

AN ABSTRACT OF THE THESIS OF

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Title: The Effects of a S.M.A.R.T. Goal Setting and Self-Monitoring Intervention on Physical Activity and Fitness in Middle School Students

Abstract approved:

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A large body of evidence suggests physical activity is inversely associated with several cardio-metabolic risk factors among children and adolescents. Despite these health benefits, a majority of youth are not meeting the physical activity guidelines set forth by the USDHHS. Schools have been identified as an ideal vehicle for interventions; however, research evidence indicates school-based interventions are not effective at increasing outside of school physical activity. Goal setting may be a potential effective strategy for increasing physical activity among youth; however no previous studies have examined the effects of goal setting on cardiorespiratory fitness and physical activity in middle school students. Therefore, the purpose of this study is to evaluate the effects of a S.M.A.R.T. goal setting and self-monitoring intervention on fitness and physical activity in middle school students.

Two middle schools in Tallahassee, FL participated in this study. One school

served as the intervention and the other served as a delayed intervention measurement only control. The students in the intervention school completed a one-time S.M.A.R.T. goal setting lesson. During the lesson, students were taught the definition of a goal, the importance of goal setting, and how to set S.M.A.R.T. goals. As part of the lesson, students completed a S.M.A.R.T. goal setting worksheet. The objectives of the worksheet activity were to teach students the concepts of S.M.A.R.T. goal setting and to apply this knowledge by creating personal fitness goals. Student fitness goals were entered into an interactive website that acted as a self-monitoring tool. Before and after the intervention, participating students completed a survey assessing student demographics, physical activity, and physical activity self-efficacy. Cardiorespiratory fitness levels, assessed by the PACER test, were also measured pre and post. Between-group differences in post-test scores, adjusted for baseline levels, were assessed for statistical significance using ANCOVA. Additional covariates included gender, race/ethnicity, grade level and weight status.

After adjustment for baseline levels, students in the intervention school exhibited significantly higher PACER laps in comparison to the control school ($(F_{(1,257)} = 58.0) p < 0.0001$). The PACER scores in intervention school increased from 40.6 laps to 45.9 laps while the PACER scores in the comparison school decreased. There were no significant between-group differences for physical activity or self-efficacy

Although these results require replication in larger studies using a group randomized study design and objective measures of physical activity, the results suggest that teaching students about S.M.A.R.T. goal setting may be a potentially effective strategy for increasing fitness in middle school students and worthy of further investigation

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The Effects of a S.M.A.R.T. Goal Setting and Self-Monitoring Intervention on Physical
Activity and Fitness in Middle School Students

by
Samantha M. McDonald

A THESIS

Submitted to
Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Presented July 19, 2012
Commencement June 2013

Master of Science thesis of Samantha M. McDonald presented on July 19, 2012.

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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ACKNOWLEDGMENTS

The author expresses sincere appreciation to the following people who played an important role in the success of this thesis. First and foremost, I would like to thank Dr. Stewart Trost, my advisor, as he aided in the development, editing, and the final presentation of this work. Furthermore, I cannot express enough gratitude for the research opportunities and skills gained during this program. Secondly, I would like to thank Adam Faurot, Jen Ace, Liz Action and the rest of the Titus Academy staff for their support and hard work during the entirety of this thesis. I would also like to thank the faculty, staff and students at Riversprings and Blountstown middle schools for their support and participation in this study. Next, I would like to thank my committee members, Dr. Marit Bovbjerg, Dr. Deborah John and Dr. Randall Rosenberger, for their support and critical comments during this process. I would also like to thank my family for their unwavering support for my education and future endeavors. Lastly, I would like to thank Tony Casler, my better half, for the unbelievable support through all the trials and triumphs over the past few years, thank you.

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The Effects of a S.M.A.R.T. Goal Setting and Self-Monitoring Intervention on Physical Activity and Fitness in Middle School Students

CHAPTER ONE

INTRODUCTION

Since the 1980s, the prevalence of obesity has dramatically increased among US children and adolescents. In the most recently-published results from the National Health and Nutrition Examination Survey (NHANES 2007-2008), 19.6% of children aged 6 to 11 years and 18.1% of adolescents aged 12 to 19 years were obese. Although recent studies have identified a plateau in these obesity rates, the high prevalence of childhood obesity remains a public health concern (Ogden et al., 2006, 2010). Obesity in youth is associated with an elevated risk for diabetes mellitus, metabolic syndrome, orthopedic disorders and adverse social consequences (Barlow, 2007). Moreover, obesity during adolescence may track into adulthood and potentially increase the risk for more severe chronic diseases later in life (The et al., 2010).

Evidence suggests that, among youth, physical activity is inversely associated with adiposity and positively associated with favorable health outcomes such as increases in bone mineral density, decreases in depression and anxiety, and improvements in sleep patterns (Janssen and LeBlanc, 2010; Janz et al., 2010; Strong et al., 2005). On the basis of this evidence, the US Department of Health and Human Services recommended that youth accumulate 60 or more minutes daily of aerobic

strengthening activities on at least three days of the week. However, results from population-based objective monitoring studies indicate that the majority of US children fail to meet the 60 minute guideline. In the 2003-2004 cycle of NHANES, only 42% of children aged 6 to 11 years and 7.6% of adolescents aged 16 to 19 years accumulated 60 minutes or more of moderate-to-vigorous physical activity daily (Troiano et al., 2008).

To address this problem, researchers have designed and tested interventions aimed at promoting physical activity among children and adolescents, most commonly in the school setting. Schools have been identified as an efficient vehicle for physical activity interventions for several reasons: nearly 100% of youth can be reached, the availability of facilities, and the availability of health promoting staff (Trost & Loprinzi, 2008). However, evidence from several systematic reviews suggests that school-based physical activity interventions are mainly effective at increasing in-school physical activity. Evidence of effectiveness for out-of-school physical activity is limited (Dobbins et al., 2009; Kriemler et al., 2011).

Interventions that teach students physical activity self-management skills such as goal setting and self-monitoring may be more effective at promoting physical activity outside of school than interventions that modify the school physical education curriculum or school environment. However, to date, few studies have evaluated the effects of goal-setting and self-monitoring on physical activity in youth. Studies examining the effects of goal-setting and self-monitoring have primarily been limited to

pedometer-based interventions, which have been found to be modestly effective at increasing physical activity (Lubans et al., 2009; Horne et al., 2009). However, the use of pedometers may not be feasible in all schools; and it is not clear if setting goals related to other metrics such as school fitness testing results in positive changes to both physical activity and fitness.

Therefore, the aims of this study are: (1) to evaluate the effects of a school-based goal setting and self-monitoring intervention on physical activity and physical fitness in middle school students; and (2) to examine the role of physical activity self-efficacy as a potential mediator of the intervention effects on physical activity and physical fitness. We hypothesize that students receiving instruction on fitness goal setting using the S.M.A.R.T. paradigm (Specific, Measureable, Action, Realistic, and Time), along with self-monitoring via the internet, will exhibit greater improvements in physical activity and health-related fitness parameters than students completing their usual school physical education curriculum. We further hypothesize that the improvements in physical activity and fitness will be attributable to changes in physical activity self-efficacy.

CHAPTER TWO

REVIEW OF LITERATURE

Physical activity is associated with multiple short and long-term health benefits in children and adolescents. However, despite these benefits, data from national surveillance studies such as the National Health and Examination Survey (NHANES) and Youth Risk Behavior Survey (YRBS) indicate that significant proportions of youth are not participating at sufficient levels of physical activity (Troiano et al., 2008; MMWR, 2010). Schools are an ideal setting for increasing physical activity in children and adolescents. However, aside from increasing the amount of physical activity performed during the school day, the impact of school-based interventions on physical activity outside of school has been minimal (De Meester et al., 2009; Salmon et al., 2007). Therefore, it is important to investigate interventions that may promote physical activity outside of school, as physical activity in this domain may be more predictive of physical activity participation later in life. This chapter serves as a review of the current literature related to school-based physical activity interventions in children and adolescents. First, the health benefits of physical activity among children and adolescents will be discussed followed by a summary of the descriptive epidemiology of physical activity in children and adolescents. Next, the health-related physical fitness levels of US children and adolescents will be described. After this, the literature related to school-based physical activity interventions will be reviewed. Then, goal setting theory and studies testing goal

setting and self-monitoring interventions in children and adolescents will be reviewed. Finally, self-efficacy theory and the mediating role of goal setting in the relationship between self-efficacy perceptions and physical activity behavior will be discussed.

Health benefits of Physical Activity in Children and Adolescents

Among adults there is compelling evidence for the health benefits of physical activity. Physical activity is inversely associated with several cardiovascular risk factors including hypertension, dyslipidemia, obesity, diabetes mellitus and metabolic syndrome (Blair & Morris, 2009). Unfortunately, the body of evidence for the health benefits associated with physical activity among youth is less compelling. However, recent evidence has shown that physical activity in youth is associated with reductions in adiposity, favorable blood lipid profiles, and increases in aerobic fitness, muscular strength, and bone mineral density (Strong et al., 2005; Janssen & LeBlanc, 2010; Janz et al., 2010). In addition, physical activity is associated with several mental health benefits including reductions in anxiety and depression, and improvements in academic achievement and sleeping patterns (Strong et al., 2005; Sääkslahti et al., 2004; Biddle, Gorley & Stensel, 2004).

Descriptive Epidemiology of Physical Activity in US Children and Adolescents

On the weight of the existing evidence, in 2008, the US Department of Health and Human Services (USDHHS) recommended that children and adolescents aged 6 to 17 years accumulate at least 60 minutes of physical activity daily. Furthermore, USDHHS

suggested that vigorous intensity activities be included on at least three days of the week. Muscle and bone strengthening activities are highly encouraged as part of the recommended 60 minutes of activity (UDHHS, 2008). Information regarding the percent of young people meeting the 60 minute guideline is available from national surveillance studies measuring physical activity in population-representative samples of children and adolescents.

The National Health and Examination Survey is a series of national surveillance studies that have examined the health and nutrition status of children and adolescents since the 1960s. One of the components measured is physical activity. The 2003-2004 cycle of NHANES examined physical activity levels, measured by an accelerometer, in a nationally-representative sample of US children and adolescents aged 6 to 19 years. Time spent in moderate to vigorous physical activity (MVPA) varied greatly across age groups and gender and minimally among racial/ethnic groups. Across all age groups, boys engaged in more MVPA than girls. Age-related declines occurred in both girls and boys. Among boys, MVPA decreased from 95.4 minutes in the 6- to 11-year age group to 32.7 minutes in the 16- to 19-year age group. A similar decline occurred in the girls. Among girls, MVPA decreased from 75.2 minutes in the 6- to 11-year age group to 19.6 minutes in the 16- to 19-year age group. Differences by race/ethnicity were only observed in 6- to 11 year olds, among whom non-Hispanic blacks (100.7 minutes of

MVPA) were significantly more active than non-Hispanic whites and Mexican American children, 82.7 and 83.9 minutes of MVPA, respectively.

The percentage of children and adolescents meeting the 60 minute guideline declined significantly from 42% in 6- to 11-year-olds to 7.6% in 16- to 19-year olds. Boys were more likely than girls to meet the guideline. Nearly 49% of boys aged 6- to 11-years and 11.9% of boys aged 12- to 19 -years reached the 60-minute guideline. In comparison, 34.7% of girls aged 6- to 11-years and 3.4% of girls aged 12- to 19-years met the 60-minute guideline. Compliance with the 60-minute guideline was not significantly different among racial/ethnic groups (Troiano et al., 2008).

Nader et al. (2008) longitudinally examined age-related trends in MVPA levels in a birth cohort sample of 1,032 youth participating in the National Study of Early Child Care and Youth Development. Moderate to vigorous physical activity was measured via accelerometry at age 9, 11, 12 and 15. Time spent in MVPA declined from 182 minutes per day in children aged 9 years to 49.2 minutes per day in adolescents aged 15 years. Up to the age of 12, nearly all children (83.9%-99.6%) met the 60 minutes of MVPA daily recommendation on weekdays; however, by age 15 only 31% met the recommendation on weekdays. Over the 6-year follow-up interval, boys were consistently more active than girls. Nader et al. also compared the minutes of MVPA on weekdays versus weekends in this cohort. Children engaged in significantly less MVPA on weekends, with

the weekday versus weekend differential increasing at age 9 for boys and at age 12 for girls.

The Center for Disease Control and Prevention's Youth Risk Behavior Survey (YRBS) is an on-going national surveillance study that has been conducted every two years since 1991. The YRBS monitors health-risk behaviors that account for the highest mortality and morbidity among adolescents, including drug use, dietary behaviors and physical activity. Data from the most recent YRBS (2009) indicated that only 37.1% of US high school students met the daily 60-minute guideline on five or more days per week. Boys were more likely to meet the guideline (46%) than girls (28%). Among both boys and girls, non-Hispanic whites (39.9%) were more likely than non-Hispanic black (32.6%) and Mexican American (33.1%) students to meet the 60-minute guideline. Compliance with the 60-minute guideline declined significantly and incrementally with grade level. Among boys, the prevalence of regular physical activity declined from 47.5% among 9th graders to 40.4% among 12th graders. Among girls, the prevalence of regular physical activity declined from 30.8% among 9th graders to 22.4% among 12th graders. Of concern, 23% of US high school students did not report participating in at least 60 minutes of physical activity on any day of the week (MMWR, 2010).

The Youth Media Campaign Longitudinal Survey (YMCLS) conducted by the Centers for Disease Control and Prevention from 2002-2006, assessed physical activity levels in a nationally representative sample of 9- to 13 year-old youth. The seven-day

recall survey evaluated participation in organized physical activity (i.e. recreation sports) and free-time physical activity (i.e. after-school and/or weekend activities) in the preceding week. Participation in physical activity during the school day was excluded (i.e. physical education). Baseline data in 2002 showed children aged 9 to 13 were more likely to engage in free-time physical activity (77.4%) than in organized physical activity (38.5%). Non-Hispanic whites (79.3%) were more likely to report participation in organized physical activity than non-Hispanic black (74.7%) and Hispanic children (74.6%). Children with parents of low socioeconomic status and lower education levels were less likely to report participation in organized physical activity (MMWR, 2003).

Wall et al. (2011) examined age-related trends of physical activity levels of 9 to 13 year-olds using the YMCLS data. Participation in physical activity was measured in five cohorts of 9 to 13 year-olds over five years. Age-related declines were reported for both boys and girls. Among girls aged 9 years at the beginning of the study, 30.8 % reported participating in seven or more sessions of physical activity in the preceding seven days. Five years later, the percent dropped to 23.0%. Similarly, among girls aged 13 years at the beginning of the study, daily participation rates declined from 22.3% to 15.3% over the 5-year follow-up period. Among boys aged 9 years at the start of the study, daily participation in physical activity declined slightly from 38.0% to 36.5% over the 5-year follow up. Boys aged 13 at the beginning of the study, daily participated rates declined from 50.0% to 27.0% over the 5-year follow-up.

Several general conclusions can be drawn about the epidemiology of physical activity in youth. First, a considerable proportion of children and adolescents are not meeting the recommended physical activity guidelines. Second, boys are more active than girls across all ages and race/ethnicities. Third, an age-related decline in physical activity levels occurs in both boys and girls. This decline is steeper and occurs earlier in girls. Fourth and finally, the evidence for significant differences in physical activity levels across race/ethnic groups is inconsistent. While some studies found race/ethnic differences in physical activity levels among children and adolescents, other studies found no differences across different race/ethnicities in youth.

Health-Related Physical Fitness in US Children and Adolescents

The evaluation of the status of health-related physical fitness among youth is important for the following reasons. First, a body of evidence supports the inverse association between cardiorespiratory fitness and cardiovascular disease risk factors including: hypertension, insulin resistance, dyslipidemia, and adiposity (Anderssen et al., 2007). Second, muscular strength and endurance have been associated with increases in bone mineral density, which is strongly correlated with osteoporosis later in life (Janz et al., 2009).

Looney and Plowman (1990) compared the fitness performances of children and adolescents who participated in the National Child and Youth Fitness Study (NCYFS) to the health-related physical fitness criterion standards of the FITNESSGRAM battery.

They reported that 75% of boys and 50% of girls were eligible to achieve the “I’m Fit” award. To obtain this award a student must have met or surpassed the age-appropriate criterion-referenced standard (Health Fitness Zone, HFZ) on all five physical fitness tests. The cardiorespiratory fitness test (mile-run) and muscular endurance tests (sit-ups and pull-ups) had the lowest passing rates in comparison to the other tests. Among boys, the percentage of students achieving the HFZ for cardiorespiratory fitness declined from 83.7% at age 8 to 75.2% at age 18. A steeper decline occurred in the girls. Among girls, the percentage of students reaching the HFZ for cardiorespiratory fitness decreased from 85.3% at age 8 to 47.9% at age 18. Passing rates for abdominal muscular endurance demonstrated an inverted U-shape relationship with age. Among boys, the percentage of students reaching the HFZ for abdominal muscular endurance increased from 42.0% to 75.3% between the ages of 6 and 11, and then decreased to 66.1% at age 18. Among girls, the percentage of students reaching the HFZ for abdominal muscular endurance increased from 42.7% to 70.4% between the ages of 6 and 12, and then decreased to 51.6% at age 18. Opposing trends were observed in boys and girls for the upper body muscular endurance. Among boys, the percentage of students reaching the HFZ for upper body muscular endurance increased from 63.9% at age 10 to 82.0% at age 18. Among girls, the students achieving the HFZ for upper body muscular endurance decreased from 33.5% at age 10 to 29.9% at age 18.

Corbin and Pangrazi (1992) used the FITNESSGRAM criterion-referenced standards to evaluate the fitness performance of children and adolescents completing the President's Council on Physical Fitness and Sports Battery. Children and adolescents reaching the HFZ for cardiorespiratory fitness varied greatly between boys and girls. The percentage of boys reaching the HFZ for cardiorespiratory fitness ranged from 64.6% to 81.3%, with no clear age-related trend occurring. Among girls, a relatively stable age-related decline occurred. The percentage of girls reaching the HFZ for cardiorespiratory fitness at age 6 was 79.2% and declined to 52.2% at age 17. For abdominal muscular endurance, the percentage of boys reaching the HFZ ranged from 65.6% to 83.1%, with no clear age-related trend occurring. Similarly, the percentage of girls achieving the HFZ for abdominal muscular endurance ranged from 50.2% to 77.9%, with no clear age-related trend occurring. For upper body muscular endurance, the percentage of boys reaching the HFZ increased from 48.5% at age 6 to 76.2% at age 17. The percentage of girls achieving the HFZ for upper body muscular endurance ranged from 28.8-41.8%, with no clear age-related trend occurring.

Malina (2007) examined secular change in cardiorespiratory fitness across several national fitness surveys from 1979 to 1985. The national fitness surveys evaluated were the AAPERD Youth Fitness Test (1979), NCYFS I and II (1980), and President's Council on Physical Fitness and Sports (1985). Across the three national

fitness surveys from 1979 to 1985, a small increase in the mile-run time occurred among boys and girls aged 10 to 18 years.

Malina (2007) also reported passing rates for Californian schools completing the FITNESSGRAM. Less than 60% of students reached the HFZ for cardiorespiratory fitness. An age-related decline occurred across the 5th, 7th, and 9th grades for cardiorespiratory fitness, with the ninth-grade students achieving lowest percentage of students achieving the HFZ for cardiorespiratory fitness. Roughly 80% of all the students reached the HFZ for abdominal muscular endurance. For upper body muscular endurance more boys reached the HFZ (70%) than the girls (65%). The percentage of students reaching the HFZ on 5 or 6 tests varied among ethnic groups. White, non-Hispanic and Asian/Asian-American students had higher passing rates across all grade levels than Hispanic/Latino and Black, African-American students.

Welk et al. (2010) assessed the FITNESSGRAM results of elementary, middle, and high school students in the state of Texas. In elementary schools, the percentage of students reaching the HFZ for CRF was higher among girls (87.6%) than boys (70.0%). Similarly, in middle schools, the percentage of students achieving the HFZ for CRF was higher among girls (56.8%) than boys (45.8%). However, in high schools the percentage of students reaching the HFZ for CRF was higher among boys (34.2%) than girls (31.4%). An age-related decline in cardiorespiratory fitness occurred in both boys and girls; however the decline observed for girls was far more precipitous. The percentage of

boys achieving the HFZ for cardiorespiratory fitness declined from 70.0% in elementary school to 63.7% in high school students. In contrast, the percentage of girls reaching the HFZ for cardiorespiratory fitness declined from 87.6% in elementary school to 31.4% in high school. For both abdominal and upper body strength the percentage of students achieving the HFZ was higher among boys than girls across all school levels. Opposing age-related trends occurred in boys and girls for the percentage of students reaching the HFZ for abdominal muscular strength. The percentage of boys achieving the HFZ for abdominal muscular endurance and strength increased with age, whereas, it decreased with age in girls. Conversely, for upper body strength and endurance the percentage of boys reaching HFZ decreased with age, whereas it increased with age in girls.

Socioeconomic status and racial/ethnic diversity were found be associated with cardiovascular fitness levels. Students attending schools of low racial/ethnic diversity and high socioeconomic status exhibited higher levels of cardiorespiratory fitness than students attending schools of high racial/ethnic diversity.

Eisenmann and Malina (2002) evaluated the secular trend in absolute and relative peak oxygen consumption among US youth from the 1930s to the 1990s. Studies considered for the review were limited to those that directly measured peak oxygen consumption. Absolute and relative peak oxygen consumption was determined through treadmill or cycle ergometer tests. Among boys, absolute peak oxygen consumption increased with age, whereas relative peak oxygen consumption remained

fairly constant. Among girls, absolute peak oxygen consumption decreased marginally with age whereas relative peak oxygen consumption decreased sharply with age. The authors concluded that, among boys, cardiorespiratory fitness levels have changed little since 1938. However, among girls, the data suggested a decline in cardiorespiratory fitness.

Pate et al. (2006) described the cardiorespiratory fitness levels of US adolescents, aged 12 to 19 years, using data from the NHANES (1992-2002). Cardiorespiratory fitness was assessed via a submaximal treadmill exercise test, estimating maximal oxygen uptake (VO_2). In general, boys had higher VO_2 values in comparison to girls. Among boys VO_2 values increased with age. Conversely, in girls VO_2 values decreased with age. There were no significant differences in cardiorespiratory fitness levels among non-Hispanic whites, non-Hispanic blacks, or Hispanic/Latino adolescents. Approximately 67% of adolescent boys and 63% of adolescent girls met the FITNESSGRAM standards for cardiorespiratory fitness of the HFZ. The authors concluded that nearly one-third of US adolescents are failing to reach the cardiorespiratory fitness standards established by experts.

Across the studies assessing fitness among US children and adolescents, several general conclusions can be drawn. First, a significant proportion of children and adolescents are not reaching the criterion-referenced standards for cardiorespiratory fitness established by experts. Second, CRF declines with age among boys and girls,

however more dramatically in girls. Third, the percentage of children and adolescents reaching the Health Fitness Zone was consistently higher in boys than girls. Fourth, gender and/or age-related trends among upper body and abdominal strength and endurance were inconsistent across studies. Fifth, evidence of differences in cardiorespiratory fitness across different races/ethnicities was inconsistent. It is important for researchers to investigate potential strategies for increasing health-related fitness among youth due to the potential benefits that can be gained from higher levels of cardiorespiratory fitness and the predictive risk factors for disease associated with low levels of cardiorespiratory fitness.

School-Based Interventions to Promote Physical Activity

Schools are an ideal place to promote physical activity in children and adolescents. In this setting, nearly 100% of children can be reached. Schools are equipped with the facilities and trained personnel with an interest in promoting health and physical activity. A majority of the waking hours of children and adolescents are spent in school settings; therefore, schools have the potential to contribute a significant amount of physical activity towards to the suggested 60 minutes of MVPA per day (Troost & Loprinzi, 2008; Ringuet & Trost, 2001; Pate et al, 2006). This section of the literature review summarizes the findings of nine published reviews on the effects of school-based interventions to increase physical activity or aerobic fitness in children and adolescents.

Ringuet and Trost (2001) completed a meta-analysis of studies evaluating school-based physical activity interventions in youth. Studies were identified via a search of the following electronic databases: MEDLINE, PsychLit, SportDiscus and Social Science Index. To be eligible for inclusion studies must have met the following requirements: the sample included children or adolescents, use of an experimental or quasi-experimental study design, and physical activity was the primary outcome. Studies using a single-group pre-post design or evaluating changes in cardiorespiratory fitness or cardiovascular risk factors were not included. The search yielded ten studies eligible for the review. Six of the ten studies were delivered in a school setting and reported moderate increases in physical activity levels. The mean effect size for these interventions was 0.47. Effect sizes for interventions targeting physical activity in physical education classes (0.85) were higher than those targeting overall physical activity (0.39). Ringuet and Trost concluded that schools are an efficient vehicle for promoting physical activity in youth.

As part of the United States Preventive Services Task Force's *Guide to Community Preventive Services*, Kahn et al. (2002) systematically reviewed the literature assessing the effectiveness of interventions aimed at increasing physical activity. Articles were identified through a search of seven research databases, including some of the following: MEDLINE, SportDiscus, and PsycInfo. To be eligible for inclusion, studies needed to be published between 1980 and 2000, be conducted in an established market

economy, include physical activity as an outcome, and include a comparison group. Once selected, interventions were categorized into three groups: informational, behavioral and social approaches, and environmental policy.

Under the informational category, 13 studies were designated as increasing physical activity through classroom-based health education. Most of the interventions focused on multiple behaviors such as physical activity, diet and smoking. The duration of the interventions ranged from three months to five years. The effects of these interventions varied greatly. For out-of-school physical activity, three study arms from two studies showed significant increases, while five study arms from two studies showed decreases. For self-reported total physical activity, five study arms from one study showed positive changes, while eleven study arms from two studies resulted in no change or negative changes. By the rules of evidence in the *Community Guide* it was concluded that the evidence of the effectiveness of health education programs aimed at promoting physical activity was insufficient.

The Task Force also examined school-based physical activity interventions implementing behavioral and social approaches. Interventions in this category included school-based physical education curriculum changes. Outcomes for these interventions included energy expenditure, percent time spent in moderate-to-vigorous physical activity (MVPA), time spent in MVPA, observed activity score, self-report of type and frequency of physical activity, and out-of-school physical activity. Eleven of the 13

studies measured aerobic fitness via endurance testing to estimate maximum oxygen uptake. All 13 studies reported increases in in-school physical activity. Five study arms from four studies showed an increase in both time spent in MVPA and percent time in MVPA during physical education class. Fourteen study arms from eleven studies showed significant increases in aerobic fitness. Interventions were successful at increasing physical activity levels in both elementary and high schools. By the rules of evidence in the *Community Guide* it was concluded that school-based interventions were effective at increasing physical activity and fitness in children and adolescents.

Jago and Baranowski (2004) evaluated non-curricular approaches for increasing physical activity levels in children and adolescents. Research studies published between 1970 and 2002 were identified through the PubMed and Medline electronic databases. Inclusion criteria were as follows: the intervention tested a non-curricular approach, the primary outcome was self-reported or objectively measured physical activity, the intervention targeted children or adolescents between 5 and 18 years of age, and physical activity was assessed pre and post-intervention. Case studies, unpublished reports and dissertations were not included in the review. This search yielded nine studies eligible for analysis. Four of the nine studies reported positive effects on physical activity. Three studies examined the effects of school breaks, such as recess and lunch, on physical activity levels in children. All three studies reported significant increases in physical activity levels. One study testing the effects of playground markings reported

an 18 minute per day increase in MVPA. Another study evaluating the addition of game equipment reported a total increase of 8 minutes per day of MVPA. The authors concluded that non-curricular approaches were effective in increasing physical activity during the school day.

Salmon et al. (2007) reviewed the extant literature related to interventions to promote physical activity in children and adolescents. Studies were identified by searching the following research databases: Medline, Premedline, SportDiscus, PsycInfo, ScienceDirect, Psych ARTICLES, Cochrane, CINAHL, Web of Knowledge, Social SciSearch, and Ovid databases. Studies included in the review met the following criteria: the intervention targeted children aged 4 to 12 years and/or adolescents 13 to 19 years, the primary outcome was physical activity served, the sample size exceeded 16, and the study was conducted as a randomized controlled trial, group-randomized trial or employed a quasi-experimental design. Studies reporting fitness as an outcome, not including a comparison group or baseline measure of physical activity, or targeting a clinical population were excluded. The literature search yielded 67 studies meeting the inclusion criteria.

Thirty-three of the studies targeted children and 20 targeted adolescents and were delivered in a school setting. Of the 53 studies, 12 tested interventions that involved modifications to the health education curriculum and only two reported significant positive effects on in-school physical activity. Twenty-one tested the

modifications to the school physical education curriculum, changes to the environment including access to game equipment and the addition of activity breaks throughout the schools day; 14 reported significant positive effects on in-school physical activity.

Twenty studies tested multicomponent interventions involving curricula modifications, community involvement and/or family participation. Ten of these studies reported significant effects on physical activity. The authors concluded that health education interventions are ineffective at increasing physical activity, whereas, the evidence supports the effectiveness of both physical education and multicomponent interventions aimed at promoting physical activity in children and adolescents.

Van Sluijs et al. (2007) reviewed the literature pertaining to the effectiveness of interventions to increase physical activity in children and adolescents. The literature search was conducted via six research databases: PubMed, PsychLit, SCOPUS, Ovid Medline, SportDiscus, and Embase. The inclusion criteria were as follows: a sample consisting of children and adolescents, physical activity served as an outcome variable, control group was included, and a description of the statistical analysis was provided. Studies targeting decreases in sedentary behavior or testing structured exercise programs were excluded from the review. Thirty-three child and 24 adolescent studies were included in the review.

For children, twenty-seven of the 33 studies were school-based. Thirteen of the twenty-seven were solely school-based; whereas fourteen studies were school-based

and included a family and/or a community component. For adolescents, twenty of the 24 studies were school-based. Fourteen of the 20 studies were solely school-based; whereas six studies were school-based and included a family and/or a community component.

The studies in this review were scored on the basis of the quality of large and small randomized controlled trials and controlled trials and the consistency of the findings to determine the level of evidence. The levels of evidence assigned to studies were: no evidence, inconclusive, limited, moderate, and strong evidence. The level of evidence for the 13 child studies restricted to a school-based setting was inconclusive. Similarly, the level of evidence for the remaining 14 child studies involving school-based, family and/or community component was inconclusive. The level of evidence for the 14 adolescent studies restricted to a school-based setting was inconclusive; however the level of evidence for the remaining 6 adolescent studies involving a school-based, family and/or community component was strong. Van Sluijs et al. concluded more high-quality studies are needed for school-based approaches for promoting physical activity in children to strengthen the evidence. Furthermore, the authors concluded multicomponent interventions seemed to be effective in the adolescent population.

De Meester et al. (2009) reviewed studies testing interventions to increase physical activity in European adolescents. Studies were identified through searches of Medline, PubMed, Web of Science, and SportDiscus. Inclusion criteria for this review

were as follow: studies were published between 1995 and 2008, physical activity was a primary outcome variable, the study included a comparison or control group, participants were aged 10 to 19 years, and the study included at least one follow-up measure. Studies testing physical activity interventions in specific at-risk populations of youth (e.g., overweight and obese) and studies targeting physical fitness or physical activity during physical education were excluded from the review. A total of 20 studies met the inclusionary criteria.

Sixteen of the 20 studies were controlled trials, of which eleven were randomized controlled trials. The majority of studies used questionnaires or recall instruments to measure physical activity. Only one study used an objective measure of physical activity. Nine studies were conducted in a school setting and did not include a family or community component. Of these nine studies, six reported significant positive effects on in-school physical activity. One study measured leisure-time physical activity and reported no significant effects.

Of the twenty studies, six evaluated multicomponent interventions that included parental and/or community components. Of these six studies, two reported significant effects on in-school physical activity without positive changes in out-of-school physical activity, two studies reported significant changes in out-of-school physical activity without changes in in-school physical activity. The remaining two studies reported no significant changes on in-school or out-of-school physical activity.

Dobbins et al. (2009) completed a Cochrane systematic review of studies evaluating school-based programs to promote physical activity. Research articles published up to July 2007 were identified via the following electronic databases: Medline, SportDiscus, BIOSIS, EMBASE, CINAHL, PsycInfo, Sociological Abstracts, and the Cochrane Central Registry of Controlled Trials. Inclusion criteria for articles were as follows: the study employed a prospective research design and was conducted as a randomized or controlled clinical trial; the intervention targeted child and adolescents between the ages of 6 to 18 years, and physical activity served as the primary outcome. Studies conducted in non-school settings, obesity treatment programs, and exercise training studies were excluded from the review. The search yielded twenty-six studies eligible for analysis.

Twenty two studies targeted children and only four studies targeted adolescents. The duration of the interventions ranged from five weeks to six years. Seven of the twenty-six studies used self-reported physical activity rates as an outcome measure. Of these seven studies, three reported significant positive effects on physical activity. Seven studies reported effects for the duration of physical activity. Of these seven, five reported significant positive effects. Increases in the duration of physical activity varied greatly across studies and ranged from 6 to 50 minutes per week. Five of the twenty-six studies included in the review examined changes in aerobic fitness. Of these five studies, three reported significant positive effects on aerobic fitness. Across all studies

reporting significant positive effects the following strategies were implemented: informational handouts providing tips on increasing physical activity, changes to school physical education curricula including access to game equipment and activities requiring moderate to vigorous intensities.

Slingerland and Borghouts (2011) reviewed the literature related to the effects of physical education-based interventions on physical activity during and outside physical education classes. Studies were identified via three research databases - Medline, Academic Search Premier and SportDiscus. To be eligible for inclusion in the review, the study must had to meet the following criteria: the study was published between 1989 and 2009 in the English language, the intervention must have been delivered in a school setting, the intervention involved the modification of the school physical education curriculum, and physical activity was a primary outcome. This search yielded 14 studies eligible for analysis.

Thirteen of the fourteen studies reported significant positive effects on physical activity levels during physical education class. Thirteen studies tested physical education-based interventions that were explicitly aimed at increasing out-of-class physical activity. Of these thirteen, eight studies reported modest significant positive effects. The authors concluded that interventions delivered as part of school physical education are effective at increasing in-school physical activity, but have only limited efficacy in promoting physical activity outside of physical education.

Most recently, Kriemler et al. (2011) reviewed the reviews on school-based physical activity interventions in children and adolescents. On the basis of previously published reviews, the authors concluded that school-based physical activity programs are effective in increasing physical activity during the school day. The authors did not comment on the effectiveness of school-based physical activity interventions on physical activity outside of school. In addition to reviewing the reviews, Kriemler et al. updated the evidence base by reviewing 20 new school-based physical activity intervention studies published between July 2007 and December 2010. Of the twenty studies identified, eleven were randomized controlled trials while the remaining nine were controlled trials. The duration of the interventions was quite variable, ranging from six months to four years. Only three studies included long-term follow-up assessments. Fourteen of the twenty studies targeted children 12 years and younger. Ten of the twenty interventions implemented a multicomponent approach consisting of health education, changes to the school environment, and/or modifications to the school physical education curriculum.

Of the 20 studies identified, 16 reported significant positive effects on physical activity. Physical activity outcomes were divided into three categories: total physical activity, in-school physical activity and leisure-time physical activity. Eleven of the 16 studies reported significant positive effects on total physical activity. Four of these 11 studies also reported significant positive effects on leisure-time physical activity. In

addition, two of the 11 studies reported significant positive effects on in-school physical activity. Four of the 16 studies reported significant positive effects on leisure-time physical activity. One of the 16 studies reported significant positive effects on in-school physical activity. The three studies that included long-term follow-up measures reported significant intervention effects that were maintained 6 to 12 months post-intervention. Eleven studies used aerobic fitness as their primary outcome. Of these 11 studies, six reported significant increases in aerobic capacity.

Summary

From these reviews several conclusions can be made about school-based physical activity interventions. First, there is strong evidence that school-based interventions that involve modifying the physical education curriculum are effective in increasing in-school physical activity. Second, purely informational or knowledge-based educational interventions are not effective at promoting physical activity. Third, across these reviews, multicomponent interventions were somewhat more effective in increasing physical activity than single component interventions; however, as with all multicomponent interventions, it is difficult to determine which component or combination of components is responsible for behavior change. Finally, the majority of reviews concluded that the evidence regarding the effectiveness of school-based interventions on promoting physical activity outside of school was insufficient. The lack of effectiveness on out-of-school physical activity could be due to the large number of

studies testing physical education interventions targeting in-school physical activity, the inability of measures to distinguish between in-school and out-of-school physical activity, or the short duration of the intervention. Increasing the levels of out-of-school physical activity is important for several reasons. First, increasing out-of-school activity will provide a greater contribution to the 60-minute daily physical activity recommendation. Second, interventions focused on increasing out-of-school activity will provide youth with the necessary physical and behavioral skills to live a physically active lifestyle, which may be more useful in the long run since these skills can be used over the lifespan. Therefore, it is imperative to devise, implement and evaluate different school-based physical activity promotion strategies that specifically target physical activity outside of school.

Goal Setting

Goal setting theory was developed by Gary Latham and Edwin Locke (Locke et al., 1981). Their work was primarily conducted in occupational settings focusing on the effects of goal setting on task performance. Locke and Latham posited that goal-setting is necessary for behavior change. Furthermore, in order to maximize change the following four components must be included in goal setting: specificity, feedback, task complexity, and commitment (Latham & Locke, 2007). Specificity refers to the level of detail in a goal. The individual must know the exact standard to which they are performing. Studies comparing specific versus “do your best” goals report the former as

exhibiting higher task performances in comparison to “do your best” goals (Weinberg, 1988). Feedback is necessary for self-monitoring. An individual must be given feedback to assess their progress, adjust the goal if needed, manipulate strategies to further progression, or create a new goal. Feedback and goals independent of one another are ineffective. Goals must be accompanied by feedback. Task complexity involves the demands and skills of the task; the greater the demands and level of skill, the more difficult the task. Studies have shown that challenging goals lead to higher performance than moderate and easy goals (Latham & Yukl, 1976; Locke & Latham, 2002, 2006). Commitment refers not only to the acceptance of the goal, but the willingness to attempt to progress towards the goal (Locke & Latham, 2002). Goal acceptance simply refers to a person accepting their goal. Goal commitment is more important than goal acceptance and necessary for effective goal-setting. In order for goal commitment to occur, two components are necessary- importance and self-efficacy. If the goal is not deemed important to the individual, they will exert minimum effort and persist less. Self-efficacy with respect to goal setting refers to the individual’s belief that they possess the necessary skills to successfully progress toward their goal (Hollenbeck & Klein, 1987; Locke & Latham, 2002).

Goal Setting Interventions to Increase Physical Activity in Youth

Although goal setting and self-monitoring interventions have been used to promote healthy eating and enhance sports performance in young people (White &

Skinner, 1989; Boyce, 1990; Baranowski et al., 2003) few studies have evaluated the independent effects of goal setting and self-monitoring on youth physical activity behavior. The available evidence base, although limited, consists almost entirely of pedometer-based goal setting and self-monitoring studies.

Schofield, Mummery, and Schofield (2005) evaluated the effects of a pedometer goal setting intervention on physical activity in low-active female adolescents. Ninety adolescent girls were assigned to one of two intervention conditions or a control group. In one intervention arm (PED), girls were instructed to set weekly goals to increase their daily step counts in increments of 1-2000 until they reached an average of 10,000 steps per day. In a second intervention arm (MIN), girls were instructed to set weekly goals to increase their time in physical activity in increments of 10-15 minutes per week until they reached an average of 30-60 minutes per day. During the first 6 weeks of the 12 week intervention period, both groups attended weekly meetings to discuss if goals were met, barriers and obstacles impeding attainment of goals, and to set new goals for each week. The control group received no intervention and was used as a measurement-only control condition. For baseline, mid-intervention (6 weeks) and post-intervention (12 weeks) assessments, all three groups wore sealed pedometers for four consecutive days to determine daily average step counts.

At week six, after controlling for baseline levels, girls in the PED group exhibited significantly greater step counts than those in the MIN group. However, because girls in

the control group also increased their activity levels, step counts for both experimental conditions were not significantly different from controls. At week 12, after controlling for baseline levels, girls in the PED group exhibited significantly greater step counts than girls in the control and marginally ($p < .06$) greater step counts than girls in the MIN group. The researchers concluded that pedometers were effective in increasing physical activity among low-active female adolescents. They further concluded that the specificity of the goals may play a critical role in the effectiveness of the strategy. In support of this assertion, weekly step count goals resulted in greater increases in physical activity than weekly time-based goals for participation in physical activity.

Zizzi et al. (2006) investigated the effects of a three-week pedometer intervention on daily step counts in high school students from West Virginia. The students were assigned to a goal setting or no goal control group. Both the intervention group and control group were given pedometers. In addition to the pedometers, the intervention group received a handout on the goal setting process and asked to set a daily step count goal. Although participants set daily step goals, feedback on attainment of goals was not given. The researchers hypothesized both groups would increase their steps over time; however, the goal setting group would have greater increases in step counts.

Over the 3-week study period, students in both groups exhibited non-significant increases in daily step counts. From baseline to the 3-week post-intervention

measurements the goal setting group marginally increased their steps from 8,835 to 9,014 steps. Similarly, the non-goal group slightly increased their steps from 9,023 to 9,486 steps. The researchers concluded that a pedometer intervention with goal setting without feedback was not effective at increasing physical activity in high school students.

Rodearmel et al. (2007) evaluated the effects of the America on the Move (AOM) physical activity intervention among adults and children. Families with at least one child who was at-risk for overweight or overweight were recruited to participate in the study. Families were randomly assigned to either the intervention or the control self-monitoring group. All participants received pedometers and were instructed to wear them for two consecutive weeks to establish a baseline level of daily step counts. Families in the intervention condition were instructed to wear pedometers and set a daily goal of 2000 steps above their baseline level. To help reach this goal, the participants received information on how to increase their steps including altering their mode of transportation, parking further away from their workplace to increase their walking distance, and taking the stairs instead of the elevator. Participants in the self-monitoring control group were instructed to wear pedometers and monitor their steps, but did not receive any instruction on setting daily step goals. After the 6.5 month-intervention period, parents and children in the intervention group increased their daily steps significantly from 9,265 to a daily average of 10,800 steps. In comparison, average

daily step counts in the self-monitoring control group increased marginally from 9,906 to 10,000 steps per day. The results indicated that self-monitoring with pedometers, coupled with goal setting and information on how to be active is effective in increasing physical activity levels in both children and adults.

Butcher et al. (2007) evaluated the effects of feedback and information on pedometer step counts in school-aged children. One hundred and seventy-seven elementary school students from three schools participated in the study. Schools were randomly assigned to one of three groups: feedback (FB), feedback plus information (FB+I) and control (CON). All schools had equivalent recess periods except for the FB+I group which had an additional 15-minute recess. Students in all groups wore pedometers during school hours for one week. However, students in the control group wore sealed pedometers and did not receive feedback. The FB and FB+I groups wore unsealed pedometers and were given general goals of increasing their steps daily. Pedometers were collected at the end of each day and step counts were recorded by research personnel. The FB+I group received additional information on how to increase their steps throughout the day by participating in activities during classroom lessons and at recess, helping their teachers set up game equipment and run errands.

All three study groups increased their steps. However, students in the feedback plus information group exhibited significantly greater step increases than those in the feedback only or control groups. The increase in steps in the control group was

attributed to reactivity effects. On the basis of the findings, the authors concluded that: a) pedometers are effective at increasing physical activity; and b) that feedback from the pedometer alone is less effective than providing feedback along with information on how to increase physical activity.

Lubans and Morgan (2008) evaluated the effects of the Learning to Enjoy Activity with Friends (LEAF) intervention on physical activity in adolescents. Three schools agreed to offer the LEAF program as a sport option to 8th and 9th grade students. At schools 1 and 2, the 8th grade students were allocated to the LEAF intervention whereas the 9th grade students were used as the comparison condition. In school 3, the 9th grade students were assigned to the LEAF intervention while the 8th grade students were used as the comparison condition. Within each group, participants were further stratified into low-active and high active groups. Students in the LEAF intervention attended eight weekly sessions which included a fifteen-minute informational component and a fifty-five minute physical activity component. During the information component, students were taught behavior modification strategies, including overcoming barriers to physical activity and goal setting. In addition, each student received a logbook and pedometer providing an opportunity for physical activity monitoring and goal setting. The comparison condition received a modified 8-week health and fitness program devised by the researchers. The sessions were identical to the intervention and students were

given a handbook outlining the program sessions. The control group did not receive any other component of the LEAF intervention.

Low-active students completing the LEAF program significantly increased their daily steps counts from 7,716 to 10,301 steps and accumulated significantly more steps than low active students in the control condition which reported a decrease in mean daily step counts from 8,414 to 8,248 steps. High-active students in both study conditions exhibited declines in their daily step counts; however, the decline was only statistically significant in the control group. The researchers concluded that goal-setting and self-monitoring with a pedometer was an effective strategy for increasing physical activity levels among low active students.

Conwell et al. (2008) evaluated the effects of a home-based physical activity intervention in obese adolescents at increased risk for type 2 diabetes. Eighteen obese adolescents were recruited through pediatricians and family practitioners. All participants were enrolled in the treatment group and there was no control group. The intervention aimed at increasing daily physical activity through the use of goal setting and self-monitoring with a pedometer. Research assistants met face-to-face with the participants in their home to determine an appropriate daily step goal and devise a plan to reach the step goal. After the initial goals were set, the research assistant conducted four additional home visits to set new pedometer goals. Eleven of the fifteen participants completed the entire ten-week intervention. Over the 10-week study

period, mean daily step counts increased from 10,800 to 13,667 steps. Relative to baseline levels, the increase in daily step counts were statistically significant from week 4 onwards. Although the single group pre-post design precluded the ability to make causal conclusions about the effects of the program, the results supported the notion that a home-based intervention composed of goal setting and self-monitoring was effective at increasing physical activity in severely obese children and adolescents.

Horne et al. (2009) evaluated the effects of a pedometer-based intervention on physical activity in Welsh elementary school children. Two schools were recruited for participation in this study and randomized to either the intervention or control condition. Baseline physical activity was assessed in both the intervention and control groups using a pedometer. After completion of baseline assessments, students in the intervention school were instructed to increase their steps by 1500 steps per day. Students were able to monitor their steps with an unsealed pedometer to receive feedback on the progression towards their goals. Upon reaching their goals, students were awarded prizes. Those that did not reach their goal were encouraged to keep trying. Students in the control school wore pedometers; however, they did not receive instruction on goal setting or receive feedback about their daily step counts.

After two weeks, mean step counts were significantly higher in the both boys and girls in intervention group in comparison to controls. Girls in the intervention groups significantly increased their daily step counts from baseline to post-intervention

10,800 to 14,700 daily steps. The mean step counts of the girls in the comparison group slightly decreased between baseline and post-intervention 10,200 to 9,800 daily step counts. Similar to the girls, the boys in the intervention group significantly increased their mean step counts from baseline to post-intervention 13,500 to 16,000 steps. The mean steps counts of the boys in the comparison condition decreased minimally from baseline to post-intervention 12,200 to 12,000 steps. At the 12-week follow-up assessment, the positive effects of the intervention were maintained, but only in girls. These results provide evidence of the effectiveness of pedometer-based goal setting and self-monitoring interventions in children.

Lubans et al. (2009) studied the effects of integrating pedometers, parenting materials and e-mail support within an extracurricular school sport intervention. Six high schools in Newcastle, Australia participated in this study and students within each school were randomized to either the intervention or control condition. The intervention consisted of five components. Participants were taught how to set goals and self-monitor physical activity using the pedometers; participated in a sports program focusing on lifetime physical activities; were given exercise handbooks; and completed information sessions providing tips on healthy eating and engaging in regular physical activity. In addition, parents received printed materials and emails from the research staff to provide information for supporting healthy eating and physical activity behaviors. Students in the control group received the same 10-week sport program and

exercise handbooks, however; they did not receive pedometers, nor did their parents receive newsletters or weekly e-mails from the research staff.

At 6-months follow-up, students in the intervention group exhibited significantly higher daily step counts in comparison to controls. From baseline to post-intervention, the intervention group significantly increased their steps from 10,547 to 11,880 steps whereas the comparison condition decreased their steps from 10,739 to 8,309 steps. These findings provided further support for the efficacy of multicomponent interventions featuring pedometer-based goal setting and self-monitoring strategies.

Summary

Collectively, the results of the aforementioned studies suggest that goal-setting interventions employing pedometers are effective at increasing physical activity among children and adolescents. More importantly, the findings highlight the necessity of including self-monitoring and feedback components in any program. However, pedometer interventions may not be feasible in all school settings. Therefore, it is important to investigate other types of goal setting interventions in children and adolescents. To date, no published studies have evaluated the effects of web-based goal setting and self-monitoring physical activity interventions among youth. Because upcoming generations of youth are technologically savvy due to the increased availability of smart phones, tablets, and computers, a web-based approach may be more appealing and/or effective. If effective, such an approach may be an advantageous

strategy to reach a larger population of young people. Notably, to date, no school-based intervention study has evaluated the effects of a goal-setting and self-monitoring on physical activity and cardiorespiratory fitness. This gap in the research literature warrants further evaluation.

Goal Setting and Self-Efficacy Theory

Self-efficacy, as defined by Bandura (1977), is the beliefs in an individual's capabilities to perform a task successfully. Self-efficacy has been determined to be rooted in the core belief that a person has the power to change a behavior (Bandura, 1994). There are four ways to achieve self-efficacy: mastery, vicarious, persuasive, and physiological readiness experience. Mastery experience refers to first-hand experience at accomplishing a task and is the most powerful way to achieve self-efficacy. Vicarious experience refers to the modeling of the desired behavior. That is, observing another individual successfully completing a task. However, in order for this to be effective, the modeled task must closely mimic the desired task. Persuasive experience involves a person, credible to the individual, persuading them that they obtain the necessary skills to complete the task successfully. Lastly, physiological readiness refers to the interpretation of physiological responses prior to or during a task. For example, clammy hands prior to a public speech can be interpreted as a sign of failure or excitement for success.

Bandura posited that goal setting may mediate the pathway between self-efficacy and behavior change. The difficulty of goals, effort expended, and persistence towards goals are largely affected by self-efficacy. Self-efficacious individuals will set challenging goals, exert maximum effort, persist longer, and recover faster when facing obstacles. Conversely, a low self-efficacious person will set easier goals, while shying away from more difficult goals. When faced with barriers, this individual will exert less effort and likely forfeit. Self-efficacy also affects the interpretation of feedback on the progression of goals. A person with high self-efficacy will internalize negative feedback as them not exerting enough effort; in response to this they will continuously search and adopt new strategies to attain their goal. However, an individual with low self-efficacy faced with negative feedback will attribute their failure to personal shortcomings and likely abort the goal process.

To date, few studies have evaluated the potential mediating pathway of goal-setting between self-efficacy and physical activity and fitness in youth (Dishman et al., 2004, 2005, 2006). Consequently, this information could help explain how behavior change is accomplished in children and adolescents.

CHAPTER THREE

METHODS

Study Design and Overview

The study employed a nonequivalent-control-group design. Students at one school received an intervention consisting of a S.M.A.R.T. goal setting lesson and self-monitoring via website. The intervention was delivered over a 10-week period, beginning in February 2012 and ending in May 2012. Students at the second school served as a delayed-intervention comparison. This school will receive the intervention the following fall semester of 2012. Participating students from both schools completed a survey assessing student demographics, physical activity self-efficacy and physical activity before and after the intervention. In addition, students completed the PACER 20 m shuttle run before (January 2012) and after the intervention (May 2012).

Participants and Settings

Participants for this study were 6th, 7th, and 8th grade students recruited from two schools in Tallahassee, Florida. Riversprings Middle School, enrollment size of 500 students, served as the intervention school. Demographic characteristics for this school were as follows: 87% White, 9% Black, and 2% Hispanic, with 43% eligible for participation in the free and reduced lunch program. Blountstown Middle School, enrollment size of 300 students, served as the delayed intervention control.

Demographic characteristics for this school were as follows: 73% White and 25% Black with 65% eligible for participation in the free and reduced lunch program.

Prior to participation in the study, parental written consent and child assent were obtained. During a regularly-scheduled physical education class, students received a study information packet containing an invitation letter and informed consent documents to take home to their parent(s) or caregiver(s) to sign. Students were asked to return the signed consent documents to their physical education teacher or a designated drop box located in the school office. The study was approved by the Oregon State University Institutional Review Board and the school district's respective research committees.

Goal Setting and Self-Monitoring Intervention

The S.M.A.R.T. goal intervention was designed to teach students how to set goals and self-monitor with the five components of S.M.A.R.T. S stands for specific, meaning students need to provide details of their desired goals. M stands for measurable, meaning the students must set a goal that can be measured. A stands for action, meaning students must provide the actions they will take to progress towards their goal. R stands for realistic, meaning students must set goals that are realistically achievable given their current level of fitness. T stands for time, meaning students must indicate the time in which they are expected to have attained their goal.

The goal setting intervention was delivered by the principal investigator

(McDonald) during the student's regularly scheduled physical education class. During the lesson, students were taught what goals were, the importance of goal setting, and how to set S.M.A.R.T. goals. As part of the lesson, students completed a S.M.A.R.T. goal setting worksheet. The objectives of the worksheet activity were to teach students the concepts of S.M.A.R.T. goal setting and to apply this knowledge by creating personal fitness goals.

Student's fitness goals were entered into an interactive website that acted as a self-monitoring tool. Students in the intervention group received a unique login and password to access their fitness testing results and goal information. Approximately 12% (11.8%) of students viewed the website only once, 30% of students viewed the website twice, 43.3% of students viewed the website three times and 13.4% of students viewed the website four or more times during experimental period.

Cardiorespiratory Fitness

Cardiorespiratory fitness was assessed using the PACER 20 m test from the FITNESSGRAM testing battery. Each student was required to run a distance of 20 meters continuously to an automated beeping sequence. The student must reach the end of the 20 meters before the sound of the beep. As the test progresses, the beeping frequencies increase, requiring the student to run faster. The test is finished when the student fails to reach the end of the 20 meters before the beep. The Pacer has established evidence of validity and reliability (Safrit, 1935; Leger et al., 1988; Mahar et al., 1997). Physical

education teachers at each school administered the PACER during regularly scheduled physical education classes. The Healthy Fitness Zone, an age-appropriate criterion-standard for cardiorespiratory fitness, was calculated using the linear 1 model prediction equation for the PACER test by Maher et al. (2011).

Survey Measures

Demographic information. The student's age, sex, grade level and race/ethnicity was measured using questions from the CDC Youth Risk Behavior Survey (MMWR, 2004).

Assessment of physical activity. Physical activity was measured using the Physical Activity Questionnaire for Children (PAQ-C). The PAQ-C is a self-report instrument, consisting of 10-items, assessing activity levels over the past week. Responses to each item were scored on 5-point Likert scale (1 to 5) with higher scores reflecting a greater level of physical activity. Previous studies have shown the PAQ-C to have acceptable reliability and concurrent validity. Internal consistency for this scale as measured by Cronbach's alphas ranged from 0.72 to 0.85. Test-retest reliability coefficients range from $r = 0.75 - 0.82$, while correlation between the PAQ-C and objective measures of physical activity with an accelerometer was $r = 0.39$ (Janz et al., 2008; Kowalski, Crocker & Faulkner, 1997a; 1997b).

Assessment of self-efficacy. Self-efficacy was measured using an 8-item scale developed by Motl et al. (2000). This measure assesses an individual's confidence to overcome barriers and seek support for physical activity. Responses were recorded on

a 5 point Likert Scale (1=Disagree A lot, 2= Disagree, 3=Not Sure, 4=Agree, 5=Agree A lot). Factorial validity, as well as group and longitudinal invariance, have been established for this scale (Motl et al., 2000).

Sample Size and Power Analysis

To formulate statistical power for this study, minimal detectable differences and associated effect sizes were calculated for the physical activity (PAQ-C) and cardiorespiratory fitness (PACER projected sample size ranged from 50 students per condition to 150 students per condition). The calculations assumed roughly equal numbers of participants from the intervention and comparison schools, a power of 0.80, and a 2-sided alpha level of 0.05. Estimates of the standard deviation were based on the published research literature (Mahar et al., 2011; Janz et al., 2008; Murray et al., 2012). On the basis of these projections, the study had 80% power to detect the following range of differences: a) 0.2 - 0.4 units on the PAQ-C physical activity self-report instrument; and b) 7.1 -12.4 laps on the PACER test. These differences can be regarded as small to moderate effect sizes. The power and sample calculation are included in Appendix A.

Statistical Analysis

Differences in baseline characteristics were evaluated for statistical significance using independent t-tests for continuous variables and Chi-square tests for categorical variables. Group differences on post-intervention physical fitness, physical activity, and

self-efficacy scores, adjusted for baseline levels, and were evaluated for statistical significance using analysis of covariance (ANCOVA). In addition to baseline scores, each ANCOVA included gender, race/ethnicity, grade level and weight status as additional covariates. Statistical significance was set at an alpha level of 0.05.

CHAPTER FOUR

RESULTS

Of the 424 students enrolled in the intervention school, 251 completed the consent process, providing a response rate of 59.2%. Of the 277 students enrolled in the comparison school, 76 completed the consent process, providing a response rate of 27.4%. The sample sizes varied across the outcome variables due to missing data. For the PACER, 222 students in the intervention school and 43 students in the comparison school were eligible for analysis. For the PAQ-C and self-efficacy, 158 students in the intervention school and 65 students in the comparison school were eligible for analysis.

Baseline characteristics for the intervention and comparison schools are presented in Table 1. There were no significant between-school differences for mean age, gender distribution, race or weight status. Grade levels distributions were, however, significantly different across schools ($p = 0.03$). The proportions of 6th graders were similar across the two schools 32.4% and 31.6%, respectively. However, the intervention school had a higher proportion of 7th grade students (43.7%) in comparison to the comparison school (30.3). In addition, the comparison school had a significantly higher proportion of Hispanic students (17.1%) in comparison to the intervention school (6.3%) ($p = 0.009$). Although not statistically significant, the comparison school had a higher proportion of African American students (22.4%) in comparison to the intervention school (10.9%).

Table 2 presents the means and 95% confidence intervals for PACER scores and the percentage of students meeting the FITNESSGRAM Healthy Fitness Zone across groups defined by gender, race/ethnicity, grade level and weight status. Results are presented for the intervention school, the comparison school, and the entire sample of student participants.

There were significant gender differences in all three groups for the PACER. Boys had significantly higher PACER scores in comparison to the girls. Similarly, the percentage of boys reaching the HFZ standard was significantly higher in comparison to the girls across all three groups. There were no significant differences related to race/ethnicity in any of the groups for the PACER or HFZ.

The combined sample exhibited significantly different PACER scores across grade levels. Eighth grade students exhibited higher PACER scores, while the 6th grade students exhibited the lowest PACER laps, indicating an age-related increase in cardiorespiratory fitness. For the intervention school, 8th grade students had higher PACER scores than 6th and 7th grade students. No significant differences were found between the 6th and 7th grade students. No significant grade level differences were found in the comparison school for PACER scores or HFZ attainment. For weight status, there were significant differences for PACER scores and HFZ attainment for the combined sample and intervention school, whereas no significant weight-related differences were detected among comparison school students. In the combined sample

and intervention group, healthy weight students had significantly higher PACER scores and were more likely to meet the HFZ standard, than overweight and obese students.

Table 1. Baseline characteristics by study condition

Variable	Intervention	Comparison	p-value
Age	13.0 ± 0.9	13.1 ± 1.0	0.41
Gender			
Boys	45.6%	52.6%	0.29
Race			
White	81.1%	75.0%	0.13
Black	10.9%	22.4%	
Other	8.0%	2.6%	
Ethnicity			
Hispanic	6.3%	17.1%	0.009
Grade			
6 th	32.4%	31.6%	0.03
7 th	43.7%	30.3%	
8 th	24.0%	38.2%	
Weight Status			
≥85th†	37.1%	31.3%	0.66
≥95th†	22.0%	21.0%	

Note: † The 85th and 95th BMI percentiles were based on the 2000 CDC Growth Charts.

Table 2. Means \pm 95% CI for PACER scores and % of students reaching the HFZ standard across Gender, Race/Ethnicity, Grade and Weight Status by Group

	PACER			Healthy Fitness Zone		
	Combined	I	C	Combined	I	C
Gender						
Boys	46.8 ^a (43.1, 50.5)	49.4 ^a (45.1, 53.6)	37.9 ^a (30.7, 45.1)	93% ^a (89%, 98%)	96% ^a (92%, 99%)	83% ^a (69%, 97%)
Girls	32.4 ^b (30.2, 34.6)	33.6 ^b (31.2, 36.0)	25.9 ^b (21.0, 30.8)	67% ^b (60%, 74%)	71% ^b (63%, 79%)	43% ^b (21%, 64%)
Race						
White	40.3 (37.5, 43.1)	41.2 (38.2, 44.2)	34.5 (27.5, 41.5)	81% (75%, 86%)	82% (76%, 88%)	74% (56%, 92%)
Non-White	36.8 (33.1, 40.7)	39.7 (35.2, 44.2)	30.8 (24.0, 37.6)	77% (67%, 86%)	85% (76%, 95%)	58% (37%, 78%)
Grade						
6 th	36.9 ^a (33.0, 40.9)	39.3 ^a (34.9, 43.8)	27.8 (20.0, 35.6)	76% (68%, 84%)	81% (72%, 89%)	58% (35%, 80%)
7 th	38.4 ^b (34.9, 41.8)	38.3 ^{a,b} (34.7, 42.0)	38.6 (30.1, 47.2)	84% (77%, 91%)	85% (78%, 93%)	75% (51%, 99%)
8 th	43.9 ^c (39.5, 48.4)	47.8 ^c (42.6, 52.9)	32.6 (24.6, 40.6)	77% (68%, 87%)	81% (71%, 91%)	67% (44%, 90%)
Weight Status						
Overweight/Obese	32.9 ^a (29.8, 36.0)	33.0 ^a (29.6, 36.3)	32.7 (24.4, 40.8)	75% (67%, 84%)	75% ^a (66%, 85%)	75% (54%, 96%)
Healthy	43.0 ^b (39.9, 46.0)	45.4 ^b (42.0, 48.7)	32.7 (26.6, 38.9)	82% (76%, 88%)	87% ^b (82%, 93%)	61% (43%, 78%)

Note: Means with different letters are significant ($p < 0.05$).

Table 3. Means \pm 95% CI for Physical Activity and Self-Efficacy scores across Gender, Race/Ethnicity, Grade, and Weight Status by Group

	Physical Activity (PAQ-C)			Self-Efficacy		
	Combined	I	C	Combined	I	C
Gender						
Boys	3.3 (3.1, 3.4)	3.2 (3.1, 3.4)	3.3 (3.0, 3.6)	3.9 (3.8, 4.1)	3.9 (3.8, 4.1)	4.0 (3.8, 4.2)
Girls	3.3 (3.2, 3.3)	3.4 (3.2, 3.4)	3.3 (3.0, 3.5)	3.8 (3.7, 4.0)	3.8 (3.7, 4.0)	3.9 (3.7, 4.1)
Race						
White	3.3 (3.2, 3.4)	3.3 (3.2, 3.5)	3.2 (2.9, 3.2)	3.9 (3.8, 4.0)	3.9 (3.8, 4.0)	3.9 (3.7, 4.1)
Non-White	3.3 (3.1, 3.5)	3.2 (3.0, 3.5)	3.4 (3.2, 3.7)	3.9 (3.8, 4.0)	3.8 (3.8, 4.0)	4.0 (3.8, 4.2)
Grade						
6 th	3.4 (3.3, 3.6)	3.4 (3.2, 3.6)	3.6 ^a (3.3, 3.9)	4.0 ^a (3.9, 4.1)	3.9 (3.8, 4.1)	4.2 ^a (3.9, 4.4)
7 th	3.3 (3.1, 3.4)	3.2 (3.1, 3.4)	3.3 ^{a,b} (3.0, 3.7)	3.8 ^b (3.7, 3.9)	3.8 (3.6, 3.9)	4.0 ^{a,b} (3.7, 4.2)
8 th	3.2 (3.0, 3.4)	3.3 (3.1, 3.6)	3.0 ^b (2.7, 3.3)	3.9 ^{a,b} (3.8, 4.0)	4.0 (3.8, 4.2)	3.8 ^b (3.6, 4.0)
Weight Status						
Overweight/Obese	3.3 (3.1, 3.4)	3.3 (3.1, 3.5)	3.2 (3.0, 3.5)	3.9 (3.8, 4.0)	3.8 (3.7, 4.0)	4.0 (3.8, 4.2)
Healthy	3.4 (3.2, 3.5)	3.4 (3.2, 3.5)	3.4 (3.0, 3.7)	3.9 (3.8, 4.0)	3.9 (3.8, 4.0)	4.0 (3.8, 4.2)

Note: Means with different letters are significant ($p < 0.05$).

Table 3 presents the means and 95% confidence intervals for the physical activity and self-efficacy scores across groups defined by gender, race/ethnicity, grade level and weight status. No significant gender or racial/ethnic differences were found for physical activity and self-efficacy scores in any group. For grade level, no significant differences were found for physical activity or self-efficacy perceptions for the combined sample or intervention school; however, 6th grade students in the comparison school reported significantly higher levels of physical activity and self-efficacy than 8th grade students. No weight-related differences were observed for physical activity or self-efficacy in either school or the combined sample.

Table 4 presents scores for the PACER, PAQ-C and self-efficacy (Means \pm 95%CI) by study condition at baseline and posttest, and the adjusted means at post. After adjusting for baseline levels and other covariates, students in the intervention school exhibited significantly higher posttest scores on the PACER than students in the comparison school ($F_{(1,257)} = 58.0$ $p < 0.0001$). PACER scores for the intervention school increased from 40.6 (95% C.I. = 38.4, 42.8) laps at baseline to 45.9 (95% C.I. = 43.7, 48.0) laps at posttest. In contrast, PACER scores for the comparison school decreased from 30.2 (95% C.I. = 25.7, 34.6) laps at baseline to 23.4 (95% C.I. = 19.0, 27.9) laps at posttest. Figure 1 provides a visual representation of these results. There were no significant between-school differences on the adjusted posttest scores for physical activity or self-efficacy. The PAQ-C scores for the intervention school decreased slightly

from 3.3 (95% C.I. = 3.2, 3.4) at baseline to 3.2 (95% C.I. = 3.1, 3.4) at posttest, while the comparison school exhibited a slight increase from 3.3 (95% C.I. = 3.1, 3.5) at baseline to 3.5 (95% C.I. = 3.3, 3.8) at posttest. Self-efficacy scores decreased slightly in the intervention school from 3.9 (95% C.I. = 3.8, 4.0) at baseline to 3.8 (95% C.I. = 3.7, 3.9) at posttest, while self-efficacy scores remained unchanged at baseline and posttest (4.0 (95% C.I. = 3.8, 4.2)). Figures 2 and 3 provide visual representations of these results.

Table 4. ANCOVA analyses for the outcome variables (Means \pm 95% CI) by study condition at baseline and posttest, and adjusted means at post.

Assessment	Intervention			Comparison		
	Pre	Post	Adjusted Post	Pre	Post	Adjusted Post
PACER*	40.6 (38.4, 42.8)	45.9 (43.7, 48.0)	45.4 (44.0, 46.9)	30.2 (25.7, 34.6)	23.4 (19.0, 27.9)	30.7 (27.3, 34.1)
PAQ-C	3.3 (3.2, 3.4)	3.2 (3.1, 3.4)	3.2 (3.1, 3.3)	3.3 (3.1, 3.5)	3.5 (3.3, 3.8)	3.4 (3.2, 3.6)
Self-Efficacy	3.9 (3.8, 4.0)	3.8 (3.7, 3.9)	3.8 (3.7, 3.9)	4.0 (3.8, 4.2)	4.0 (3.8, 4.2)	3.9 (3.7, 4.0)

Note: * denotes a significant finding ($p < 0.05$). The following variables were controlled for during the ANCOVA analysis: gender, age, race/ethnicity, grade level and weight status.

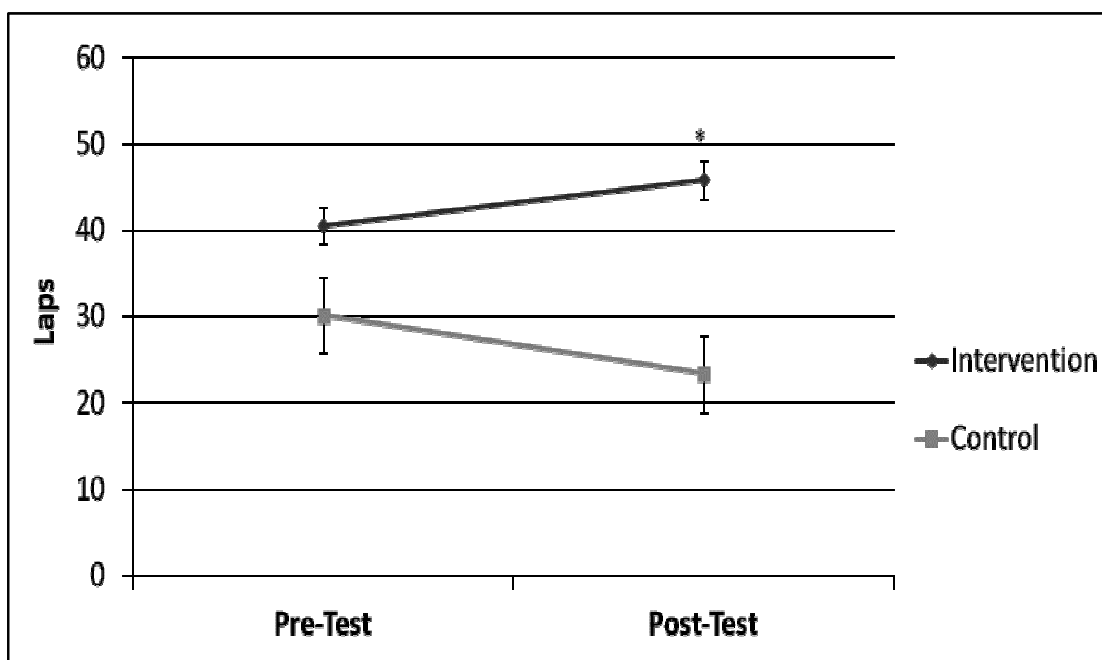


Figure 1. Pretest and posttest scores for the PACER test by study condition.

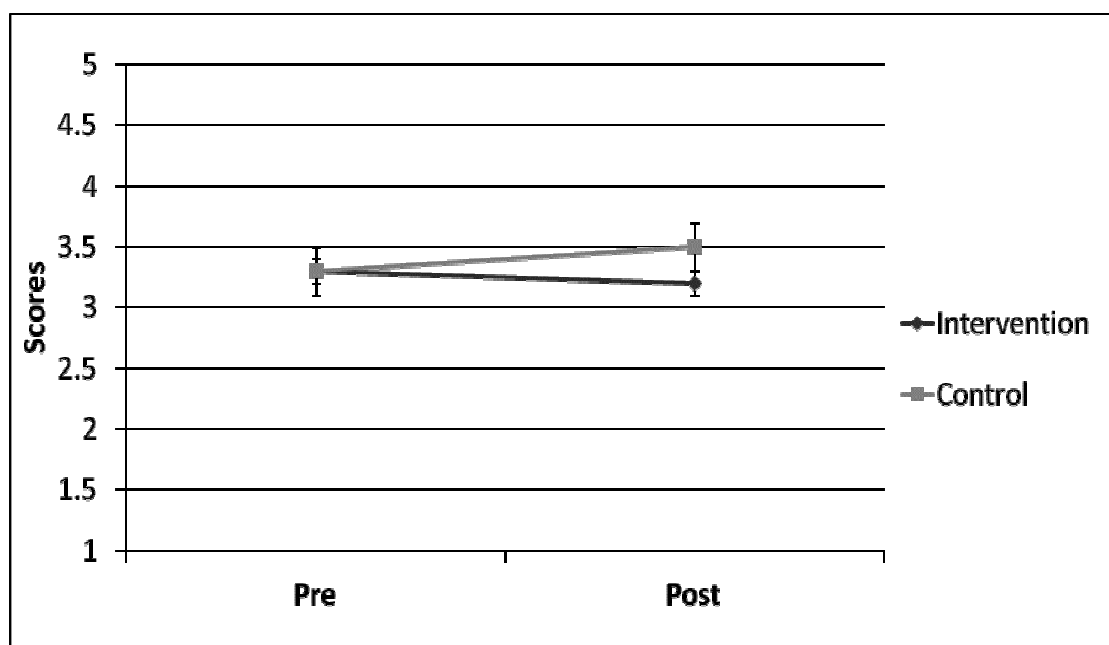


Figure 2. Pretest and posttest scores for the PAQ-C by study condition.

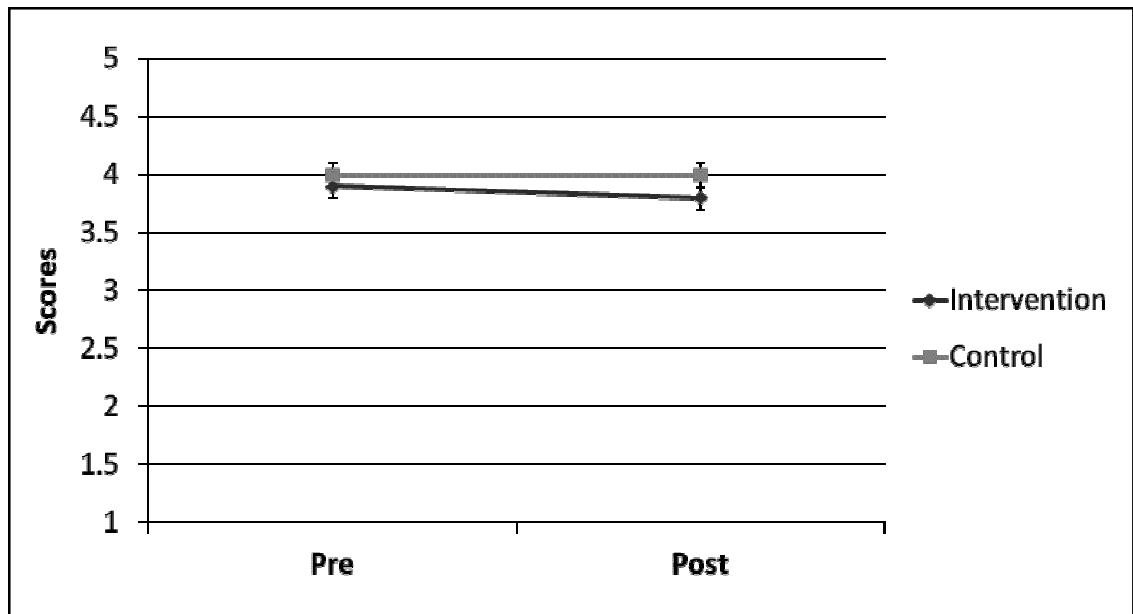


Figure 3. Pretest and posttest scores for self-efficacy by study condition.

CHAPTER 5

DISCUSSION

The purpose of this study was to evaluate the feasibility and potential efficacy of a school-based S.M.A.R.T. goal setting and web-based self-monitoring intervention on cardiorespiratory fitness and physical activity in middle school students. A secondary purpose was to examine physical activity self-efficacy as a potential mediator of the intervention effects on cardiorespiratory fitness and physical activity. We hypothesized that the students exposed to the intervention would exhibit greater improvements in cardiorespiratory fitness and physical activity than the students in the comparison school. We further hypothesized that the improvements in cardiorespiratory fitness would be explained by positive changes in physical activity and physical activity self-efficacy. The findings confirmed our first hypothesis that the goal setting and self-monitoring intervention would increase cardiorespiratory fitness levels. Contrary to our other research hypotheses, students in the intervention school did not exhibit increases in physical activity or self-efficacy.

A major finding of the present study was that educating middle school students about S.M.A.R.T. goal setting was effective at improving fitness scores. Previous studies evaluating the effectiveness of goal setting and self-monitoring on health-related behaviors have reported similar results. White and Skinner (1988) examined the effects of goal setting as part of a nutrition education program in adolescents. As part of the program participants were instructed to set goals aimed at increasing a nutrient of their

choice. The authors reported that goal setting had the strongest effect on increased nutrient intake. Similarly, Howison et al. (1988) evaluated goal setting as a component of a nutrition education program focusing on food choices and nutritional knowledge. Students significantly improved their nutrition knowledge and increased their daily servings in fruits and vegetables. Lastly, Cullen et al. (2004) evaluated whether goal setting was differentially related to an intervention aimed at increasing fruit and vegetable consumption. The authors reported goal setting related to the increase in fruit, juice, and vegetable intake among fourth grade students. In addition, results from pedometer-based studies provide evidence of the effectiveness of goal-setting and self-monitoring interventions in children and adolescents on physical activity (Lubans & Morgan, 2008; Schofield, Mummery & Schofield, 2005; Horne et al., 2009). Because few goal setting studies have been conducted in the middle school students, the ability of 12 to 14-year olds to comprehend the concepts of goal setting have been questioned (Shilts et al., 2004). The positive findings observed in this study suggest that middle school students are able to understand and successfully apply the concepts of S.M.A.R.T. goal setting.

Students exposed to the intervention exhibited significant increases in cardiorespiratory fitness; however, physical activity levels remained unchanged. This result was unexpected and difficult to explain. However, there are three potential explanations for this finding. First, the goal setting and self-monitoring intervention focused on increasing cardiorespiratory fitness and not physical activity. Although

students were instructed to explain the steps they would take to increase their fitness scores, (Action stage of S.M.A.R.T.) the objective of the goal setting lesson was to establish a S.M.A.R.T. goal related to improvements on the PACER test. Moreover, the web-based self-monitoring tool only displayed results of the PACER test and was not reflective of physical activity levels. Second, the self-report physical activity measure may have lacked the sensitivity to detect changes in physical activity. Although the PAQ-C has acceptable evidence of validity in middle school-aged youth (Janz et al., 2008; Kowalski, Crocker & Faulkner, 1997a; 1997b), the limitations associated with self-report methods in children and adolescents are well-documented (Welk, Corbin & Dale, 2000; Sirard & Pate, 2001). Moreover, the PAQ-C only provides a qualitative rating of participation in physical activity, and does not provide a quantitative assessment of the frequency, intensity, and duration of physical activity. Given that the intervention did not alter the frequency or duration of physical education, recess or after-school physical activity programming, it is possible that students in the intervention school increased the intensity of physical activity while maintaining the same frequency and duration. If this was the case, it is possible that the PAQ-C may not have been able to capture this change in behavior. Unfortunately, logistic constraints precluded our ability to use objective measures of physical activity (e.g. accelerometers) or more burdensome self-report instruments such as the PDPAR or 3DPAR (Sallis, 1991). Third, although students were required to put forth their best effort on the PACER test, it is conceivable that the process of setting fitness goals may have motivated students to try harder on the

posttest fitness assessment. However, it is important to note that, at baseline, 82.8% of students in the intervention school met or exceeded the FITNESSGRAM Healthy Fitness Zone. This suggests that students in the intervention school completed the baseline PACER test with considerable effort. Hence it is unlikely that the significantly higher PACER scores observed at posttest were not solely the result of an increased effort during the test.

The S.M.A.R.T. goal setting and self-monitoring intervention did not have a positive effect on self-efficacy. The lack of an effect may be explained, in part, by the intervention's focus on fitness rather than physical activity, and the measure used to assess self-efficacy perceptions. In the current study, we used the 8-item physical activity self-efficacy scale developed by Motl et al. (2000). This measure asks children to rate their confidence related to overcoming common barriers to physical activity and seeking support for physical activity. Because the S.M.A.R.T. goal setting and self-monitoring intervention did not specifically focus on these constructs it is perhaps expected that physical activity self-efficacy scores did not change over the 10-week experimental period.

The present study had a number of limitations that should be taken into consideration. First, the study employed a quasi-experimental design and did not randomize the schools to the intervention or comparison conditions. The intervention and comparison schools were not similar with respect to race/ethnicity and grade level; however, we controlled for these differences by including gender, race/ethnicity, grade

level and weight status in the ANCOVA analyses. Second, the sample sizes for each school were vastly different. This was a function of differences in school enrollment and the response rate in each school. The intervention school had a higher response rate (59.2%) than the comparison school (27.4%). The disparity in the response rate may be related to differences in school climate, the level of support from teachers, and/or the lack of interest of the students. Third, the study was delimited to two schools in Florida, making it difficult to generalize the results to the schools in other geographic locations. Lastly, as stated earlier, physical activity was measured using a self-report instrument instead of an objective measure such as an accelerometer or pedometer. However, given our logistic constraints and limited access to the schools, objective measures were not feasible.

In summary, this present study found that a S.M.A.R.T. goal setting and a web-based self-monitoring intervention was effective at increasing cardiorespiratory fitness in middle school students. This finding suggests that educating students about S.M.A.R.T. goal setting is a feasible and potentially effective strategy for increasing fitness and warrants further investigation. Future research evaluating goal setting and self-monitoring in the physical activity domain should include a larger number of schools, employ a group randomized study design, and use more rigorous assessments of physical activity and cardiorespiratory fitness.

CHAPTER SIX

CONCLUSIONS

No previous studies have evaluated the effects of goal setting on cardiorespiratory fitness and physical activity in middle school youth. Therefore, the purpose of this study was to evaluate the feasibility and potential efficacy of a S.M.A.R.T. goal setting and web-based self-monitoring intervention on cardiorespiratory fitness and physical activity in middle school students. The following conclusions were developed from the results of this study:

- Middle school students are able to comprehend, create, monitor and achieve S.M.A.R.T. goals.
- A brief intervention consisting of a single lesson on setting S.M.A.R.T. goals and monitoring progress towards goals via the internet resulted in positive increases in cardiorespiratory fitness levels in middle school students.
- The S.M.A.R.T. goal setting intervention did not result in significant increases in physical activity or physical activity self-efficacy in middle school students. However, the self-report instrument used to measure physical activity may have not been sufficiently sensitive to detect changes in physical activity intensity.

Teaching students the basics of S.M.A.R.T. goal setting, combined with web-based self-monitoring may be a feasible and potentially effective strategy for increasing fitness in middle school youth, warranting further investigation. Future studies

evaluating goal setting interventions in the physical activity domain in youth should consider the following recommendations:

- Researchers should employ a group randomized study design in which schools are matched on size and other socio-demographic characteristics, and randomly assigned to the intervention or control conditions.
- Multiple schools should be recruited to increase power and generalizability.
- Where feasible, more rigorous assessments of cardiorespiratory fitness and physical activity should be used (e.g., accelerometers).
- Researchers should explore the use of more interactive self-monitoring tools that may appeal to the middle school population (e.g. social media).

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APPENDICES

APPENDIX A

Sample size and Power Analysis

N	Minimal Detectable Difference / Effect Size			
	PAQ-C (SD=0.7)	PACER (SD=22)	Curl-Up (SD=23)	Push-Up (SD=10)
50	0.4 / ES = 0.57	12.4 / ES = 0.56	13.0 / ES = 0.57	5.7 / ES = 0.57
75	0.3 / ES = 0.43	10.1 / ES = 0.46	10.6 / ES = 0.46	4.6 / ES = 0.46
100	0.3 / ES = 0.43	8.8 / ES = 0.40	9.2 / ES = 0.40	4.0 / ES = 0.40
125	0.2 / ES = 0.29	7.8 / ES = 0.35	8.2 / ES = 0.36	3.5 / ES = 0.35
150	0.2 / ES = 0.29	7.1 / ES = 0.32	7.4 / ES = 0.32	3.2 / ES = 0.32

APPENDIX B

Set Goals the **S.M.A.R.T.** Way!

What is a goal?

A goal is something you are trying to achieve. For example: "I want to get a good grade on my next test!"

What is a fitness goal?

A fitness goal is set when you want to improve your fitness. For example: "I want to be able to do 10 sit-ups"

Why is goal setting important?

Goals give us a way to improve at many things. All of us set goals; in fact you probably set goals and may not know it. For example, you may have not done as well as you wanted on a test and told yourself "I want to get a better grade on the next test." You just set a goal!

Let's find out what S.M.A.R.T. goal setting is!

S.M.A.R.T. goal setting is a detailed way to set your goals in order for you to achieve them!

Let's learn how to....



What does S.M.A.R.T. stand for?

- Specific–** This means to put as many details in your goal so you know exactly what you want to do.
- For example:** Instead of setting a goal for doing more sit-ups, set a goal for reaching 10 sit-ups.
- Measurable -** This means “are we able to find out if we reached our goal?”
- For example:** If we want to increase our number of push-ups, we can count those!
- Action –** This means how are you going to reach your goal?
- For example:** If your goal is to run one mile, three times a week, you can do this by starting out running ½ mile three times a week and increase the distance as it gets easier.
- Realistic –** This means we are able to achieve our goal.
- For example:** Instead of setting a goal of running 10 miles a day, when you have never ran before set your goal for running a ½ mile a day.
- Timely –** This means we put a timeline of when you want to achieve your goal.
- For example:** I want to be able to run one mile in one month!

APPENDIX C

S.M.A.R.T. GOAL SETTING WORKSHEET

Part #1

Directions: Write down the word that corresponds to each letter of S.M.A.R.T. Then, describe what word each means.

S =

M =

A =

R =

T =

Part #2

Directions: Below are four personal goals. Read each goal carefully and choose which part of S.M.A.R.T. is missing. Write the letter in the blank space at the end of each sentence provided for you.

1. I want to increase my number of laps for the PACER run. To do this I will run 2 extra laps around the gym every day. I will reach this goal by the end of the month. _____
2. By the end of the school semester I will improve my personal best in push-ups by five. _____
3. I will improve my number of sit-ups by 10 and I will do this by adding an extra 5 minutes to my basketball game twice a week. _____
4. I will increase my PACER laps by 5 and I will do this by playing soccer after school three times a week, and I will reach my goal in two months. _____

Part #3

Directions: Write down one S.M.A.R.T goal for the 20 meter shuttle run test (PACER).

1. _____

Next, write down one S.M.A.R.T. goal for the Push-Up test.

2. _____

Then, write down one S.M.A.R.T. goal for the Curl-Up test.

3. _____

APPENDIX D

Website Self-Monitoring Program

Logout



[Home](#) | [My Info](#) | [Profile](#) | [Goals](#) | [Reports](#) | [Gallery](#) | [Journal](#) | [Workouts](#) | [Nutrition](#) | [Ask Titus](#)



Name
Paul Champion
Segment
Champions

LATEST RESULTS

FG SnR	17.00 in
Broad Jump	5 ft 0.5 in
40 YD	6.22 sec
Pro Agility	5.52 sec
300 YD S(30)	1 min 16.0 sec

Standard Tests
 Assigned Tests
 Performance Scale

ALL TESTS

BIOMETRICS
MOBILITY
SPEED
STRENGTH
AGILITY
ENDURANCE

300 YD S(30) | Sit-ups (1 min)



Start:
End:

SEE ALL + -
Current Goal: 47 reps | Set Goal reps Update

Self

Compare Your Performance

Compare Your Team Performance

APPENDIX E

Child Survey**Child Name**_____
(First name) (Last Name)**School Name**

This cover sheet will be torn off by the researchers so that your name will **not** be on the survey.

Instructions:

Please read all the instructions and questions carefully.

Do not put your name on any part of the survey on the following pages.

Demographic Questions

1

This part of the survey we are trying to gather basic information from you like your age. Please answer the following five questions to the best of your knowledge. For questions 1-3 and 5 questions please select only **ONE** answer. On question four you may choose multiple answers. There are no right or wrong answers and this is **NOT** a test. Please answer **ALL** of the questions.

1. When is your birthday (for example: 11/11/2011)

____ \ ____ \ ____
Month Day Year

2. What is your gender? (Please check one)

Boy Girl

3. Are Hispanic or Latino? (Please check one)

Yes No

4. What is your race? (Please check all that apply)

- White
- Asian
- American Indian or Alaska Native
- Black or African American
- Native Hawaiian or Other Pacific Islander
- Other (please specify): _____

5. What grade are you in? (Please check one)

6th 7th 8th

Self-efficacy Questions

2

In this part of the survey we are measuring physical activity self-efficacy. We would like to know how you feel about being active. We ask that you read each statement and answer honestly and to the best of your knowledge. There are no right or wrong answers and this is NOT a test.

(1 = Disagree a lot, 2 = Disagree, 3 = Not sure, 4 = Agree, 5 = Agree a lot)

- | | | | | | |
|---|---|---|---|---|---|
| 1. I can be physically active during my free time on most days. | 1 | 2 | 3 | 4 | 5 |
| 2. I can ask my parent or other adult to do physically active things with me. | 1 | 2 | 3 | 4 | 5 |
| 3. I can be physically active during my free time on most days even if I could watch TV or play videogames instead. | 1 | 2 | 3 | 4 | 5 |
| 4. I can be physically active during my free time even if it is very hot or cold outside. | 1 | 2 | 3 | 4 | 5 |
| 5. I can ask my best friend to be physically active with me during my free time on most days. | 1 | 2 | 3 | 4 | 5 |
| 6. I can be physically active during my Free time on most days even if I have to stay home. | 1 | 2 | 3 | 4 | 5 |
| 7. I have the coordination I need to be physically active during my free time on most days. | 1 | 2 | 3 | 4 | 5 |
| 8. I can be physically active during my free time on most days no matter how busy my day is. | 1 | 2 | 3 | 4 | 5 |

Physical Activity Questions

Now, we would like to find out about your level of physical activity in the past week (last 7 days). Physical activity refers to sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard like tag, running, climbing etc... There are no right or wrong answers. Please answer all the questions honestly and to the best of your knowledge.

1. Physical activity in your spare time: have you done any of the following activities in the past 7 days (last week)? If yes, how many times (Mark only one circle per row)

	No	1-2	3-4	5-6	7+
Skipping.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rowing/ canoeing.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In-line skating.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tag.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Walking for exercise.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bicycling.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jogging or running.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aerobics.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Swimming.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Baseball, softball.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dance.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Football.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Badminton.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skateboarding.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soccer.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wrestling.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Volleyball.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floor hockey.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basketball.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice-skating.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cross-country skiing.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice hockey/ice skating...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other: _____.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
_____.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

I didn't do PE.....	<input type="radio"/>
Hardly ever.....	<input type="radio"/>
Sometimes.....	<input type="radio"/>
Quite Often.....	<input type="radio"/>
Always.....	<input type="radio"/>

2. In the last 7 days, what did you do most of the time when you had *recess*? (Check only one.)

Sat down (talking, reading, doing school work)...	<input type="radio"/>
Stood around or walked around.....	<input type="radio"/>
Ran or played a little bit.....	<input type="radio"/>
Ran around and played quite a bit.....	<input type="radio"/>
Ran and played hard most of the time.....	<input type="radio"/>

3. In the last 7 days, what did you normally do *at lunch* (besides eating)? (Check one only.)

Sat down (talking, reading, doing school work)...	<input type="radio"/>
Stood around or walked around.....	<input type="radio"/>
Ran or played a little bit.....	<input type="radio"/>
Ran around and played quite a bit.....	<input type="radio"/>
Ran and played hard most of the time.....	<input type="radio"/>

4. In the last 7 days, on how many days *right after school*, did you do sports, dance or play games in which you were very active? (Check only one.)

None.....	<input type="radio"/>
1 time last week.....	<input type="radio"/>
2 or 3 times last week.....	<input type="radio"/>
4 times last week.....	<input type="radio"/>
5 times last week.....	<input type="radio"/>

5. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were active? (Check one only.)

None.....

1 time last week.....

2 or 3 times last week.....

4 times last week.....

5 times last week.....

6. During *the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Check only one.)

None.....

1 time

2 - 3 times.....

4 - 5 times.....

6 or more times.

7. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

- a. All or most of my free time was spent doing things that involve little physical effort.....
- b. I sometimes (1-2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics).....
- c. I often (3-4 times last week) did physical things in my free time
- d. I quite often (5-6 times last week) did physical things in my free time
- e. I very often (7 or more times last week) did physical things in my free time

8. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very Often
Monday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuesday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wednesday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thursday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saturday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sunday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes.....

No.....

If yes, what prevented you? _____

10. On a typical school day, how many total hours outside of school do you watch TV, view videos, or work/play on the computer? Circle your answer.

- I do not watch TV, view videos or use the computer on a typical day
- Less than 1 hour per day
- 1 hour per day
- 2 hours per day
- 3 hours per day
- 4 or more hours per day

APPENDIX F

INVITATION LETTER

Project Title: Effects of a goal setting intervention on physical activity and fitness in middle school students

Principal Investigator: Stewart G. Trost, PhD

Co-Investigator(s): Adam Faurot, Titus Sports Academy

Dear Parent or Guardian:

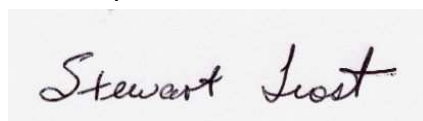
The School of Biological and Population Health Sciences at Oregon State University is conducting a study to test the effects of a goal setting program on physical activity and fitness in middle school students. The study is being conducted with the support of Titus Sports Academy and the Champions Program. This research is important, as it will help educators and health professionals learn more about promoting physical activity and combating obesity in children and adolescents.

As principal investigator of the study, I would like to invite your child to participate in the study. Your child is being invited because they are currently enrolled at Riversprings Middle School or Blountstown Middle School, and will be participating in physical education during the spring or fall semester of 2012.

In this information packet, you will find several documents describing the study and its requirements. Please take the time to carefully read through these documents. **If you would like your child to participate in the study, both the parental consent and the child assent form must be signed and returned to your child's physical education teacher or the study drop box located in the office. You may keep the second copy of the Parent Consent for your records.**

I hope that you will consider allowing your child to participate in this important study. If you have questions or would like to talk more about the study, please do not hesitate to contact me via phone at 541-737-5931 or email stewart.trost@oregonstate.edu

Sincerely,



Stewart G. Trost, PhD

Associate Professor

School of Biological and Population Health Sciences

APPENDIX G



Stewart G. Trost, PhD
 Hallie E. Ford Center for Healthy Children & Families
 College of Public Health and Human Sciences
 2631 SW Campus Way
 Corvallis, OR 97331 USA
 Phone: 541/737-5931
 Stewart.Trost@oregonstate.edu

INFORMED CONSENT DOCUMENT

Project Title: Effects of a goal setting intervention on physical activity and fitness in middle school students

Principal Investigator: Stewart G. Trost, PhD, School of Biological and Population Health Sciences.

Student Researcher: Samantha M. McDonald, MS candidate

Co-Investigator(s): Adam Faurot, Titus Sports Academy

1. WHAT IS THE PURPOSE OF THIS FORM?

This form contains information you will need to help you decide whether you want your child to be in this study or not. Please read the form carefully and ask the study team member(s) questions about anything that is not clear.

2. WHY IS THIS STUDY BEING DONE?

The purpose of this study is to examine the impact of a school-based goal setting and self-monitoring intervention on physical activity and physical fitness in middle school students. We want to know if teaching students to set and monitor fitness goals improves their physical activity and fitness levels. The study is being conducted by a student for the completion of a master's thesis.

3. WHY AM I BEING INVITED TO TAKE PART IN THIS STUDY?

Your child is being invited to take part in this study because they attend Riversprings or Blountstown Middle School in Wakulla County School District or Calhoun County School District; and will be enrolled in a physical education class during the winter and fall semesters of 2012.

4. WHAT WILL HAPPEN IF I TAKE PART IN THIS RESEARCH STUDY?

During the winter or fall semesters of 2012, your child will receive instruction on how to set effective fitness goals using the S.M.A.R.T. principle (Specific, Measureable, Action, Realistic, and Time). The goal setting class will be delivered as part of the normal school physical education curriculum and will take just one class period to complete. Students at Riversprings Middle School will complete the class during the winter 2012 semester. Students at Blountstown Middle School will complete the class during the fall 2012 semester.

As part of the class, your child will be asked to set S.M.A.R.T. goals for improvements in the following FITNESSGRAM tests: 1) number of laps completed on the 20 m shuttle run (also known as PACER) and the Beep Test; 2) number of push-ups (modified or traditional) completed in 1 min; and 3) number of curl-ups (also known as stomach crunches or sit-ups) completed in 1 min. Your child's fitness goals will be uploaded to a password protected website operated and maintained by Titus Sports Academy, and your child will be able to visually monitor their progress towards meeting their fitness goals. Your child will have access to the website at all times and can access the site from any device with an internet connection.

During week 5 and week 17 of the winter 2012 semester, your child will complete a brief survey measuring their physical activity level and confidence in their ability to be physically active. The survey will be completed during their regularly scheduled physical education class and take no longer than 15 min to complete. To see if the goal setting class improved fitness, your child's fitness testing results will be shared with the researchers at Oregon State University.

5. WHAT ARE THE RISKS AND POSSIBLE DISCOMFORTS OF THIS STUDY?

There are no foreseeable risks to participating in this study. Some children may feel uncomfortable providing personal information about their physical activities in school and at home.

Oregon State University

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6. WHAT ARE THE BENEFITS OF THIS STUDY?

This study is not designed to benefit your child directly. However, your child may continue to use the goal setting information to set short- and long-term fitness goals. In the future, all children may benefit from this research because the results will be used to improve the effectiveness of school-based physical activity programs.

7. WILL I BE PAID FOR BEING IN THIS STUDY?

Your child will not be paid for being in this research study.

8. WHO WILL SEE THE INFORMATION I GIVE?

The information your child provides during this research study, including the fitness testing results provided by your child's school, will be kept confidential to the extent permitted by law. Research records will be stored securely and only researchers will have access to the records. Federal regulatory agencies and the Oregon State University Institutional Review Board (a committee that reviews and approves research studies) may inspect and copy records pertaining to this research. Some of these records could contain information that personally identifies your child. If the results of this project are published your child's identity will not be made public. To help ensure confidentiality, we will replace your child's name with an ID number. Your child's information will be stored in locked file cabinets or password-protected computer files at Oregon State University.

9. WHAT OTHER CHOICES DO I HAVE IF I DO NOT TAKE PART IN THIS STUDY?

Participation in this study is voluntary. If your child does not participate, it will not affect your child's grades in physical education. If you allow your child to participate, you are free to withdraw their participation at any time without penalty. They will not be treated differently if you decide to stop taking part in the study. If you choose to withdraw from this project before it ends, the researchers may keep information collected about your child and this information may be included in study reports. If your child does not take part in the study, your child will complete their regular physical education class.

10. WHO DO I CONTACT IF I HAVE QUESTIONS?

If you have any questions about this research project, please contact: Stewart Trost at 541-737-5931 or via email: stewart.trost@oregonstate.edu. If you have questions about your rights or welfare as a participant, please contact the Oregon State University Institutional Review Board (IRB) Office, at (541) 737-8008 or by email at IRB@oregonstate.edu

11. ASSENT STATEMENT

This research study has been explained to my child in my presence in language my child can understand. He/she has been encouraged to ask questions about the study now and at any time in the future.

12. WHAT DOES MY SIGNATURE ON THIS CONSENT FORM MEAN?

Your signature indicates that you understand the procedures of the study, that your questions have been answered, and that you permit your child to take part in this study. You will receive a copy of this form.

Participant's Name (Child) (printed): _____

Parent/Caregiver's Name (printed): _____

(Parent/Caregiver's Signature)

(Date)

Oregon State University

IRB Study # 5156

Expiration Date 02/12/2013

APPENDIX H



Stewart G. Trost, PhD
 Hallie E. Ford Center for Healthy Children & Families
 College of Public Health and Human Sciences
 2631 SW Campus Way
 Corvallis, OR, 97331 USA
 Phone: 541/737-5931
 Stewart.Trost@oregonstate.edu

ASSENT FORM

Project Title: Effects of a goal setting intervention on physical activity and fitness in middle school students

Principal Investigator: Stewart G. Trost, PhD, School of Biological and Population Health Sciences

Student Researcher: Samantha M. McDonald, MS candidate

Co-Investigator(s): Adam Faurot, Titus Sports Academy

We are asking you whether you want to be in a research study. Research is a way to test new ideas and learn new things. You do not have to be in the study if you do not want to. You can say Yes or No. Even if you say yes now, you can change your mind later.

Ask questions if there is something that you do not understand. After all of your questions have been answered, you can decide if you want to be in this study or not.

This study is about how goal setting might affect your fitness and exercise levels. We want to know if teaching you about goal setting helps you improve your scores on the fitness tests at school and helps you to be more physically active.

We are asking you if you want to be in this study because you attend Riversprings Middle School or Blountstown Middle School and will be taking a physical education class during the winter 2012 semester.

If you take part in this study, you will attend a class on how to set fitness goals. It will take place during your PE class. At the beginning and end of this semester, we will ask you to fill out a brief survey measuring your physical activity and your confidence that you can do physical activity. The survey will be filled out during your PE class. It will only take about 15 minutes to complete. We will also post your fitness test results on your own page on the My CHAMPIONS website so you can track your fitness scores. You will have a personal login and password to this website and you will be the only person who can see this information.

We will write a report when the study is over, but we will not use your name in the report.

If you decide not to participate in this study, it will not impact your class standings, grades or relationships with your teachers.

If you want to be in the study, sign your name on the line below.

Participant's Name (printed): _____

 (Signature of Participant)

 (Date)

 (Signature of Person Obtaining Assent)

 (Date)

Oregon State University

IRB Study # 5156

Expiration Date 02/12/2013

APPENDIX I



Institutional Review Board • Office of Research Integrity
 8308 Kerr Administration Building, Corvallis, Oregon 97331-2140
 Tel 541-737-8008 | Fax 541-737-3093 | IRB@oregonstate.edu
<http://oregonstate.edu/research/ori/humansubjects.htm>

NOTIFICATION OF APPROVAL

February 17, 2012

Principal Investigator:	Stewart Trost	Department:	School of Biological and Population Health Sciences
Study Team Members:	Adam Faurot		
Student Researcher:	Samantha McDonald		
Study Number:	5156		
Study Title:	Effects of a Goal Setting Intervention on Physical Activity and Fitness in Middle School Students		
Funding Source:	None		
Funding Proposal #:			
PI on Grant/Contract:			
Submission Type:	Initial Application received 12/13/2011		
Review Category:	Expedited	Category Number:	6, 7
Waiver(s):	None	Number of Participants:	600 <i>Do not exceed without prior IRB approval</i>
Risk level for children ¹ :	§46.404 minimal risk		

The above referenced study was reviewed and approved by the OSU Institutional Review Board (IRB).

Approval Date: 02/13/2012

Annual continuing review applications are due at least 30 days prior to expiration date

Expiration Date: 02/12/2013

Documents included in this review:

- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> Protocol | <input checked="" type="checkbox"/> Recruiting tools | <input type="checkbox"/> External IRB approvals |
| <input checked="" type="checkbox"/> Consent forms | <input checked="" type="checkbox"/> Test instruments | <input type="checkbox"/> Translated documents |
| <input checked="" type="checkbox"/> Assent forms | <input type="checkbox"/> Attachment A: Radiation | <input type="checkbox"/> Attachment B: Human materials |
| <input type="checkbox"/> Grant/contract | <input checked="" type="checkbox"/> Letters of support | <input type="checkbox"/> Project revision(s) |
| <input checked="" type="checkbox"/> Other: Individual Investigator Agreement | | |

Comments:

Principal Investigator responsibilities for fulfilling the requirements of approval:

- All study team members should be kept informed of the status of the research.
- Any changes to the research must be submitted to the IRB for review and approval **prior** to the activation of the changes. **This includes, but is not limited to, increasing the number of subjects to be enrolled.**
- Reports of unanticipated problems involving risks to participants or others must be submitted to the IRB within three calendar days.
- Only consent forms with a valid approval stamp may be presented to participants.
- Submit a continuing review application or final report to the IRB for review at least four weeks prior to the expiration date. Failure to submit a continuing review application prior to the expiration date will result in termination of the research, discontinuation of enrolled participants, and the submission of a new application to the IRB.

If you have any questions, please contact the IRB Office at IRB@oregonstate.edu or by phone at (541) 737-8008.

¹ Where parental permission is to be obtained, the IRB may find that the permission of one parent is sufficient for research to be conducted under §46.404 or §46.405. Where research is covered by §§46.406 and 46.407 and permission is to be obtained from parents, **both** parents must give their permission unless one parent is deceased, unknown, incompetent, or not reasonably available, or when only one parent has legal responsibility for the care and custody of the child.

APPENDIX J



Riversprings

Middle School



800 SPRING CREEK HIGHWAY + CRAWFORDVILLE, FLORIDA 32327 + (850) 926-2300 + FAX (850) 926-2111

Dod Walker - Principal

Michele Baggett - Assistant Principal

We at Riversprings Middle School approve the following: "The Effects of a S.M.A.R.T. Goal Setting Intervention on Fitness in Middle School Students" study **within the current CHAMPIONS Program** research project. We understand that S.M.A.R.T. Goal research personnel will be coming to Riversprings Middle School twice during the Spring 2012 semester to teach our students about goal setting and monitoring their progress towards these goals.

A handwritten signature in black ink, appearing to read 'Dod Walker', written over a horizontal line.

Dod Walker, Principal
Riversprings Middle School
Wakulla County School District

This study will be conducted by Stewart Trost, PhD, and Samantha McDonald of Oregon State University as well as Adam Faurot of Titus.

APPENDIX K



Blountstown Middle School
17586 Main Street North
Blountstown, Florida 32424

Neva Miller
Principal

Keith Summers
Assistant Principal

We at Blountstown Middle School approve the following: "The Effects of a S.M.A.R.T. Goal Setting Intervention on Fitness in Middle School Students" study **within the current CHAMPIONS Program** research project. We understand that S.M.A.R.T. Goal research personnel will be coming to Blountstown Middle School twice during the Spring 2012 semester to teach our students about goal setting and monitoring their progress towards these goals.

A handwritten signature in cursive script that reads "Neva Miller". The signature is written in black ink on a white background.

Neva Miller, Principal
Blountstown Middle School
Calhoun County School District

This study will be conducted by Stewart Trost, PhD, and Samantha McDonald of Oregon State University as well as Adam Faurot of Titus.

