.7
Men's Basketball	4	3.3
Men's Tennis	6	5.0
Men's Track & Field	3	2.5
Rifle	1	0.8
Soccer	4	3.3
Softball	6	5.0
Volleyball	9	7.5
Women's Basketball	24	20.0
Women's Golf	7	5.8
Women's Track & Field	7	5.8
Other	6	5.0
Total	120	100

Social Cognitive Variables

Data were collected on three social cognitive variables: self-regulation, exercise self-efficacy and outcome expectancy value (Appendix A, B, C). These variables were chosen because they are potentially modifiable in an educational environment. The descriptive data for Social Cognitive Variable are shown in Table 5.

Table 5. Descriptive Statistics for Social Cognitive Variables and Total Days of Exercise

	Minimum Score	Maximum Score	Mean Score	Std. Deviation
Exercise Self-Regulation	2	59	41.81	9.85
Exercise Self Efficacy	7	100	69.95	22.36
Outcome Expectancy Value	52	266	148.32	50.23
Total Days Exercise	0	7	4.04	2.19

N=120

Physical Activity

Exercise was measured using the 7-Day Physical Activity Recall instrument (Appendix D). The Department of Health and Human Services (USDHHS), the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) agree that 150 minutes of moderate exercise per week sufficient for health benefits, although the USDHHS expressed that the 150 minutes could be accumulated in various ways. However, the ACSM/AHA recommendations suggest that adults engage in at least 30 minutes of moderate intensity activity at least 5 days per week. The researchers agree with this standard and applied it to this project, so only participants who accumulated 30 minutes of exercise in a day were credited for a day of exercise. It is the researcher's position that obtaining 120 minutes, two hours, in one day and thirty minute over another is not sufficient for substantial health benefits thus ACSM/AHA guidelines were used to measure total days exercised.

Correlations

Correlates of exercise have been examined across many populations, yet relatively few studies have examined correlates of theoretical mediators of exercise in former student athletes. The correlations between SCT variables and total days exercise ranged from r=.362 to r=.573 ($p<.001$) (see table 6). Age was negatively correlated to exercise self-efficacy r=-.227 (p=.016). Age was not significantly correlated with other SCT variables. Multicollinearity is a condition that occurs when more than two predictors correlate very strongly. If two variables are highly correlated they essentially are measuring the same characteristics which would make it difficult to ascertain which variable is more relevant (Meyers, Gamst, & Guarino, 2006). To address this concern in the regression equations, collinearity diagnostics tests were conducted including assessments of tolerance and VIF. Results of self-regulation test (T=.693; VIF=1.44) and

outcome expectancy value test (T=.799; VIF=1.25) suggests that multicollinearity was not an issue for these analyses.

Table 6

Social Cognitive Theory Constructs and Total Days of Exercise Correlation Matrix

	EXSR	EXSE	OEV
EXSE	.554		
OEV	.573	.448	
TotEx	.565	.472	.362

Abbreviations: Exercise Self-Regulation (EXSR); Exercise Self-efficacy (EXSE); Outcome Expectancy Value (OEV);
Total Days of Exercise (TotEx)

All correlations were significant at p=.001 level (2-tailed)

Mediation Analysis

A mediating variable is defined as a variable that further explains the relationship between the independent and dependent variable. A mediating framework provides a methodical way to evaluate theory, thus, identifying which constructs of the theory are effective in increasing exercise behavior. Three regression equations were used to determine the mediating effect of self-regulation on total days of exercise and outcome expectancy value on total days exercise.

Total days' of exercise was the dependent variable; self-efficacy was the independent variable with self-regulation and outcome expectancy value being the mediators. Two separate regression tests of mediation were conducted, one for self-regulation and one for outcome expectancy value. Based on Baron and Kenny (1986), the following regression equations were used to test mediation: Equation 1) regress total days of exercise on self-efficacy; Equation 2)

regress self-regulation and outcome expectancy value on self-efficacy, separately; Equation 3) regress self-regulation and outcome expectancy value will be regressed on total days of exercise controlling for self-efficacy separately. If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the first. The results of the mediating analysis for self-regulation are shown in Table 7. The results of the mediation analysis for outcome expectancy value are shown in Table 8.

Table 7

Mediation Analysis for Self-Regulation, Self-efficacy and Total Days Exercise

	B	SE	Sig.	R^2
Equation 1	.046	.008	<.001	.223
Equation 2	.243	.034	<.001	.306
Equation 3(SR)	.097	.020	<.001	.356
Equation 3(SE)	.023	.009	<.011	.356

Equation 1: IV regressed on DV; Equation 2: MV regressed on IV; Equation 3: MV regressed on DV controlling for IV (IV: Self-efficacy; MV: Self-regulation; DV: Total days exercise)

A mediating effect was found for self-regulation: Equation 1) regress self-efficacy on total days' exercise; Equation 2) regress self-regulation on self-efficacy; Equation 3) regress self-regulation on total days exercise controlling for self-efficacy. The Preacher and Hayes (2008) procedures for estimating indirect effects in mediation models were used for significance testing. The results of the Sobel test for self-regulation suggested a statistically significant indirect effect (t=2.58, se=.0059, p=.0110). These results supported through calculation of 95% biased corrected confidence interval trails (lower= .0105; upper=.0411; se=.008) based on bootstrapped

sample of 5000 trails. Self-regulation accounted for 35% percent of variance in total days exercise in the model.

Table 8

Mediation Analysis for Outcome Expectancy Value, Self-efficacy and Total Days Exercise

	B	SE	Sig.	R^2
Equation 1	.046	.008	<.001	.223
Equation 2	1.003	.185	<.001	.200
Equation 3(OEV)	.008	.004	<.038	.252
Equation 3(SE)	.038	.009	<.001	.252

Equation 1: IV regressed on DV; Equation 2: MV regressed on IV; Equation 3: MV regressed on DV controlling for IV (IV: Self-efficacy; MV: outcome expectancy value; DV: Total days exercise)

A mediating effect was found for outcome expectancy value. Equation 1) regress self-efficacy on total days' exercise, Equation 2) regress outcome expectancy value on self-efficacy Equation 3) regress outcome expectancy value on total days exercise controlling for self-efficacy. The Preacher and Hayes (2008) procedures for estimating indirect effects in mediation models was used for significance testing. The results of the Sobel test for outcome expectancy value suggested a statistically significant indirect effect (t=4.34; se=.0088, p=.001). These results supported through calculation of 95% biased corrected confidence interval trails (lower= .0013; upper=.018; se=.004) based on bootstrapped sample of 5000 trails. Therefore outcome expectancy value scores mediated changes in total days' exercise. The outcome expectancy value accounted for 25% of the variance in total days' exercise in the model.

Summary

The present study was designed to understand the relationships between selected SCT variables and exercise in a sample of former student athletes. Specifically, we examined associations between self-regulation, self-efficacy, outcome expectancy value and total days' exercise in former student athletes. Consistent with previous studies, self-efficacy was related to total days' of exercise. The relationship between self-efficacy and total days' exercise was mediated by self-regulation and outcome expectancy value.

There was enough evidence to reject the following hypotheses:

Ho1: Self-efficacy will not be significantly related to total days of exercise.

Ho2: Self-efficacy will not be significantly related to self-regulation.

Ho3: Self-regulation will not be significantly related to total days of exercise.

Ho4: Self-regulation will not mediate the relationship between self-efficacy and total days of exercise.

Ho5: Self-efficacy will not be significantly related to outcome expectancy value.

Ho6: Outcome expectancy value will not be significantly related to total days of exercise.

Ho7: Outcome Expectancy value will not mediate the relationship between self-efficacy and total exercise.

CHAPTER V

DISCUSSION

This chapter provides a review of the background and findings from this research. Following that a detailed review of social cognitive theory constructs and a comparison of the current results with prior research will be provided. This chapter will also review the subscales of the self-regulation constructs in detail and consider how each might relate to a NCAA student athlete's experiences. Then implications of this research will be covered and some recommendations for future research. A description of limitations of this study will then be offered with closing thoughts.

Most student athletes must transition from a structured physical training environment to one of self-management once they finish their college eligibility. Until recently, support systems for student athletes' failed to consider student athletes transition from the college environment. In 1994, the NCAA launched the CHAMPS Life Skills program to address this concern. In short, CHAMPS Life Skills promotes programming to address student athletes' academic, athletic, social responsibilities and personal development. Considering personal development, many areas are covered, including nutrition, healthy relationships, stress management and manners yet physical activity is not among the skills addressed. Student athletes are physically active while in college and receive many benefits from their physical activity, including lower risk of diabetes, lower risk of breast cancer and increased life expectancy (Frisch et al., 1985; Wyshak & Frisch,

2000; Sarkna, Sahl, Koskenvuo, and Kario,1993). These benefits are lost when physical activity is discontinued.

Prior researchers have found that former student athletes are less active after graduation. Sorenson found that current student-athletes reported a substantially higher volume of weekly exercise and perceived exercise importance. These differences were not found between alumni student-athletes and non-student athlete alumni (Sorenson, 2012). In a pilot study of former student athletes, Davis and Hallam (2012) found 45% of participants were not meeting USDHHS physical activity guidelines. Reifsteck (2014) found that approximately 25% of the former athletes in her study were sedentary the previous six months. These results signal a need to understand how to increase the physical activity patterns of the student athletes. This project was planned to investigate how the social cognitive constructs of self-regulation, self-efficacy, outcome expectancy values might impact the physical activity of former student athletes'.

Self-regulation and outcome expectancy value were both mediating variables influencing the relationship between self-efficacy and total days' exercise. Forty-five percent of participants in this study did not meet ACSM/USDHHS physical activity guidelines. The results of the present study are in agreement with the findings of previous studies on adults and college students (Hallam & Petosa, 2004; Wadsworth & Hallam, 2010). These results provide a starting point for better understanding a social cognitive perspective for explaining exercise behavior in former student athletes.

Social Cognitive Theory Variables

Bandura's (1986) social cognitive theory postulates that the person, the environment, and the behavior of that person all influence each other. Within SCT, behavior is depicted as

dynamic, depending on the environment and the person, all of which influence each other in a relationship referred to as reciprocal determinism. SCT's major constructs include reciprocal determinism, self-efficacy, the environment, situation, behavioral capability, outcome expectancy values, observational learning, reinforcements, emotional coping responses and self-regulation/self-control. During the literature review process, it was determined that self-efficacy, self-regulation and outcome expectancy value are SCT constructs which are strongly related to physical activity and may impact physical activity or exercise when the variables are modified through intervention programming.

The self-efficacy and outcome expectancy value scores for former student athletes were similar to that of adults and university students in Hallam and Petosa (1998) and Wadsworth and Hallam (2010) studies which assessed the same SCT variables (Table 8). The finding that outcome expectancy and self-efficacy scores from former student athletes were similar to and not higher than those of non-athletes in prior research was unexpected. It had been predicted that self-regulation would be lower for student athletes than for other populations which was not the case. It had been anticipated that because student athletes' are accustomed to executing planned training regimens from strength and conditioning coaches (planned by others) that their self-regulation skills would be lower than other adult samples. Yet, the self-regulation score percentage was higher for former student athletes than that of the other populations (Table 9).

Table 9

Mean Baseline SCT Variable Scores for Hallam & Petosa's (1998) Worksite Sample and Wadsworth and Hallam (2010) University Sample and the Former Student Athletes Sample Mean

SCT Variable	Worksite Sample	University Sample	Former Athletes
Self-regulations (comps)	100.05 ± 28.56	89.30±25.58	41.81±9.85*
Treatment	92.61±24.79	91.07±27.14	
Self-efficacy (comps)	62.89±14.79	55.02±17.45	69.95±22.36
Treatment	59.78±18.91	59.47±15.86	
Outcome Expectancy Value	133.67±35.59	113.59±37.09	148.32±50.23
Treatment	133.44±34.30	113.56±33.84	

Comps=comparison group; *Self-regulation for former student athletes (12-60); because self-regulation scales were different for former athletes, scores were taken and divided by the highest score to get a percentage score for which to compare. Worksite Sample Self-regulation (comps) percentage (.465) treatment (.430); University Samples self-regulation (comps) percentage (.415) and treatment (.423); Former athletes (.697).

Twenty one percent of the student athletes did not meet USDHHS physical activity guidelines while forty five percent of student athletes did not exercise five days a week as recommended by ACSM (2015) and American Heart Association (2014) though their SCT scores were similar to their peers who were successful at meeting recommendations. For a portion of the population of study there seemed to be a disconnect between their reported use of SCT variables and their ability to exercise.

Because student athletes are in an environment that supports physical activity, they have to exercise little control over their personal behavior until the structure is gone; once the person's environment changes, from a practical perspective, the behavior changes. The question becomes:

when there are no facilities or no access to facilities does the individual have the skills to regulate their physical activity? Bearing in mind the six subscales of self-regulation; self-monitoring, goal setting, time management, social support, reinforcement and relapse prevention, student athletes may not have to do much self-monitoring. Strength and conditioning coaches, as well as sports coaches, monitor much of the student athletes' physical activity behavior, they are instructed when to exercise and how much exercise is necessary. Taking into account goal setting, much of the goals student athletes' set, specifically in team sports, are set as it pertains to what is best for the team. In cases of individual sports this is different. A large amount of the student athlete's time is set by academics, practice, game, and travel times, along with other activities set by support staff.

Even when not in season, a training schedule is provided and must be kept thus time management as it pertains to physical activity is not a concern because it is structured for the athlete. Considering social support, student-athletes have their peers' and coaches' support while training, support may or may not be present when eligibility ends. Taking into account reinforcement and relapse prevention, if training does not occur, the student-athlete is well aware that their playing time can be impacted which for the most part in and of itself is a deterrent to missed training sessions along with any punishments which may go along with missing training sessions. The only time a student athlete may have to manage when to exercise and where to exercise would be if they go home for the summer, still, in most cases, strength and conditioning coaches send workout regimens with the athlete. These assessments are the experiences of the research who participated in sport during college. As indicated from the information above, there are many influences on the multiple subscales of self-regulation that impact student athletes. For this reason, it is recommended that future research use the 43-item self-regulation instrument.

Implications

The struggles former student athletes face were recently made evident by the NBC television show "Biggest Loser, Glory Days." Many of the participants on the show were not only former student athletes but were also former professional athletes (Silverman, Broome, Gaha, Katz, Relampagos, Franklin, Roth, & Nelson, 2014). All of the former athletes struggled with their weight and were overweight or obese. Though this group is small, the researcher believes this group is a microcosm of a much larger problem in this population. As previously stated, findings from Davis and Hallam (2012), Sorenson (2012) and Reifsteck (2014) all suggest that many former athletes become less active upon graduation and in some instances are less active than non-athlete peers. Forty five percent of the participants in this study did not meet ACSM/USDHHS physical activity guidelines. Sixteen percent of these participants did not exercise in the last seven days. These studies suggest the need to address this issue. It is the researcher's position that physical activity should be included in the CHAMPS Life Skills personal development commitment, in particular the exercise component of physical activity.

Currently approximately 160,000 student have participated in Division I sports. If 45% of these individuals were to discontinue physical activity, 72,000 individuals would potentially not meet exercise requirement with 25,600 potentially becoming sedentary. Student athletes are regular exercisers during their collegiate athletic careers and there are several benefits received from long-term athletic activity, including lower risk of diabetes and breast cancer (Frisch et al., 1985). Sarkna, Sahl, Koskenvuo, and Kario (1993) found in a Finnish study that life expectancy on male elite athletes was significantly higher than the referent groups. Approximately 5 million deaths in 2008 could be attributed to inactivity making inactivity comparable to the established risk factor of smoking and obesity (Lee, Shiroma, Lobelo, Puska, Blair & Katzmarzyk, 2012).

The potential 32,000 former student athletes who were regular exercisers receiving the aforementioned benefits now potentially add to the millions of deaths attributed to inactivity. These findings support the importance of athletes continuing to be active.

Because the student-athletes SCT variable scores and exercise rates are similar to that of the general population, this group may be treated in the same manner as other populations. As with Hallam and Petosa's (2004) research with adults suggests, selected SCT variables are changeable in a brief intervention. Such an intervention is plausible for use with current student athletes. Similarly, Suminski and Petosa (2006) and Wadsworth and Hallam (2010) used web-based interventions successfully to increase knowledge of their SCT strategies and self-regulation skills, respectively. These type programs may be useable for student athlete programming.

Future Research

Social Cognitive Theory offers a systematic approach to inform, guide and enable people to adapt habits that promote health and reduce those that harm it (Bandura, 1991). Student athletes' training is structured and supervised. Student athletes perform the carefully planned training regimen under the guidance of their coaches and strength and conditioning coaches. They also receive oversight from trainers, dieticians, sports psychologist and academic counselors at their disposal. Fazenda a former University of Southern California swimmer said, "Everything is totally planned out for you, class scheduling, practice hours and tutoring. I am the kind of person who thrived as an athlete because I did great with structure," (Sorenson, 2014). This is an example of how a former student athlete may not possess the skills to regulate their own physical activity upon graduation. The question again is what happens when the structure is

no longer provided? Bandura (1991) posits one's current behavior is continuously made in reference to one's past performance. From the brevity of research on student athletes, it appears that some former athletes manage their physical activity well while others become sedentary or do not meet the physical activity guidelines set by ACSM/USDHHS. Future research is needed to address this disconnect.

Self-incentive affects behavior mainly through motivation function, when reward and self-satisfaction are conditioned upon certain accomplishments these things motivates the individuals to expend the efforts needed to attain the required performance (Bandura, 1991). David Epstein, a sports writer and former middle distance runner stated, "There is this feeling that all college athletes are internally motivated. But from seeing what became of my own training and partners from college, I think some of them were motivated by being good and basically went cold turkey when their competitive days were over," (Sorenson, 2014). This may mean once motivation based on being accomplished at one's sport is over, student athletes find it difficult to find a source of motivation. Further research may address what motivates former student athletes to continue being physically active once their collegial careers end.

More research is necessary to ascertain what drives the physical activity patterns of other former student athletes. It may also be of interest to assess if there might be group differences. Do individuals who participate in team sports have different physical activity patterns when compared to those who do not? Research in the development of programs to help student athletes as they transition from a world of structured planned exercise regimen into the world with no structure, would be of great value. At the time of this dissertation there was no known or published programming designed to help student athletes with this transition. Because there is

limited published literature on this population and their physical activity patterns, this study will expand the body of knowledge for the population.

Self-regulation is a multifaceted phenomenon operating through a number of subsidiary processes. Successful self-regulation partly depends on faithful and consistent self-monitoring. Self-monitoring provides information for setting realistic goals and evaluating progress towards goals. Individuals who reward their own achievement usually accomplish more than those who perform the same activities under instruction but without self-incentives (Bandura, 1991). Furthermore, a person who is intention, motivated and self-regulated will be more successful (Bandura, 2001). Doing things intentionally involves not only the deliberative ability to make choices and action plans, but the ability to give shape to appropriate courses of action and to motivate and regulate their execution (Bandura, 2001). These types of skills are needed in programs that wish to assist student athletes in continuing to be physically active. The goal of programing should be to provide student-athletes with the skills necessary to transition from being other-regulated towards self-regulation; from having access to facilities to potentially not having a place to work out, while helping student athletes find what motivates them to stay physically active. It appears that outcome expectancy value, what individuals expect when they exercise and the value they place on it, is not a sufficient motivator.

Conclusion

One goal of the study was to inform the development of physical activity programs and programs like the NCAA's CHAMPS Life Skills program in an effort to facilitate participation in a physically active lifestyle for college student athletes. The following suggestions are offered to assist in the design of future SCT research on student athletes. Incentives should be offered to increase participation rates as it was difficult to get participation for this study. If possible more

than one supporter should be garnered from athletic departments as any turnover during your study could cause problems with soliciting participants. Support from several institutions should be garnered to decrease the time spent soliciting participants and to improve the external validity findings.

The results need to be considered in the context of the limitations of this study. A nonrandom convenience sample was used. Because a convenience sample was used instead of random selection of participants, generalizability of the results is limited to this sample. Another limitation is the study relied on self-report of physical activity.

Despite its limitations, this research has a number of strengths first, although previous research examined the relationship between self-regulation and performance, to the researcher's knowledge, it is the first known study to explore SCT variables with this population. The fact that the study's findings were consistent with those of other studies argues for the reliability of the results. Secondly, the results suggest that student athletes become less active upon completion of their collegial careers which would not be expected. It has been suggested that the best predictor of future behavior is past behavior yet, for a large number of the athletes, proportion of time spent in physical activity decreases, sometimes dramatically, after their competitive careers end. This exploratory research is a good point for better understanding a social cognitive perspective on explaining exercise behavior in former student athletes.

Finally, student athletes' physical activity is of little concern during their college careers. Yet, research suggests, many student athletes' physical activity patterns decrease upon graduation. Self-efficacy is a necessity for one to sustain physical activity but it does not work independently. This study found evidence to suggest that self-regulation and outcome expectancy value mediate the influence self-efficacy has on student athlete physical activity behavior. This

study also provides evidence that self-efficacy, self-regulation, outcome expectancy values are predictors of physical activity. There is also evidence to suggest that student athletes' may be treated in the similar manner to that of the general population when considering interventions. The CHAMPS Life Skills program offers and opportunity for institutions to addressed the aforementioned concerns. The goal of such programs should strive to provide student athletes with the skills necessary to transition from being other regulated towards self-regulation upon graduation. The researcher believes student athletes' are a population few envision as having issues when it comes to being physically active but as presented here, many struggle to continue the physically active lifestyle they have sustained over the years, once sport is not a part of the equation. This is exploratory research and a good starting point for better understanding this population's physical activity behavior but there is much work to be done.

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LIST of APPENDICES

APPENDIX A: MODIFIED SELF-REGULATION INSTRUMENT

This part of the survey is about things (activities) that you may have done in the past 4 weeks. People use different ways (techniques) to help them be physically active on a regular basis. In thinking about the physical activities you performed during the last four (4) weeks, please answer the following questions (please **circle** your answer using the 5-point scale below).

PLEASE BE SURE TO ANSWER EVERY QUESTION.

1 Never	2 Rarely	3 Sometimes	4 Often	5 Very Often

Please choose the response that best represents how often you used each technique in the <u>past four (4) weeks</u>:	**Rating 1-5**				
1. I mentally kept track of my physical activities.	1	2	3	4	5
2. I mentally noted specific things that helped me exercise.	1	2	3	4	5
3. I set short term goals (daily or weekly) related to how often I am exercise.	1	2	3	4	5
4. I set exercise goals that focused on my health (e.g. improved blood pressure, improved function).	1	2	3	4	5
5. I asked someone for advice or demonstration of exercises.	1	2	3	4	5
6. I asked a exercise expert/health professional for advice or demonstration of exercises.	1	2	3	4	5
7. After I was exercise, I focused on how good it felt.	1	2	3	4	5
8. I reminded myself of health benefits of exercise (e.g. improved blood pressure, improved function, and weight loss).	1	2	3	4	5
9. I mentally scheduled specific times to exercise	1	2	3	4	5
10. I rearranged my schedule of other activities to ensure I had time to exercise.	1	2	3	4	5
11. I purposely planned ways to exercise when I was on trips away from home.	1	2	3	4	5
12. I purposely planned ways to exercise during bad weather.	1	2	3	4	5

APPENDIX B: SELF-EFFICACY INSTRUMENT

Self-Efficacy

Using the scale below as a yardstick, please answer the following: How confident are you that you could do the following:

0%-----10%-----20%-----30%-----40%-----50%-----60%-----70%-----80%-----90%-----100%

I cannot do it at all Moderately certain that I can do it Certain that I can do it

I could:	Confidence rating (0-100%)
Exercise when tired	_____
Exercise during or following a personal crisis	_____
Exercise when feeling depressed	_____
Exercise when feeling anxious	_____
Exercise during bad weather	_____
Exercise when slightly sore from last time I exercised	_____
Exercise when on vacation	_____
Exercise when there are competing interests	_____
Exercise when I have a lot of work to do	_____
Exercise when I haven't reached my exercise goal	_____
Exercise when I don't receive support from my family or friends	_____
Exercise when I have not exercised for a prolonged period of time	_____
Exercise when I have no one to exercise with	_____
Exercise when my schedule is hectic	_____
Exercise when my exercise workout is not enjoyable	_____

APPNEDIX C: OUTCOME EXPECTANCY VALUE INSTRUMENT

Please complete the phrase I exercise to…for each item. Please circle a number that represents how often (FREQUENCY) and the value (IMPORTANCE) for each item:

EXAMPLE FREQUENCY IMPORTANCE

I exercise to:	Never	Rarely	Some Times	Often	Very Often	Low Value	Med Value	High Value
Build Muscle	1	2	3	4	5	1	2	3

	FREQUENCY					IMPORTANCE		
I exercise to:	Never	Rarely	Some Times	Often	Very Often	Low Value	Med Value	High Value
Improve my health	1	2	3	4	5	1	2	3
Stay in shape	1	2	3	4	5	1	2	3
Release tension	1	2	3	4	5	1	2	3
Maintain/lose weight	1	2	3	4	5	1	2	3
Enhance my self-image and appearance	1	2	3	4	5	1	2	3
Improve my physical attractiveness	1	2	3	4	5	1	2	3
Feel a positive psychological effect	1	2	3	4	5	1	2	3
Experience a sense of accomplishment	1	2	3	4	5	1	2	3
Enjoy the activity	1	2	3	4	5	1	2	3
Improve metal alertness	1	2	3	4	5	1	2	3
Cope with life's pressures	1	2	3	4	5	1	2	3
Have fun/enjoyment	1	2	3	4	5	1	2	3
Feel younger	1	2	3	4	5	1	2	3
Spend time with friends	1	2	3	4	5	1	2	3
Be a member of a team	1	2	3	4	5	1	2	3
To earn the respect of others for my skills	1	2	3	4	5	1	2	3
Spend time with family	1	2	3	4	5	1	2	3
Feel the thrill of victory	1	2	3	4	5	1	2	3
Feel the thrill of competition	1	2	3	4	5	1	2	3

APPENDIX D: 7-DAY PHYSICAL ACTIVITY RECALL

Please record how much exercise you did in the last **SEVEN** days. Please place your exercise into one of the two categories: exercise that is **NOT EXAUSTING** or exercise that makes your **HEART BEAT RAPIDLY**.

Please do **not** record any **LIGHT** exercise (such as bowling, golfing with a motorized cart, or walking from your car to your house).

- Record only the time you actually exercised. Do not count breaks and rest periods.
- List the activity that you did when you exercised.
- Please ☑ the BOX if you did ***NOT*** exercise during the last seven days.

☐ I did ***NOT*** exercise in the last seven (7) days

Exercise that is **NOT EXHAUSTING** examples include: brisk walking, lifting weights, calisthenics, sports, doubles tennis, volleyball, water jogging, water aerobics	Exercise where your **HEART BEATS RAPIDLY** examples include: running, swimming, cycling, aerobics, strenuous sports such as singles racquetball or tennis, soccer, basketball

	Total Minutes	LIST ACTIVITY	Total Minutes	LIST ACTIVITY
Sun				
Mon				
Tue				
Wed				
Thurs				
Fri				
Sat				

APPENDIX E: RECRUITMENT EMAIL ALUMNI ATHLETES

Dear Former Student- Athlete,

My name is T. Davis and I am a graduate student at the University of Mississippi. I am conducting research for my dissertation on the physical activity patterns of former University of Mississippi student athletes who played at Ole Miss from 2003-2013.

Your e-mail address was obtained from one of your university, associates, former coaches, friends or fellow teammates. I would appreciate your help in my research project and ask you to take about the time to complete a questionnaire about your physical activity behavior. I cannot offer incentives for participation but your assistance is greatly appreciated.

In addition, please forward this email to other former student athletes who participated at your university as I would like to collect as many questionnaires as possible. The questionnaire is anonymous. Those who choose to complete the survey can go to the link below to participate. By completing the survey you are giving your consent to participate in this study. Your responses are important and I hope that you will agree to participate. This survey will take about 15 minutes.

This study has been reviewed by the University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns regarding your rights as a research participant, please contact the IRB at (662).915.7482 protocol number 14x-227. Thank you very much!

If you have problems accessing the survey or any other questions, please contact:

T. Davis
662.915.3459
ttdavis@olemiss.edu

Link to Survey

APPENDIX F: RECRUITMENT EMAIL ALL ATHLETES

Dear Former Student- Athlete,

Hello my name is T. Davis and I am a graduate student at the University of Mississippi. I am conducting research for my dissertation on the physical activity patterns of former Division I student athletes.

Your e-mail address was obtained from one of your university administrators, associates, former coaches, friends or fellow teammates. I would appreciate your help in my research project and ask you to take the time to complete a questionnaire about your physical activity behavior. I cannot offer incentives for participation but your assistance is greatly appreciated.

In addition, please forward this email to other former student athletes who participated at your university as I would like to collect as many questionnaires as possible. The questionnaire is anonymous. Those who choose to complete the survey can go to the link below to participate. By completing the survey you are giving your consent to participate in this study. Your responses are important and I hope that you will agree to participate. This survey will take about 20 minutes.

This study has been reviewed by the University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns regarding your rights as a research participant, please contact the IRB at (662).915.7482 protocol number 14x-227. Thank you very much!

If you have problems accessing the survey or any other questions, please contact:

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Link to Survey

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