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The effect of two modes of aerobic assessment on fifth grade students' self efficacy

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2016

Abstract

The Effect of Two Modes of Aerobic Assessments on Fifth Grade Students' Physical Activity Self-Efficacy

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MA, California State University, Chico, 1991

BS, California State University, Chico, 1974

Doctoral Study Submitted in Partial Fulfillment

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Abstract

Declining youth physical activity levels and lack of aerobic fitness have been well documented with a corresponding rise in obesity levels and health issues. Based on Bandura's social cognitive theory, healthy physical activity levels and aerobic fitness are strongly connected to positive physical activity self-efficacy beliefs. This study examined whether student physical activity self-efficacy, motivation, and effort were different for the FitnessGram® (FG) 1-Mile Run when compared to the 15-minute Aerobic Assessment Based on Improvement (AABI). A concurrent mixed method quasi-experimental approach measured 5th grade students' physical activity self-efficacy beliefs through a pretest and posttest survey while aerobic assessment scores provided data that measured and compared student performance. Percent improvement and *t*-test analytic procedures found significant differences between groups and genders. The FG group (*n* = 131) improved 1.49% while the AABI group (*n* = 209) improved 22.53%; furthermore, FG girls' percent improvement decreased to -7.56% and the AABI girls' percent improvement was above the average score at 24.21%. Qualitative data collected and coded from teachers' (*n* = 6) found no noticeable differences in student behaviors or preparation between the FG or AABI groups. A 3-day workshop was created to initiate change in aerobic fitness assessment. Assessing student aerobic fitness based on improvement theoretically builds physical activity self-efficacy beliefs, especially for girls. Positive physical activity self-efficacy beliefs motivate greater student participation and engagement in physical education, which improves aerobic fitness. Social implications from these results indicate that students would increase their physical activity self-efficacy by assessing aerobic fitness based on individual improvement.

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Dedication

This project study is dedicated to all the hard working and committed physical education teachers who have been innovative, compassionate, and understanding that the one mile run is challenging and difficult. Likewise, the Rainbow Run is dedicated to all students who have had to run (and hate) the mile aerobic assessment for the past 40 years.

In addition, I would like to dedicate this project study to my parents, Ed and Corrinne Roth. Your unconditional love and impact on my life is immeasurable. Don't worry Dad, I will slow down and get some rest.

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There were groups of people who followed my journey with great interest and patronage. My bridge group has heard about every challenge and frustration with patience and acceptance. Their ideas for improvement were unbelievably practical and useful. The members of my swim team followed every step of my journey and were constantly and sincerely interested in my progress; you’re awesome. My Special Olympic family sacrificed most and lost their leader in this process; I’m back! And finally, my family deserves special acknowledgement for their understanding and support during this journey. Thank you Tracy, Tyler, Kathryn, Porter Ann Doman, and Judi Roth; you’re the best. Love you.

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Section 1: The Problem

Introduction

The intent of this concurrent, mixed methods study was to collect qualitative and quantitative data to examine fifth grade students' physical activity self-efficacy, which is connected to aerobic fitness, academic success, emotional stability, and wellness (Blom, Alvarez, Zhang, & Kolbo, 2011; Going, Lohman, & Eisenmann, 2014; Lees & Hopkins, 2013; Morales et al., 2013). Physical activity self-efficacy is related to confidence and becoming competent to "achieve and maintain a health-enhancing level of physical activity and fitness" (Shape America: Society of Health and Physical Educators [SHAPE], n.d.b, para. 1), which is a national standard and essential goal of physical education in schools. Improving physical activity self-efficacy beliefs benefits students' well-being; whereas, building negative feelings about physical activity encourages inactivity, obesity, and poor fitness (Leirhaug & MacPhail, 2015; López-Pastor, Kirk, Lorente-Catalán, MacPhail, & Macdonald, 2013). The FitnessGram® (FG) 1-Mile Run is the typical method to measure aerobic fitness with established grade level standards based on research related to healthy fitness levels (Cooper Institute, n.d.b). Generally, about one-fourth to one-third of a typical class does not reach the pre-established FG performance standard. Out of a class of 30 students, 7 to 10 students fail to make the standard every time the FG 1-mile aerobic assessment is administered. This problem is systematic; that is, about the same percentage of students do not meet the FG 1-mile aerobic assessment standard locally, in California, and in the United States. Furthermore, the percentages of students who fail to meet the aerobic fitness standard increases as students get older (Craggs, Corder, van Sluijs, & Griffin, 2011; Jones, Hinkley, Okely, &

Salmon, 2013). It would seem sensible for students to stop trying if achieving the standard is perceived to be impossible to reach. Motivation to exert effort and to become physically uncomfortable to reach the standard is reduced, and the assessment becomes a nemesis and unreasonable. Similarly, students who do make the standard stop trying hard to improve their scores for a lack of an incentive. Indeed, students have been found to purposely avoid participating in the FG 1-mile aerobic assessment due to their dislike and perceived irrelevance of the activity (López-Pastor et al., 2013). Not assessing aerobic fitness would be a disservice to students due to the importance and benefits of becoming physically active and aerobically fit, thus the need to create an alternative assessment that encourages student participation became the focus of this study.

Finding an alternative method to the FG 1-mile aerobic assessment to measure student aerobic fitness was the purpose of this study. The "15-minute Aerobic Assessment Based on Improvement" (AABI) measures student aerobic performance that emphasizes individual improvement as compared to the FG 1-mile aerobic assessment that is based on grade level standards to measure performance. Student physical activity self-efficacy while comparing the FG 1-mile and AABI aerobic assessments was the focus of this project study.

The Local Problem

Evidence of the Problem at the Local Level

Examination of the California 2015 FG 1-mile aerobic assessment results showed that in California about 63.5% of students assessed in fifth, seventh, and ninth grades met the performance standard in aerobic capacity; however, 29.9% students tested were placed in the "needs improvement" category and another 6.6% were placed under the "high risk" category on the FG "Healthy Fitness Zone®" charts (California Department of Education [CDE], 2015). In other words, overall in California about 36.5% of fifth grade students tested failed the FG 1-mile aerobic fitness assessment, indicating either a lack of aerobic fitness, lack of physical ability, FG 1-mile performance standards error, or the lack of motivation to improve. Local schools (*n* = 5) under investigation in this study had mixed results and reported that 17.9%, 22.5%, 24%, 35.6%, and 37.7% of fifth grade students tested did not meet Healthy Fitness Zone® standards for aerobic fitness (CDE, 2015), even though these schools had physical education specialists as teachers and curricula with daily physical education experiences. These percentages represent about 6-12 students per class who were unsuccessful in achieving the FG Healthy Fitness Zone® standard on test day and every time this assessment was practiced and performed. It is possible that students may not continue to try hard and be motivated to improve their performance if reaching the standard is difficult and seemingly impossible to achieve. Motivation to improve aerobic fitness requires an incentive based on building physical activity self-efficacy.

Physical inactivity and the lack of aerobic fitness are related to the obesity epidemic. According to body composition measurements that reflect obesity levels, 59.7% of fifth grade students in California met the FG Healthy Fitness Zone® standard, whereas, 40.3% of the students tested did not meet the standard for body composition (CDE, 2015). Similarly, the schools (*n* = 5) under investigation in this study had 38.6%, 46.9%, 48.8%, 38.4%, and 42% of students tested failed to meet the healthy zone related to body weight and height (CDE, 2015). In other words, around a third to half of the students tested were considered either overweight or obese. Local schools, schools throughout California, and across the nation have similar FG physical fitness results with a significant percentage of students tested struggling to meet the established FG Healthy Fitness Zone® standards for body composition and aerobic fitness (Centers for Disease Control and Prevention [CDC], n.d.b). The similarities in FG scores indicate that the problem is systematic; that is, schools that use FG Healthy Fitness Zone® standards have similar results.

Evidence Regarding the Severity of Youth Inactivity

According to Trust for America's Health (2011) report on obesity in America, "two-thirds of adults and nearly one-third of children and teens are currently obese or overweight, putting them at increased risk for more than 20 major diseases, including type 2 diabetes and heart disease" (p. 3). The U.S. Department of Health and Human Services [HHS] (n.d.a) and the 2016 report card on physical activity released by SHAPE (n.d.a) reported that about 60% of adult Americans are not regularly physically active with 30% considered sedentary. The "Walking as a Way for Americans to get the Recommended Amount of Physical Activity for Health" initiative reported that more than half (52%) of all U.S. adults are not regularly active (CDC, 2013). In other words, at least half of American adults are not regularly active, which is about the same percentage of youth not achieving the FG Healthy Fitness Zone® standard while in school. There is a lack of ongoing and longitudinal research regarding the correlation between adult inactivity and youth inability to reach the FG Healthy Fitness Zone® standard; however, the relationship is likely. That is, those students in fifth, seventh, and ninth grades who fail to meet the FG grade level standard for the mile are most likely to be inactive as adults. There is a connection between inactivity and obesity for both youth and adults

(Aryana, Li, & Bommer, 2012; Burkhalter & Hillman, 2011; HHS, n.d.a; WHO, n.d.), and a positive relationship between youth obesity becoming adult obesity (CDC, 2013; Journal of the American Medical Association [JAMA], 2013). Conversely, adults and youth who are physically active are most likely not obese.

Evidence of the Problem from Professional Literature

Physical education plays an important role in school curriculum. Fundamentally based in Bloom's Taxonomy learning theory (Cochran & Conklin, 2007; Muehleck, Smith, & Allen, 2014), physical education is responsible for student achievement related to the psychomotor learning domain with goals of gaining motor skills and increasing physical fitness levels (American Alliance for Health, Physical Education, Recreation and Dance [AAHPERD], 2013; Graham, Holt/Hale, & Parker, 2013). The National Association for Sport and Physical Education (NASPE; 2011) and SHAPE (n.d.b) vision statement for schools was that a physically educated person "will display a physically active lifestyle, [while] knowing the benefits of their choice to be involved in physical activity" (AAHPERD, 2013, p. 4). NASPE (2011) asserts that "physical education is critical to educating the whole child, and that all students in grades K-12 should receive physical education on a daily basis" (p. 2). Furthermore, SHAPE (n.d.d) recommends 150 minutes each week of instructional and developmentally appropriate physical education for elementary school children. The "2008 Physical Activity Guidelines" sponsored by the HHS (n.d.b) and WHO (n.d.) recommended that children engage in daily physical activity for 60 minutes or more with most of the time spent engaged in moderate to vigorous aerobic exercise to gain health benefits from exercise. This recommendation from HHS has not changed since 2008 and is used today to guide curriculum choices. The mind-body connection is significant in learning with academic performance indicators supporting the relationship between student health, physical fitness, physical activity, and school achievement (Blom et al., 2011; CDC, 2010; Lees & Hopkins, 2013; Wittberg, Northrup, & Cottrell, 2012). Researchers investigating skill development and physical fitness levels have found that children with low motor ability were more likely to have lower fitness levels (Parschau et al., 2014); conversely, children with higher motor skill levels were more fit (Haapala et al., 2013; Haga, 2009; Kantomaa et al., 2013). Similarly, Lee (2014) examined parenting practices of low socioeconomic families and found lower levels of engagement in physical activity as parents with a negative association with fitness as adults. The fundamental goal of physical education is to develop motor skills, gain content knowledge, and learn fitness concepts in order to become competent while engaging in physical activity and enjoy the health-related benefits for a lifetime. The purpose of this study was to examine how the standardized FG 1-mile aerobic assessment affected fifth graders' physical activity self-efficacy and motivation to improve physical fitness performance, and to suggest an alternative aerobic assessment based on improvement.

FitnessGram® 1-Mile Aerobic Assessment

The "1-Mile Run" aerobic assessment has been a measurement of cardio respiratory fitness from the beginning of standardized fitness testing (Cureton, Plowman, & Mahar, 2014; Plowman et al., 2006). This assessment, through a variety of national fitness initiatives, has been part of the American culture and physical education battery of assessments from the beginning of measuring and reporting physical fitness scores in schools. The ability to record and track fitness scores electronically prompted the development of “FitnessGram®” in 1977 (Plowman et al., 2006). Currently, the FG 1-mile aerobic assessment with “healthy fitness zone standards” is not inclusive of all children’s ability levels with about one-third of the students tested failing to meet the standard yearly. In turn, students are discouraged from participating in the evaluation process due to the lack of building confidence and self-efficacy through active participation and success. The number of children failing the FG 1-mile aerobic assessment has increased, similar to the local inactivity and obesity rates (CDE, 2013, 2015). From this data it is reasonable to conclude that the preparation or the actual engagement in this assessment has not improved performance or motivated students to become more aerobically fit. Indeed, the Division of Nutrition, Physical Activity, Overweight and Obesity (CDC, n.d.c) and the Trust for America’s Health (2011) confirm that physical inactivity and obesity rates are increasing in both youth and adult populations.

Researchers have found that proper test preparation builds self-efficacy to perform well on assessments, which in turn builds motivation and higher levels of participation in the preparatory process (Belcastro & Boon, 2012). Likewise, early positive childhood experiences in physical education have been found to increase physical activity self-efficacy and engagement in physical activity (Lewis, Williams, Frayeh, & Marcus, 2016). This examination of youth physical activity self-efficacy during two modes of aerobic fitness assessments, the “FitnessGram® 1-Mile Run” and the proposed “15-Minute Aerobic Assessment Based on Improvement,” adds data to current research presented in the literature review of this study that surrounds effort, motivation, and self-efficacy, and addresses the challenge of how to increase youth physical activity.

Rationale

Meta-analysis research surrounding the benefits of physical activity and fitness indicated that academic achievement, cognitive performance, behavior management, and psychosocial functioning were positively related to moderate-to-vigorous exercise (Lees & Hopkins, 2013). There was significant evidence surrounding active and inactive youth that positively connected academic performance to physical activity and fitness (Booth et al., 2013; Chomitz et al., 2009; Dills, Morgan, & Rotthoff, 2011; Padilla-Moledo et al., 2012; Rauner, Walters, Avery, & Wanser, 2013; Wittberg et al., 2012). Cognitive function, such as brain activity related to memory, has been shown to increase with physical activity and fitness as increased brain activity and brain growth occurs with ongoing aerobic activity. Behavior management, such as reducing stress and depression, has been associated with physical activity and aerobic fitness by many studies (Brown, Pearson, Braithwaite, Brown, & Biddle, 2012; Krafft et al., 2014; Krivolapchuk, 2011; Park, Han, Kang, & Park, 2013; Wiles & Bondi, 2011). Healthier anger and mood management were associated with improved behavioral control while psychosocial measures, such as quality of life and sense of well-being, have been connected to physical activity participation (Kelly et al., 2011; Lees & Hopkins, 2013; Morales et al., 2013; Sanchez-Vaznaugh, Sánchez, Rosas, Baek, & Egerter, 2012; Thomas, Dennis, Bandettini, & Johansen-Berg, 2012). Social and personal development, such as cooperating and teamwork, are integrated into physical education curricula and goals. In all, youth who participate in regular physical activity that met aerobic physical fitness standards demonstrated higher academic performance, increased brain activity and growth, and improved mental health and well-being (Barz et al., 2016).

To reach the goal of becoming physically active for a lifetime, I explored how current physical education practices affect student self-efficacy beliefs during aerobic assessments. Effective physical education instruction that focuses on motor development and skill competency by providing ample practice opportunities and successful experiences builds positive self-efficacy beliefs through positive experiences and learning activities (Gao, Lee, Xiang, & Kosma, 2011; Lewis et al., 2016; Palmer & Bycura, 2014). Bandura (1977), the author of social cognitive theory (SCT), addressed the need to build self-efficacy to enhance learning and motivation. Ramirez, Kulinna, and Cothran (2012) agree that SCT is the most appropriate learning theory to use in understanding children's physical activity behavior. Self-efficacy is related to building self-confidence. Although these traits are similar because both include self-perception and judgment of skills, self-efficacy is related to performing specific tasks rather than a general perception about overall abilities (Block, Taliaferro, Harris, & Krause, 2010; Plotnikoff, Costigan, Karunamuni, & Lubans, 2013). Voskuil and Robbins (2015) defined youth physical activity self-efficacy as a "belief in his/her capability to participate in physical activity and to choose physical activity despite the existing barriers" (p. 2002). Physical education lessons that were developmentally appropriate with a high rate of success and providing a positive experience have been found to build self-efficacy beliefs (Arslan, 2012; Lewis et al., 2016; Parschau et al., 2014). It is reasonable to expect that students with more success and elevated self-efficacy beliefs will be more motivated by their own positive outcomes to participate in physical activity, improve motor skill learning, and elevate their physical fitness levels. Other motivational interventions, such as fitness awards and social support, have had marginal success with varied results and conclusions (Biddle, Braithwaite, & Pearson, 2014; Biddle, O'Connell, & Braithwaite, 2011; Cataldo et al., 2013; Pearson et al., 2015; Resaland, Andersen, Mamen, & Anderssen, 2011; West & Shores, 2014). When predicting physical activity behaviors of youth ages 11-16 years, perceived competence and level of participation during physical education were strong indicators of leisure and after school physical activity participation. Shen and Liu (2011) in their research with 11-15 year old children concluded that physical education positively influenced leisure-time physical activity by reporting that "perceived autonomy and competence in physical education are interrelated and function as a whole for enhancing leisure-time physical activity intentions and behavior" (p. 328). Physical education teaches children how to be active for life with enhanced self-efficacy related to physical activity. The impact aerobic assessments have on student motivation, effort, and physical activity self-efficacy was the focus of this research.

Definition of Terms

There are several terms used in exercise science that have similar meanings and are often used interchangeably, such as aerobic fitness, cardiorespiratory fitness, and cardiovascular endurance (Caspersen, Powell, & Christenson, n.d.; Cooper Institute, n.d.b). Likewise, the terms fitness, physical fitness, physical activity, and exercise are substituted for each other freely. In this study these terms and others are defined as:

Aerobic physical activity: Aerobic physical activity describes purposeful and planned exercise activity that elevates the heart rate for a sustained period of time to improve or maintain the cardiorespiratory system and enhance health (CDC, n.d.d).

Improved aerobic fitness, aerobic capacity, and cardiovascular endurance are the end products of this process.

Body mass index: Body mass index (BMI) is defined as the measurement of body weight, which includes fat, muscle, and bone content (Institute of Medicine, 2012). BMI calculations are part of the FitnessGram® battery of tests. They indirectly determine percent of body fat by using a height/weight comparison chart, and influence the FG 1-mile aerobic assessment results by adjusting the achievement standards based on BMI scores (Welk & Meredith, 2007).

Exercise intensity: Exercise intensity describes the effort required to elevate one's heart rate during exercise. Light-intensity exercise refers to physical activity that is not difficult to maintain for long periods of time; moderate-intensity exercise refers to effort that is somewhat challenging for a prolonged period of time and elevates one's heart rate to 50-60% of maximal capacity; and vigorous-intensity exercise refers to effort that is clearly challenging and elevates one's heart rate to 70-80% of maximal capacity (CDC, n.d.c). According to the Cooper Institute (n.d.b), all exercise intensities have health benefits.

Fitness: Fitness or being "fit" describes a general state of readiness and ability to perform physical activities, either through recreational engagement or competitive sports (" Fit," n.d.).

NASPE, SHAPE, AAHPERD: There may be some confusion regarding National Association of Health and Physical Education (NASPE), American Alliance for Health, Physical Education, Health, Recreation, and Dance (AAHPERD) and Society of Health and Physical Educators (SHAPE) references. During this study, NASPE and AAHPERD dissolved as the national organizations for health and physical education professionals. These two organizations merged together and created SHAPE (n.d.b), which now hosts the website to documents that are referenced to NASPE (n.d.), AAHPERD (n.d.), and SHAPE. Reference citations refer to NASPE, AAHPERD, and SHAPE with current and historical document links from one, two, or all three associations as appropriate.

Physical fitness: Physical fitness describes components consisting of cardiorespiratory endurance, skeletal muscle strength, skeletal muscle power, skeletal muscle endurance, balance, flexibility, reaction time, speed of movement, and body composition (CDC, n.d.d). There are skill or performance-related fitness components and health-related fitness components. Schools focus on health-related fitness with physical fitness defined as, “a state of being that reflects a person’s ability to perform specific forms of physical activity/exercise or functions, and is related to present and future health outcomes” (Cooper Institute, n.d.b, p. 1). The focus of this study is on health-related physical fitness.

Significance of the Study

The HHS (n.d.a) has noted that children who are physically active are also healthier. Furthermore, a healthy childhood increases the chances for good health as an adult; for instance, “risk factors for chronic diseases such as heart disease, high blood pressure, type 2 diabetes, and osteoporosis can develop early in life and regular physical activity can be a significant preventative measure” (AAHPERD, 2013, p. 2). The lack of physical activity has been found to be directly related to overweight and obese children and adults (Aryana et al., 2012; Burkhalter & Hillman, 2011; HHS, n.d.a; WHO, n.d.). The CDC (2013) reported that 69.2% of American adults over 20 years old were either overweight or obese with obesity rate at 18% for children. Indeed, researchers have reported that "overweight or obese preschoolers are five times as likely to become overweight or obese as adults when compared to their nonobese peers" (Journal of the American Medical Association, 2013, p. 1). Early and positive experiences in physical education and sports are required to increase physical activity self-efficacy and aerobic fitness (Parschau et al., 2014). The connection between physical activity self-efficacy beliefs, aerobic fitness levels, and obesity rates is clear.

Data related to aerobic fitness and obesity levels at the local level indicate that about one third of the students tested fail to meet the FG 1-mile standard and more than one third of the students tested do not meet the healthy standard for body composition. These students are at risk for developing health problems that could be prevented with regular moderate to vigorous aerobic exercise (WHO, n.d.). Building positive physical activity beliefs is "an important step toward assisting youth to develop an active lifestyle" (Voskuil & Robbins, 2015, p. 2015), which is the goal of all quality physical education programs (SHAPE, n.d.b; "supportREALteachers," n.d.). Understanding the impact and significance of building physical activity self-efficacy beliefs during physical education lessons assists local educators in providing positive experiences during the preparation and assessment of aerobic fitness of their students. According to Voskuil and Robbins (2015), "Theory-based interventions designed to increase both the sources of self-efficacy and physical activity self-efficacy directly have the potential to promote physical activity among youth" (p. 2015). The intervention used to measure aerobic fitness during this study significantly benefitted local youth in building physical activity self-efficacy beliefs.

Research Questions

A greater understanding related to physical activity self-efficacy beliefs is needed to gain insight about student motivation and effort during aerobic assessments. Performance on aerobic assessments has been connected to academic success, emotional stability, and obesity (Booth et al., 2013; Lees & Hopkins, 2013; Telford et al., 2011; WHO, n.d.). I analyzed and compared data that were collected from fifth grade students using a mixed research design. Pretest and posttest student performance data were collected from two modes of aerobic assessments, the FG 1-mile and AABI. Additional quantitative data were collected from fifth-grade students regarding physical activity self-efficacy beliefs through a pretest and posttest survey. Qualitative data were collected from teacher-participants who were asked to comment on student attitudes, motivation, and effort surrounding the aerobic assessments. Quantitative and qualitative data were collected simultaneously and analyzed using a concurrent mixed methods design.

Quantitative Research Questions (RQ)

RQ1: Will student performance scores from the FG 1-mile and AABI aerobic assessments improve from the pretest to the posttest?

$H_0$1**:** There will be no difference in the percentage of student improvement on both aerobic assessments.

H_a1: There will be a difference in the percentage of student improvement on both aerobic assessments.

RQ2: Does participation in the AABI aerobic assessment result in a difference in student physical activity self-efficacy belief levels as compared to FG 1-mile aerobic assessment participation?

$H_0 2$**:** Participation in the AABI aerobic assessment will result in no difference in student physical activity self-efficacy belief levels as compared to FG 1-mile aerobic assessment participation.

$H_a 2$: Participation in the AABI aerobic assessment will result in a difference in student physical activity self-efficacy belief levels as compared to FG 1-mile aerobic assessment participation.

Qualitative Research Question

RQ3: What are student behavior characteristics during an aerobic fitness assessment?

The qualitative subquestions include:

SQ1: What are the differences in perceived student motivation and effort during an aerobic assessment based on improvement as compared to an assessment based on performance standards?

SQ2: To what extent do student behavioral characteristics change after the first assessment attempt as compared to the last attempt?

Review of the Literature

Introduction

In this review of literature I examined peer-reviewed research specific to this study surrounding the correlation between youth physical activity self-efficacy beliefs and aerobic fitness. The three major sections include research related to self-efficacy theory and motivation interventions, health benefits derived from physical activity and importance of aerobic fitness, and physical fitness assessments. Resources used in this review of literature reflect peer-reviewed articles, literature reviews, and professional organizations' websites with research focused on pre-adolescent and adolescent children, Grades K-6 students; there are limited sources related to preschool-aged children and youth in high school, and no sources were related to adults or seniors. Research that ranged from 2011-2016, as well as historically significant research from earlier years, was used to build a factual and reliable body of knowledge surrounding the present research topic. For instance, Plowman's (2006) research regarding the history of FitnessGram® and the onset of recording fitness scores locally and nationally is the only article with this perspective on fitness testing. Similarly, Gao and associates (Gao, 2012; Gao, Lee, & Harrison, 2008; Gao et al., 2011; Gao, Lodewyk, & Zhang, 2009; Gao, Newton, & Carson, 2008; Ning, Gao, & Lodewyk, 2012) have numerous progressive studies surrounding physical activity self-efficacy, motivation, exercise intensity, and interventions that provide a foundation of knowledge that are included in this study. Feltz, Short, and Sullivan's (2008) book regarding physical activity self-efficacy research, sport psychology, and motivation also provided dated and yet invaluable references and resources to this topic. The four sources that influence physical activity beliefs are derived from the Feltz et al. text, highlighted in the literature review section, and used in the study project workshop. Due to examining K-6th grade students, studies dated from 2006-2010 were used to give examples of previous work done with youth, which is limited otherwise. Literature searches were pursued through Education Source, Education Research Complete and ERIC database sites for physical education and fitness research, PubMed was used to locate fitness, health, and wellness resources, and Google Scholar was used to find associate research and current articles related to the content area. Meta-analysis reviews provided pertinent references, which lead to an extensive and thorough examination of relevant research related to physical fitness assessments, self-efficacy and motivation, and health benefits gained from physical activity and aerobic fitness.

Key words and phrases used to search relevant research included physical education, physical fitness, aerobic fitness, cardiovascular fitness, physical activity, self-efficacy, motivation, social cognitive theory, brain growth, cognitive function, obesity, youth training, and health benefits.

The history and types of aerobic fitness assessments, sources of self-efficacy and motivation interventions, and various benefits from engaging in regular moderate-to-vigorous physical activity are discussed in this section. There are several anomalies to note and review; both children and adults are inactive at rates very similar to FG aerobic test failures, the 1-mile aerobic assessment has been the only fitness assessment to remain from the beginning of recording student physical fitness scores and is performance based, and finally, self-efficacy beliefs about engaging in physical activity predicts physical activity participation.

Theoretical Framework

The concept of self-efficacy was first described by Bandura (1977) while introducing his social cognitive theory (SCT) and research related to understanding human behavior. Social cognitive theorists believe that we learn behaviors, develop perceptions of self, and build efficacy from watching others. Furthermore, self-efficacy is related to self-confidence. Although these traits of confidence are similar because both include self-perception and judgment of skills, self-efficacy is related to performing specific tasks rather than a general perception or confidence about overall abilities (Block et al., 2010; Warner et al., 2014). Self-efficacy framework is task related. A student could feel confident in the ability to learn skills in physical education but not feel competent to perform the 1-Mile Run aerobic fitness assessment under a pre-determined standard. Research conducted by Foley et al. (2008) examined other models within the social cognitive theoretical framework, Theory of Planned Behavior (TPB) and Perceived Behavioral Control (PBC). These overlapping theories were used to explain motivation and cognitive processes surrounding behavior, which found self-efficacy was the common thread that merged these theories together. Foley et al. concluded that self-efficacy interventions have the greatest potential to increase physical activity levels in youth. Ramirez at al. (2012) concur by stating, "This study supports the use of Social Cognitive Theory in understanding the constructs of physical activity behavior in children" (p. 303). Ultimately, self-efficacy beliefs determine behavior choices about performing a task.

Self-Efficacy Related to Physical Education

Researchers have conducted multiple research studies with children and adolescents exploring self-efficacy, motivation, physical activity, fitness, and physical education variables with consistent findings significant to this study. Research studies have reported that physical activity self-efficacy beliefs were a predictor of aerobic fitness levels with student interest, perceived importance, and usefulness of fitness as predictors of physical activity levels (Craggs et al., 2011; Harmon et al., 2014; Ning, Gao, & Lodewyk, 2012). Physical activity self-efficacy was the only predictor of aerobic fitness, whereas muscular strength and endurance fitness were not associated with self-efficacy beliefs (Plowman, 2014). In a follow-up study, Gao et al. (2011) reported that only self-efficacy beliefs significantly predicted moderate-to-vigorous physical activity during middle school physical education classes while examining soccer and fitness activities; furthermore, students with higher self-efficacy beliefs toward achieving a goal had greater participation and exerted more effort. Specifically, “high self-efficacy could lead to high levels of motivational beliefs, effort/persistence, and increase physical activity adherence in physical education [classes]” (Gao et al., 2011, p. 32). Student motivation to engage in activities and achieve success occurs when they believe that they can accomplish the task or skill, whereas, motivation diminishes when the task is perceived too overwhelming or difficult to achieve. Indeed, Gao, Hannon, and Carson’s research with middle school students concluded “…students would have higher cardiovascular fitness levels if they believed that they would do well in fitness and physical education” (p. 17). Physical activity self-efficacy related to gaining aerobic fitness is critical for student success in achieving goals in physical education.

Children develop self-efficacy beliefs about learning and task performance through a variety of sources. Researchers have attempted to identify sources that influence physical activity self-efficacy beliefs with similar outcomes. Perry, Garside, Morones, and Hayman (2012) indicated that “intrapersonal, social networks, sociocultural and community, environment, and policy” (p. 112) as domains that influence physical activity self-efficacy beliefs. Similarly, Voskuil and Robbins (2015) identified “personal cognition/perception, self-appraisal process, related action, power to choose physical activity, dynamic state, and bi-dimensional nature” (abstract) of the activity as factors that develop physical activity self-efficacy beliefs. As described and simplified by Feltz et al. (2008), Bandura determined that self-efficacy beliefs were developed through four sources of information: (a) performance accomplishments, (b) vicarious experiences, (c) verbal and social persuasion, and (d) psychological states (see Figure 1). There is a clear consensus that the domains and factors that influence physical activity self-efficacy are interconnected and subtle (Perry et al., 2012; Voskuil & Robbins, 2015). An examination of the four sources that influence physical activity self-efficacy describes the factors and explains the connections and differences between the various learning domains.

Figure 1. Sources that influence self-efficacy beliefs.

Performance factors that influence physical activity self-efficacy beliefs. Performance accomplishments refer to the ability to master a skill or task. The appraisal of personal performance, factual or perceived, is considered the most influential source of information and builder of self-efficacy beliefs (Feltz et al., 2008). Furthermore, if the experience is repeatedly positive and enjoyable at an early age, self-efficacy beliefs increase, whereas, negative experiences cause self-efficacy beliefs to decrease (Arslan, 2012; Jones et al., 2013; Lewis et al., 2016). The perceived difficulty of the task, effort expended, amount of guidance, and inherited abilities also have influence on motivation and self-efficacy beliefs. (Harmon et al., 2014; Wood, Angus, Pretty, Sandercock, & Barton, 2013); that is, tasks need to be challenging and yet successful to increase self-efficacy beliefs. Researchers have found that students who performed positively early in the school year were more motivated to score higher on fitness tests later as compared to those that did not perform well during the pre-test stages of preparation (Gao et al., 2011). Similarly, students with greater motor skill and higher fitness levels were more motivated to achieve their goals in physical education than those with lesser skills and fitness levels (Parschau et al., 2013). Gao et al. (2008) suggested that expectancy outcomes should be integrated with self-efficacy measurements to increase understanding of behaviors to engaging in physical activity. Generally, outcome expectancy is a combination of outcome likelihood or perceived outcome, and outcome value or perceived worth of the outcome. However, Gao et al. found little variance in physical activity behavior when outcome expectancy was considered in the results as compared to self-efficacy values, that is, “only self-efficacy predicted MVPA [moderate-to-vigorous activity], while both self-efficacy and outcome expectancy emerged as predictors of effort/persistence across learning activities" (p. 27). In addition, individuals who are more efficacious tended to envision positive rather than negative outcomes (Gao, Lodewyk, & Zhang, 2009; Parschau et al., 2014). A common thread through the research was that participation to increase aerobic fitness is determined by self-efficacy beliefs gained through performance accomplishments.

Vicarious persuasion that influence self-efficacy beliefs. Gaining information that influences self-efficacy beliefs comes from vicarious sources. Feltz et al. (2008) described vicarious sources of information as observing and comparing oneself with others, including peers, role models, and TV and media performers. Researchers have found that the closer the comparison, that is, age, gender, and ability, the greater the effect was on influencing self-efficacy perception about the task vicariously. In school, peers provide the most common source of vicarious self-efficacy information about performance. Bean, Miller, Mazzero, and Fries (2012) reported that third through fifth grade girls participating in a running program had significant improvement in self-efficacy with increased physical activity after an eight-week running program. Furthermore, these findings were consistent at the 3-month follow-up suggesting that benefits from participation in a successful activity continued after the program ended. Students who engaged in exercise with a peer mentor increased physical activity self-efficacy levels suggesting that social interaction with a peer as a model increases student motivation (Spencer, Bower, Kirk, & Friesen, 2014). The number of opportunities to participate in physical activity with others also determines the number of opportunities to compare performance. Lee (2014) reported that lower socio-economic status children had fewer opportunities to participate in leisure activity than children with higher socio-economic status with corresponding lower physical activity self-efficacy. Lee examined low socio-economic families and found that parents had lower levels of engagement in physical activity as compared to higher socio-economic status parents with a negative association connected to physical activity as adults. Likewise, research findings have found that lower socioeconomic communities have more barriers to participating in recreational physical activity with a strong relationship between opportunities and physical activity self-efficacy beliefs (Lee, 2014; Ning, Gao, & Lodewyk, 2012). Clearly sociocultural, environment, and play opportunities affect physical activity self-efficacy beliefs (Perry et al., 2012). Studies have shown that a key component to improving physical activity self-efficacy based on vicarious sources is to provide the opportunity to play with others, which increases opportunities to gain competence and allows for comparison to build physical activity self-efficacy beliefs.

Verbal and social persuasion that influence self-efficacy beliefs. Another source of self-efficacy information is through verbal and social persuasion. Feltz et al. (2008) defined verbal persuasion as constructive feedback, expectations from others, and self-talk. In addition, the more qualified or authoritative the source of persuasion, the greater the credibility and influence on performance. Verbal and social persuasion comes from teachers, coaches, parents, and peers, as well as from society norms. Feltz et al. continued by stating, “Coaches [teachers] who encourage athletes [students] to measure their successes in terms of self-improvement rather than outcome can help in the persuasive process” (p. 10). Support from the teacher during physical education and performance competence positively predicted personal motivation toward exercise with high school students (Standage, Gillison, Ntoumanis, & Treasure, 2012). Teacher encouragement and high expectations can influence student motivation to try hard to accomplish a task. Similarly, peers supporting each other provide another source of verbal and social persuasion (Harmon et al., 2014; Perry et al., 2012). While working with sixth through eighth grade students, Arslan (2012) found verbal and social persuasion to be significant with developing self-efficacy beliefs. Social support and self-efficacy were found to be significant when predicting physical activity levels in children while outcome expectancy and physical and social environment were not significant in predicting physical activity levels (Carlson et al., 2013; Gao, 2012). Similarly, research regarding afterschool programs to increase physical activity have found that both social support and self-efficacy beliefs were predictors of physical activity behaviors (Huang et al., 2012; Palmer & Bycura, 2014). A study that examined African American adolescent girls, "Girls on the Run" program, found that physical activity increased with both social support and self-efficacy influencing behavior; even further, self-efficacy was the strongest predictor of physical activity increase (Bean et al., 2012). According to Feltz et al., prejudice about a group or group stereotype influences self-efficacy judgments about self and performance abilities. In physical education, "ablism," or the ability to perform a task, is visual and public with peers able to witness success or failure while engaged in physical education tasks and assessments. Individuals who are overweight or obese tend to fall within a group that is stereotyped as not as capable in physical education. Research surrounding physical activity and obese adolescents found that normal-weight adolescents boys were positively affected by both social support and self-efficacy, whereas, physical activity behavior by over-weight boys and girls was associated with self-efficacy but not influenced by social support (Kitzman-Ulrich et al., 2010; Suton et al., 2013). Self-efficacy was found to be an important variable related to increasing physical activity, more than social support. Studies have shown that verbal and social persuasion influenced self-efficacy beliefs and that both were positively associated with physical activity with self-efficacy having the strongest effect on behavior.

Physiological factors that influence self-efficacy beliefs. Physiological factors that determine physical activity self-efficacy beliefs include perceived personal levels of strength and fitness preparedness as well as fatigue and pain (Feltz et al., 2008). Indeed, if one does not feel fit or prepared to run a mile, then self-efficacy beliefs about performing the task would be low. In addition, factors that lead to self-efficacy beliefs depends on the situation and significance of the task. Children try harder when the task has meaning. Physiological factors include emotional states that affect self-efficacy beliefs such as fear, anxiety, sadness, or depression, as well as, happiness, excitement, and enjoyment. Feltz et al. concluded that positive states of emotion enhance self-efficacy beliefs; whereas, negative emotional states decrease confidence and performance potential. Lack of participation in physical activity in adolescents, especially moderate to vigorous aerobic exercising and strengthening physical activity, was closely related to students' low emotional self-efficacy or the ability to cope with negative emotion factors such as frustration, anxiety, depression, and nervousness (Brown et al., 2012; Motta, McWilliams, Schwartz, & Cavera, 2012; Park, Han, Kang, & Park, 2013). Factors that contribute to higher physical activity levels include self-efficacy, social support, and enjoyment with these factors a predictor of daily physical activity levels (Harmon et al., 2014; Lewis et al., 2016; Ning, Gao, & Lodewyk, 2012). Research investigating self-efficacy, enjoyment, and the PACER® aerobic fitness assessment with middle school children found that enjoyment for physical activity was stable, perhaps indicating a general perception about physical activity, whereas, pre and post assessments of self-efficacy beliefs were significantly different with pre-test levels significantly higher (Kane et al., 2013). In other words, students' pre-test self-efficacy beliefs about their performance on the PACER® assessment were more favorable than their self-efficacy beliefs after the test experience; however, the physiological factor of enjoyment in physical education class was still high. Morales et al. (2013) compared physical fitness, both aerobic and strength/endurance assessments, BMI, and quality of life measurements with children, ages 8-11 years old, and found perceived quality of life beliefs were related to physical fitness levels. Physiological factors that affect self-efficacy beliefs are connected to physical activity engagement and perceived physical fitness achievement and are connected to interventions to increase physical activity.

Motivation Interventions

Motivational approaches to increase youth daily physical activity and fitness levels have been varied and this challenge continues today. The use of recognition awards for reaching standards, goal setting techniques, heart rate monitors and pedometers, and mass media campaigns with celebrity endorsements are the most common strategies in use today. Several meta-analyses of research surrounding change interventions to increase physical activity and decrease sedentary behaviors among youth concluded that some strategies were successful in increasing physical activity, although small, with no intervention more effective than others (Biddle et al., 2014; Biddle et al., 2011; Heath et al., 2012; Metcalf et al., 2012). Some researchers suggested a single-behavior intervention to increase physical activity (Atkin, Gorely, Biddle, Cavill, & Foster, 2011), while other researchers suggested a multi-component approach to increase physical activity (Kriemler et al., 2011; Liao, Liao, Durand, & Dunton, 2014). Another review concluded that a single-component approach was as effective as a multi-component approach (Liao et al., 2014). Interventions to increase physical activity with obese youth that used high dosage methods had success with decreasing skin-fold thickness and increased fitness but not overall BMI levels (Sun et al., 2013). Yildirim et al. (2011) concluded from a review of interventions that there is a lack of understanding as to what intervention works for specific populations with more research needed to examine targeted groups. Motivational interventions have had little effect on youth physical activity behaviors. Physical activity levels for youth, children through adolescents are well below the recommended level (SHAPE n.d.a; Colley et al., 2011; WHO, n.d.). Interventions to increase physical activity have been plentiful, single and multi-component, and somewhat successful when implemented.

While discussion surrounding interventions and programs deserve further review, some commonalities can be made about motivational techniques to increase physical activity. First, barriers surrounding physical activity are significant in providing opportunities to participate in after school activities. Children who are active after school are also more inclined to be active during physical education class (Ning et al., 2012). These barriers could be socio-economic as demonstrated by Lee (2014) who found that lower socio-economic status children had fewer opportunities to participate in leisure activity than children with higher socio-economic status. Likewise, higher socio-economic communities have shown that physical activity levels increased, physical fitness improved, and motor skills developed through school-based interventions to increase physical activity, which were most likely through quality physical education programs (Heath et al., 2012). School-based interventions have been found to be more successful in affluent communities. Second, motivating students to be physically active after school includes overcoming barriers such as neighborhood factors and accessibility (Voorhees, Yan, Clifton, & Wang, 2011). Environmental factors, such as the lack of facilities and safety are key issues youth face every day. Physical limitations, such as youth with obesity and children in wheelchairs, have social and physical barriers to overcome. When compared to moderate to vigorous physical activity levels, motivation to participate was less with overweight adolescents than normal weight adolescents (Chen, Welk, & Joens-Matre, 2014; St. George, Wilson, Lawman, & Van Horn, 2013). A study examining self-efficacy, barriers to physical activity, enjoyment, perceived benefits, and activity preferences of sixth grade boys, Robbins, Talley, Wu, and Wilbur (2010) reported that obesity was the greatest personal barrier to motivation and engaging in physical activity. Children with disabilities often feel left out and not included. Verschuren, Wiart, Herman, and Ketelaar (2012) reported both social and facility barriers to physical activity participation for individuals with cerebral palsy. Student maturity and age, regardless of other factors such as ethnicity, socio-economic status, or weight, were significantly related to motivation and engagement when measuring physical activity levels suggesting that educators need to consider student maturation when designing an exercise program to promote physical fitness (Das & Horton, 2012; Ribeiro et al., 2010). Research with underserved sixth grade boys suggested interventions to increase physical activity should integrate motivational techniques with building self-efficacy beliefs (Lawman, Wilson, Van Horn, Resnicow, & Kitzman-Ulrich, 2011). A variety of approaches to motivate youth to be more physically active have been used with limited success. A review of these interventions will demonstrate the effort and diversity of methods that educators have put forth to increase youth physical activity.

Motivation through the use of awards. Recognizing student achievement in physical education comes mostly from earning awards for meeting standards. Motivational awards were part of the evolution of fitness assessments. AAHPERD supported a criterion-based system for awards, whereas, the PCPFS criteria was based on percentile (85%) for receiving physical fitness awards. Indeed, researchers found that students with greater motor skill and higher fitness levels are more motivated to achieve their goals in physical education than those with lesser motor skill and physical fitness (Gao, Newton, & Carson, 2008). Award winning students were more engaged during lessons, had more confidence, tried harder, and enjoyed participating more than their counterparts, and were more likely to be active for a lifetime (Domangue & Solmon, 2010). Conversely, those that did not achieve award winning fitness standards were less motivated to be successful in physical education. Using awards as the only means for motivation has been successful for those students that are fit but was not an incentive for students that were struggling with low physical fitness levels. In 2004, the awards system changed to a recognition system that rewarded and reinforced fitness behavior and regular physical activity (Plowman et al., 2006). Several ways to promote and recognize student physical activity achievement emerged, which included incentives such as activity booklets, exercise logs, contract agreements, setting goals, activity-promoting events, and model school/teacher recognition. Currently students can earn the “Get Fit” award that is connected to the “Fitness Contract Recognition” program through FG and students can earn the “Presidential Active Lifestyle Award,” which has partnered with FG to promote daily physical activity. The change in the awards system reflects the evolution of physical fitness assessment practices and philosophy toward the development of health-related criterion to measure fitness. The intent is to make physical fitness testing more personal and individualized. With the emphasis on physical activity, the “ActivityGram®” was developed to accompany the FitnessGram® for students to recall and report personal physical activity levels. Results from both assessments are combined to give students, parents, and teachers a complete picture of physical fitness and activity. Although physical activity amounts are measured, efficacy surrounding these measurements is not included. Most likely, these capable students who earned awards and confirmed their efficacy about their ability already had higher levels of confidence and enjoyment before the fitness testing. Fitness achievement and recognition awards use performance as a source to build self-efficacy beliefs and confirms their efficacy about their ability, which in turn motivate students to become physically active. In addition to developing and authenticating basic fitness assessments and awards, the onset of FG and related research has impacted the “evolution of physical fitness and physical activity philosophy, research, evaluation, education, and promotion” (Plowman et al., 2006, p. S6) in schools. Various approaches to motivate students through awards and recognition to increase physical activity and fitness have evolved to be more personalized and health related.

Technology, community, and media interventions. Technological interventions and media campaigns have been used to increase youth physical activity levels. Many researchers have investigated the usefulness of pedometer-based interventions to promote physical activity. A meta-analysis of pedometer-based interventions reported moderate success in influencing the increase of physical activity for youth (Minsoo, Marshall, Barreira, & Lee, 2009). More specifically to this study with fifth grade students, a four-week study with children Ages 10-11 years old found that pedometer-based intervention had a positive effect to increase physical activity. The studies concluded that children classified as normal weight were more active than children classified as overweight or obese (Duncan, Birch, & Woodfield, 2012). Another technological method of evaluating physical activity, a heart rate monitor measures exercise intensity by calculating heartbeats per minute during exercise and rest. The use of heart monitors has had inconsistent results with proper wear and inaccurate reading of the device as possible barriers to effective use (Gregoski et al., 2012). Heart rate and pedometers monitors connected to a mobile device or a smartphone that download information without student interference are under development. A study with fifth grade students that integrated heart rate and pedometer data into classroom learning activities reported that student knowledge about fitness concepts increased with the addition of technology-based information about personal physical activity (Lee & Thomas, 2011). Through ongoing practice of informing, assessing, and receiving feedback related to physical activity levels and intensity, student motivation to engage in physical activity and improve fitness levels increased. The use of technology-based interventions is an example of gaining self-efficacy beliefs through performance indicators. The advantage of using a pedometer-type and heart rate monitor intervention is the ability to measure physical activity levels and intensity accurately and to know if minimum standards are reached.

Media campaigns are often targeted to influence specific populations. Media ads to promote physical activity that targeted youth have been effective with several studies examining the results of using a social networking and media marketing approach to increase motivation to exercise. The VERB™ media campaign, sponsored by the CDC, delivered a message to be physically active every day based on planned behavior and social cognitive theories, which promoted benefits, such as, physical activity is social, fun, popular, and healthy (CDC, n.d.e). The VERB™ campaign was extensive, lasted four years, created logos, marketed merchandise, had celebrity spokespersons, ran TV and magazine ads, and sponsored school-directed efforts to promote physical activity. Research surrounding the VERB™ campaign was one of the earliest studies of social media effectiveness and ability to influence youth. Huhman et al. (2010) found that the VERB™ campaign significantly influenced 9-13 year olds' physical activity levels, which continued through their adolescent years. Another study by Annesi et al. (2010) found that targeted media campaigns have effectively increased physical activity levels; however, the effects were not long lasting. The "Let's Move" media campaign was initiated by Michele Obama and sponsored by the Task Force on Childhood Obesity with five stated goals: (a) creating a healthy start for children; (b) empowering parents and caregivers; (c) providing healthy food in schools; (d) improving access to healthy, affordable foods; and (e) increasing physical activity ("Let's Move!," n.d.). Similar to the VERB™ campaign, comprehensive strategies to reach targeted populations, which include social media outlets, such as FaceBook® and Twitter®, and partnerships with celebrities and popular organizations, such as NFL football, are used to encourage a behavioral change. These efforts and others are examples of the use of the media to motivate children to be physically active.

Media campaigns that influence youth utilize vicarious persuasion to increase self-efficacy beliefs about physical activity. The use of role models and delivering information about benefits gained from exercising are key components to improving self-efficacy through persuasion and motivation to engage in physical activity. Media campaigns are effective with promoting and encouraging physical activity and do not use established fitness standards as goals to reach, rather general play and walking is encouraged. For instance, The “Let’s Move” initiative encourages 60 minutes a day of non-specific physical activity. The international “I Walk to School” campaign promotes children walking to school was launched in 1994 in Great Britain and grew to over 42 countries in 2011 (“International Walk to School - About the Walk,” n.d.). The purpose of this campaign is to encourage physical activity and raise awareness of other social and environment issues around the world. The California Department of Public Health (CDPH) sponsors the “Network for a Healthy California—Children’s Power Play! Campaign,” which is intended to motivate and empower 9- to 11-year old children with lower socioeconomic status to exercise 60 minutes per day and eat healthy foods (“Network for a Healthy California—Children’s Power Play! Campaign,” n.d.). A review of research surrounding media campaigns concluded, “Mass media campaigns may promote walking but may not reduce sedentary behavior or lead to achieving recommended levels of overall physical activity” (Abioye, Hajifathalian, & Danaei, 2013, abstract). In summary, mass media campaigns have had promising results with modest increase of physical activity; however, the overall effect has not changed the obesity levels significantly since the VERB campaign research in 2006. Childhood obesity or behaviors surrounding physical activity remain similar, regardless of the efforts of agencies to promote physical activity through mass media campaigns.

The use of video-exercise format that includes games and dance activities has been infused into current physical activity motivational approaches. A systematic review of research that examined active video games involving adolescents and children found light increase of moderate exercise with little evidence regarding long-term effect on promoting physical activity (Biddiss & Irwin, 2010). According to Staiano and Calvert's (2011) review surrounding video-exercise programs, "current research…links exergame play to weight loss, physical and mental fitness, and improved health" (p. 96); furthermore, this review concluded that video-exercise programs, "provide social and academic benefits…increases caloric expenditure, heart rate, and coordination,… [and may improve] self-esteem, social interaction, motivation, attention, and visual–spatial skills" (p. 93). Staiano and Calvert continued by recognizing the positive social interaction inherited by video-exercise activities as well as postulating that body self-consciousness was reduced because student attention was on the screen and not each other. Lyons and Hatkevich (2013) confirmed these findings while working with weight loss interventions and found video-exercise games increased self-efficacy and self-regulation skills with youth. A study that used a "computerized agent," or video of a person, to deliver educational information about physical activity was compared to students that received the same information in a written format. The results from this study indicated the video version of instruction for increasing physical activity efficacy and health and fitness knowledge was higher than the written format of instruction (Murray & Tenenbaum, 2010). HOPS is a video program and curriculum for teachers to use during class that has had some success with increasing physical activity during class; however, the long term effects on physical activity outside of school are unknown (West & Shores, 2014). A review of research surrounding online social network outlets, such as FaceBook® and Twitter®, to increase activity had modest results with the lack of longitudinal evidence to make further conclusions about long-term impact of this mode to increase exercise (Maher et al., n.d.). Self-efficacy and physical activity increased through video-exercise participation through self-efficacy sources of verbal and social persuasion provided by the positive exercise experience. The use of technology has been infused into physical education curriculum and pedagogy practices to increase physical activity in youth with moderate success.

Community agencies have afterschool programs for youth that focus on health and wellness. The “Youth Fit For Life” obesity prevention program, sponsored by the YMCA, reported a significant reduction in BMI scores for 5 to 12-year old children, which was subsequently the most successful of various community-based intervention programs (Annesi, Faigenbaum, & Westcott, 2010). This program was 45 minutes per day for three days a week, which included a variety of aerobic fitness activities and skill mastery learning opportunities for participants. In addition, Annesi et al. (2010) shared that the “Youth Fit For Life” curriculum was based on Bandura’s social cognitive theory that included building “self-efficacy, perceived competence, positive outcome expectations, and social supports” (p. 8). Rural communities often have greater challenges with increasing physical activity with less opportunity for community engagement. A study with third grade students at rural schools found that overweight and obesity levels were significantly greater than average levels with lower physical activity levels for this group (Shriver et al., 2011). A peer mentoring program through the "Heart Healthy Kids Program" in Canada with students in Grades 4, 5, 6 found positive behavioral changes with increasing physical activity, which was associated with improved cardiorespiratory fitness (Spencer, Bower, Kirk, & Hancock Friesen, n.d.). Pedometers measured physical activity levels while the Pacer® measured cardio-respiratory levels before and after the peer mentor intervention. The success of peer mentoring to increase physical activity reflects a strategy to increase motivation and self-efficacy beliefs through social persuasion and support. Peer interaction and achieving affective goals of social and personal development include learning the skills of effective communication and how to cooperate, problem solve, and contribute in a group setting, which are essential components in physical education curriculum as dictated by SHAPE (n.d.e) national standards.

Researchers have reported that specific programs to increase physical activity and reduce obesity levels have had limited success (Cawley, Frisvold, & Meyerhoefer, 2013). These programs varied with some addressing exercise factors, while others addressed diet and exercise, and some obesity prevention efforts included diet, exercise, and environment components. A review of research surrounding interventions to reduce obesity reported that one component was not more effective to reduce BMI than the other, rather interventions that address a combination of components were most effective (Liao et al., 2014). The AHA sponsored Promoting Lifestyle Activity for Youth (PLAY) program at elementary schools, which included during and after school physical activity opportunities, encouraged teacher and social support, and promoted special events such as “walk to school” days, increased physical activity but did not improve BMI scores (Yetter, 2009). Likewise, to promote wellness and health, the CDC endorsed the Coordinated School Health Program (CSHP) to address obesity prevention in schools. The CSHP approach to improving student wellness included quality health and physical education instruction, healthy food choices in the cafeteria, student health clinics, and promotion of school-wide wellness events that included school community members (“CDC - Coordinated School Health - Adolescent and School Health,” n.d.). Other school-based programs to prevent obesity have had inconsistent findings with Yetter concluding, “comprehensive public health-inspired obesity prevention efforts for children and youth have not yet been linked with strongly successful outcomes” (p. 742), indicating that public and comprehensive programs to increase childhood physical activity and reduce obesity have had inconsistent results. School and community programs to increase physical activity have addressed the issue of youth obesity with limited success.

Physical Activity and Gender

There is no doubt that there are differences between boys’ and girls’ physical activity behaviors. Simply stated, boys have more physical activity efficacy than girls. A one-year study that involved third and fourth grade students found that boys were more physically active during physical education and after school than girls. Furthermore, children who were involved in organized sports after school were more active during physical education at school than their non-participating peer (Biddle et al, 2014; Craggs et al., 2011; Smith, Nichols, Biggerstaff, & DiMarco, 2009a). In a longitudinal study of children 4-17 years old, Findlay, Garner, and Kohen (2010) reported that unorganized physical activity declined for girls during adolescence, whereas boys had a relatively constant pattern of unorganized physical activity throughout childhood. Research with students during an afterschool movement program found that the relationship between physical activity, enjoyment, motivation, and self-efficacy were stronger for boys than girls (Atkin et al., 2011; Dzewaltowski, Geller, Rosenkranz, & Karteroliotis, 2010), except for underserved (minorities, low socio-economic status) groups (Lawman et al., 2011; Peterson, Lawman, Wilson, Fairchild, & Van Horn, 2013). Furthermore, boys with normal weight scored higher than boys who were overweight or obese in mood and emotion control, social support, autonomy, and physical well-being, whereas, girls with normal or overweight scored higher in self-perception than girls that were obese. Muscular strength and endurance scores for boys of normal weight and aerobic fitness levels for girls of normal weight were significantly related to higher quality of life of children (Morales et al., 2013). In addition, boys had higher self-efficacy regarding overcoming barriers to participate in physical activity with girls perceiving to need more social support (parent) to participate in physical activity; and reported that boys preferred competitive sports, whereas, girls had a greater variety of physical activity choices, such as, dance and jump rope (Pearson, Braithwaite, & Biddle, 2015; Wright, Wilson, Griffin, & Evans, 2010). Although boys are more active and have a greater level of self-efficacy toward physical activity, interventions to increase physical activity were more successful with girls than with boys (Biddle et al. 2014). However, Spencer, Bower, Kirk, and Hancock (2014) measured physical activity during a peer mentoring intervention and found that boys responded greater to the peer mentoring intervention than girls and had more steps per day or were more active than the control group.

Physical education curriculum protocols in the past separated genders for instruction and activity with a sports-focused curriculum, whereas, physical education classes today are coed with a curriculum that has a movement-education and health/fitness focus. The history, discussion, and implementation of the change in curriculum to have coed instruction in physical education were similar to the FitnessGram® transformation from criterion-based standards that measured sports related skills, such as agility and quickness, to health-related factors, such as BMI, flexibility, and muscular strength (Going, Lohman, & Eisenmann, 2014; Plowman et al., 2006). Physical education curriculum mirrored the FG change to be more inclusive of all populations and reflected concern for student health and fitness. Regardless of the motivational technique, having a positive early childhood experience was found to be most related to physical activity self-efficacy (Jones et al., 2013; Lewis et al., 2016; Parschau et al., 2013). Furthermore, goal setting or action planning was connected to motivational self-efficacy and predicted physical activity levels. Positive physical activity experiences were associated with higher self-efficacy beliefs and intentions; conversely, lower levels of self-efficacy beliefs were connected to lower levels of action planning and reported less than positive experiences while exercising (Parschau et al., 2013). Setting realistic goals that match personal ability provides inclusive, successful, and positive learning experiences in physical education, which are essential for effective instruction and student achievement.

Health Benefits From Aerobic Exercise

There is a direct correlation between regular physical activity and health among children and adolescents (CDC, 2010; HHS, n.d.a; Institute of Medicine, 2012; WHO, n.d.). "Risk factors for chronic diseases such as heart disease, high blood pressure, type 2 diabetes and osteoporosis can develop early in life and regular physical activity can be a significant preventative measure" (AAHPERD, 2013, p. 2). Furthermore, a healthy childhood increases the chances for good health as an adult. More specific to this study examining the FG 1-mile aerobic assessment that measures cardiovascular fitness, aerobic capacity has the highest relationship to student wellness, academic performance, brain development, psychological function, and weight control as compared to any other fitness assessment (Lees & Hopkins, 2013). A closer examination of these outcomes demonstrates the importance of pursuing regular physical activity and aerobic fitness in youth.

Academic achievement and brain development. Grisson (2005) was the earliest researcher to connect standardized fitness scores obtained from the FG 1-mile aerobic assessment to standardized academic results obtained from the Stanford Achievement (STAR) assessment scores of fifth, seventh, and ninth grade students in California, who found a consistent and positive relationship between fitness and academic achievement. Many studies followed this research that re-examined and confirmed this relationship between FG 1-mile aerobic assessment and STAR results. At first, researchers postulated that fit students who scored higher on fitness assessments were healthier and had fewer absences, thus they performed better academically due to more time in school to learn. Blom et al. (2011) proposed this argument by connecting physical fitness scores to attendance records, regardless of gender, race, or socioeconomic status. A review of literature surrounding the benefits of aerobic physical activity and fitness indicated that academic achievement, behaviors, cognitive performance, and psychosocial functioning were positively related to moderate to vigorous exercise (Lees & Hopkins, 2013). Indeed, ample research has connected academic performance to physical activity and fitness (Blom et al. 2011; Booth et al., 2013; Haapala et al., 2013; Kantomaa et al., 2013; Lees & Hopkins, 2013; Wittberg et al., 2012). A study that examined perceived weight status found that academic performance was associated with weight status, regardless of the actual weight (Florin, Shults, & Stettler, 2011; Kantomaa et al., 2013). Children's perception of weight status affected self-perception and academic success. Research with fifth, seventh, and ninth grade students found low aerobic fitness and obesity were associated with lower standardized test scores in children (Roberts, Freed, & McCarthy, 2010). However, contrary to this finding, Rauner et al.' (2013) research with fourth through eighth grade students reported that, "Aerobic fitness was a significant predictor of academic performance; weight status was not" (abstract). Likewise, Suton et al. (2013) found that only physical activity self-efficacy was found to be related to increased physical activity; whereas, weight status was not related. The relationship between students that are obese and academic performance is still not clear. A study examining first through third grade students found that poor motor skills were associated with weaker academic skills, especially with boys (Haapala et al., 2013; Parschau et al., 2013). Research with young children suggested weaker motor skills were associated with obesity, lower physical fitness levels, and struggling academic performance. According to Kantomaa et al. (2013), "compromised motor function in childhood may represent an important factor driving the effects of obesity and physical inactivity on academic underachievement" (abstract). Higher grade point averages were associated with physical activity, whereas, obesity was associated with lower grade point average in adolescents (Kantomaa et al., 2013). Specific to the present research with fifth grade students, an early study that examined third and fifth grade students found aerobic fitness tests were positively related to academic achievement, whereas, elevated BMI was inversely related (Castelli, Hillman, Buck, & Erwin, 2007). In general, the level of intensity to gain the benefits of fitness and academic achievement has been determined to be moderate to vigorous while participating in any activity that elevates the heart rate. Research involving kindergarten through fifth grade students found extra time spent during recess and/or physical education (away from academics) did not impact standardized test scores negatively, rather findings showed that breaks for physical activity may improve alertness and academic achievement (Dills, Morgan, & Rotthoff, 2011; Trudeau & Shephard, 2008). Researchers found that physical activity and aerobic fitness were related to academic performance and questioned why this phenomenon occurred.

There is a significant relationship between human growth and development, and human movement and exercise. Aerobic activity is an essential component to the development of the brain during preadolescence (Best, 2012; Chaddock et al., 2011; Thomas, Dennis, Bandettini, & Johansen-Berg, 2012) and adolescence. There is a strong correlation between aerobic fitness levels and cognitive ability, that is, aerobic exercise actually builds brain cells, promotes development, and improves brain function (Krivolapchuk, 2011; Hogan et al., 2013). For instance, research with children found that the cognitive function of memory improved with aerobic exercise and higher fitness levels (Chaddock, Hillman, Buck, & Cohen, 2011; Fisher et al., 2011; Hill, Williams, Aucott, Thomson, & Mon-Williams, 2011). Furthermore, research with overweight children, who tend to lack aerobic exercise and often struggle academically, found that exercise activated brain growth that is connected to cognitive control (Krafft et al., 2014). Children in the third grade performing regular integrated aerobic activity performed significantly better on intelligence testing and on state tests on social studies (Reed et al., 2010). While agreeing on the benefits of aerobic activity to human growth and brain development, the actual dose of activity or level of intensity differs between researchers.

There are three variables to consider when discussing amount or dosage of physical activity needed to promote human growth and development. These variables are duration, intensity, and frequency of exercise. The actual amounts of each, for instance exercising the AAHPERD (n.d.) recommended 60 minutes a day (duration), every day (frequency), are still under investigation, especially in regard to intensity of exercise. Duration and frequency of exercise has not been challenged in the literature with the SHAPE (n.d.d) recommendation of 150 minutes per week of physical education accepted as sufficient. Daily physical activity of at least 60 minutes is the goal; however, the actual aerobic activity to gain fitness did not matter; any activity that was moderate to vigorous exercise impacted cognitive function (Lees & Hopkins, 2013). Stroth et al. (2009) concluded that overall aerobic fitness gained from daily participation caused higher cognitive function rather than a single attempt of aerobic activity. In other words, one bout of aerobic exercise is not enough to make a difference with brain growth, rather the building and maintenance of aerobic fitness is needed to affect cognitive development. Hill, Williams, Aucott, Thomson, and Mon-Williams (2011) reported that moderately intensive aerobic exercise performed within a classroom setting had short-term positive effect on cognitive performance. Children in the Hill et al. study performed various callisthenic-type exercises in the classroom between academic learning activities. Research conducted by Davis et al. (2011) found that vigorous aerobic exercise improved cognitive function and development. The conflicting results from different studies suggest that research surrounding the intensity of exercise needed to affect growth and development is still unknown. An important study related to the present research found a strong connection between peak FG 1-mile aerobic assessment scores and academic achievement. Namely, fifth grade boys at 9-minute thresholds and girls at 12-minute thresholds during the FG 1-mile aerobic assessment demonstrated a significant increase in academic performance on standardized assessments as compared to those students that did not achieve these standards (Wittberg, Cottrell, Davis, & Northrup, 2010). These thresholds also match the Healthy Fitness Zone® standards established by FitnessGram®. Another interpretation of these results indicate that any assessment to measure aerobic fitness needs to be at least nine minutes for boys and twelve minutes for girls to measure full aerobic capacity. The AABI aerobic assessment protocol, as suggested by this present study, measures aerobic capacity due to the length of effort expended by students.

Physical activity and psychological behaviors. There is a strong relationship between adolescent mood, emotional regulation, self-esteem, and physical activity. Simply, physically active children are happier. According to Wood, Angus, Pretty, Sandercock, and Barton (2013), “short bouts of moderate physical activity can have a positive impact on self-esteem and mood in adolescents" (p. 311). Adolescent aerobic exercise programs have been found to improve symptoms of depression, alleviate stress, and elevate self-esteem (Brown, Pearson, Braithwaite, Brown, & Biddle, 2012; Lees & Hopkins, 2013; Park, Han, Kang, & Park, 2013). The psychological state of "well-being" was significantly enhanced with increased physical activity and aerobic fitness (Kelly et al., 2011). For instance, depression symptoms decreased with increased aerobic fitness levels, body satisfaction improved, and sense of well-being was enhanced after an exercise intervention. Researchers have found that aerobic exercise improved the behavior of anxious six to eight year old children under a stressful informational load (Krivolapchuk, 2011). Physically active adolescents, regardless of intensity of the exercise, had reduced depressive symptoms. (Wiles, Haase, Lawlor, Ness, & Lewis, 2011). Motto, McWilliams, Schartz, and Cavera (2012) joined others in finding that exercise consistently decreased negative emotional behaviors adding the comment, "exercise fits within the natural ecology of childhood and adolescent activities, whereas psychotherapy and psychotropic medication do not" (p. 234). However, similar to research surrounding brain development, the exact exercise frequency, duration, and intensity to gain the greatest benefits related to cognitive and psychosocial behaviors needs further investigation (Lees & Hopkins, 2013; Thomas et al., 2012). Regardless of physical activity dosage, psychological behaviors are positively affected by exercise. Physical activity and fitness influence children's psychological function and well-being.

Obesity and physical activity. Youth physical activity, physical fitness levels, and obesity rates are directly related. Nutrition and food choices are also important factors surrounding good health and weight control. Specific to the present study, aerobic fitness scores as measured by FitnessGram® were directly related to obesity levels. A study examining California obesity and physical fitness issues in schools examined fifth, seventh, and ninth grade physical fitness data (2003 through 2008) and found overall fitness improved with scores slightly elevating or remaining stable as students progressed through school; however, fifth grade students were found to be more obese currently than previous years, which was not reversible by the end of ninth grade (Aryana et al., 2012). Moderate to vigorous activity declined as children progressed through school, which was associated with increased weight gain; furthermore, boys were more affected by gaining more weight due to inactivity than girls (Basterfield et al., 2012). Early childhood education and prevention interventions are important to reduce obesity levels. “Children who are overweight or obese as preschoolers are 5 times as likely as normal-weight children to be overweight or obese as adults” (CDC, 2013, p. 1). There was a decline in obesity rates of preschool children according to data from 2008 to 2011 (CDC, 2013). Another study reported a 43% reduction in obesity for children ages two to five years old from 2003 to 2012 (Journal of the American Medical Association, 2013). Analysts point to a nutritional media campaign focused on reducing sugary soda-type drinks targeted to low socio-economic families with infants and pre-school children as a reason for a reduction to preschool obesity. In Butte County, California State University, Chico was awarded a two-year grant from the California Department of Health Obesity Prevention Program to decrease obesity levels of children in low-income preschool settings (“Child care applauds Chico State for increasing opportunities in preschool physical activity,” n.d.). Through the campus “Center of Nutrition and Activity Promotion” program, which promotes healthy eating and physical exercise for children, the grant provides services that promote developmentally appropriate physical activity ("Center for Nutrition and Activity Promotion," n.d.). The combination of healthy eating and physical activity contributes to the overall health of children and adolescents. Specific to this study, aerobic fitness is strongly connected to obesity and BMI scores.

Several reviews of research surrounding physical fitness reported that the measurement of aerobic capacity had the most significant relationship to student health and was the greatest predictor of student academic achievement and success in school when compared to the other fitness measurements, and that body composition (BMI) scores were related to aerobic capacity results (Booth et al., 2013; Janssen & LeBlanc, 2010; Lees & Hopkins, 2013). Research showed that the students with higher BMI scores indicating overweight or obese levels were the same students with weak aerobic assessment scores. Engaging in aerobic activity, perceived confidence, and self-esteem were found to be lower in children with weight issues (Chen, Welk, & Joens-Matre, 2014). Strongly supported by multiple disciplines exploring multi-faceted research, Thomas, Dennis, Bandettini, and Johansen-Berg (2012) reported that regular exercise at moderate aerobic intensities promoted positive health benefits including improved fat mobilization and developing an efficient cardio-respiratory system. There were conflicting findings about the effectiveness of school physical education programs with decreasing obesity. An early childhood longitudinal study with kindergarten through fifth grade students indicated that physical education had a causal effect on decreasing youth obesity with boys benefitting most from physical education in reducing BMI scores (Cawley et al., 2013). Physical education specialists have been more successful than non-specialists with decreasing age-related BMI levels in children and improvement on academic assessments (Telford et al., 2011). Effective teaching practices that promote life-long physical activity are key to increasing youth physical activity levels.

Physical Fitness Assessments

Assessments in physical education have evolved over the years and are still under scrutiny. Educators disagree as to what and how to evaluate student learning. Some teachers in physical education will grade primarily on participation, attitude, behavior, and effort (Baghurst, 2014) while others include formative assessments on performance and knowledge (Leirhaug & MacPhail, 2015; López-Pastor et al., 2013) to evaluate student learning. While alternative methods of authentic styles of assessment are slowly emerging, physical fitness tests (PFT) are universally used to evaluate student performance and remain a common and unwavering practice. There has been a conscientious effort to reform physical education assessment practices with little progress toward change from a lack of consensus about appropriate and practical assessment procedures (Leirhaug & MacPhail, 2015; Plowman, 2014). Indeed, "the use of PFTs has been widely criticized in the research literature and students have reported that these tests often result in a negative experience conveying little knowledge about their meaning and applications to real life" (López-Pastor et al., 2013, p. 60). Rather, older students were found to avoid fitness-testing days due to students' disdain and perceived irrelevance of the assessments. When referring to the mile run researchers reported that, "Avoidance strategies were common to all students with low scores in the test [mile run], but not exclusively, since some of the students with high scores displayed similar reactions" (López-Pastor et al., 2013, p. 60). It would be reasonable to assume that these students' efficacy to perform these fitness assessments was below average. Macdonald (2011) specifically reported that participating in fitness tests was counter to building physical activity self-efficacy beliefs. Assessments in physical education continue to be under scrutiny with alternative methods suggested for improvement.

There are many authentic and practical assessments in physical education that measure student learning related to psychomotor skills as well as evaluations that determine cognitive understanding and personal development. Psychomotor assessments evaluate motor skill, quickness, and agility, whereas, cognitive assessments measure knowledge and understanding of strategies, and personal development assessments evaluate teamwork, cooperation, and communication. In addition there are assessments that measure various physical fitness components that are related to student health and wellness. The battery of fitness tests includes methods to measure body composition, flexibility, muscular strength, muscular endurance, and aerobic capacity. While summarizing the SHAPE Standards in physical education, Graham et al., (2013) stated, “the purpose of fitness assessment is to identify areas of concern and assist youngsters in establishing personal goals” (p. 41) to improve current physical fitness levels and to establish future habits of living an active and healthy lifestyle. In addition, assessments need to be authentic, ongoing, and meaningful to be effective (Graham et al., 2013). The purpose of assessments include measuring current performance levels and providing a platform to set future goals for improvement. Likewise, fitness assessments can help teachers determine appropriate teaching practices to improve overall student health and wellness levels. FitnessGram® provides ongoing assessment procedures and tools to measure physical fitness of youth in schools.

FitnessGram®. Cooper Institute for Aerobics Research developed the FitnessGram® battery of assessments in the early 1980s to provide school administrators and parents a "report card" about physical fitness similar to other content areas (Cooper Institute, n.d.a). Officially adopted in 1987, the FitnessGram® is an educational assessment and reporting software program that maintains longitudinal data related to fitness and physical activity (Plowman et al., 2006). Used nationally to measure youth fitness achievement in schools, student FitnessGram® results are reported three times during a student's schooling, in the fifth, seventh, and ninth grades.

A battery of tests that measure physical fitness have evolved over the years with direction and support from AAHPERD, the national organization representing professionals and teachers in physical education, members from the President's Council on Physical Fitness and Sports (PCPFS), and other research groups. Under contention for many years, the battery of tests have been either altered or dropped; for instance, previous test items, such as the shuttle run, 50 yard dash, and softball throw were eliminated with improvements made to the sit-up, pull-up, and flexibility tests. When examining the history of the FG and other physical fitness assessments, every version has had a "1-Mile Run" test; however, the Pacer ® and 1-Mile Walk, were added to the FitnessGram® battery of assessments in 1992 and 1999 respectfully, as alternative tests for assessing aerobic fitness (Cureton et al., 2014; Plowman et al., 2006). These alternative assessments reflect the necessity to meet the needs of all students, especially those that cannot perform a mile run.

Debate continued through 1992 as to whether physical fitness evaluation should use criterion-referenced standards or measure fitness levels based on population norms.

Researchers and practitioners were dissatisfied with test items and award system that reflected sport performance rather than functional and healthy physical activity to prevent diseases. During this time there was a conscious effort to change testing criterion from sports-related test items to health-related test items (Going, Lohman, & Eisenmann, 2014). From data gathered over five years (1987-1992), FitnessGram® developed criterion-based standards, called Healthy Fitness Zone (HFZ), to evaluate student physical fitness levels. Student fitness test results from the FG were classified as "Healthy Fitness Zone," "Needs Improvement," or "High Risk" (Going et al., 2014). Test results in the "healthy fitness zone" are considered "minimum levels of fitness that offer protection against diseases that results from sedentary life" (CDE, n.d., p. 1). Healthy Fitness Zone® calculations that measure cardiovascular endurance are derived from students' age, gender, height, and weight (BMI), which are compared to the assessment results or time for the FG 1-mile aerobic assessment. A chart provided by FitnessGram® estimates VO2max capacity during exercise from these variables and determines if the results are within the HFZ criteria. According to researchers from the Cooper Institute for Research, calculating individual VO2max capacity during exercise determines intensity levels appropriate for improving health and assesses aerobic fitness levels (Cureton et al., 2014). The FitnessGram® 1-Mile Run has been the standard method to assess aerobic capacity from the beginning of reporting fitness scores and continues today. California Department of Education (CDE, 2015) reported that 63.5% of fifth grade students tested (*n*=455,897) in California met the healthy fitness zone standard for the FG 1-mile aerobic assessment with 29.9% needing improvement and 6.6% in the high-risk zone (see Table 1). Furthermore, seventh and ninth grade aerobic test results were similar with the high-risk group increasing each test cycle. Body composition measurements in California found that 59.7% of fifth grade students, 61.5% of seventh grade students, and 64% of ninth grade students met the healthy fitness zone related to body weight and height; in other words, about one-third of the students tested did not meet the standard and considered overweight or obese. Local schools in Butte County reported that 30.2% of fifth grade, 22.5% of seventh grade, and 19.6% of ninth grade students need improvement according to the healthy fitness zone standards for aerobic fitness; while 'at risk' students increased from 6.5% to 9.5% to 13.4%, rather than improving aerobic fitness from fifth to ninth grades (see Table 1). These results were consistent with others researchers who found physical activity decreased during adolescence with girls having a greater decline at an earlier age than boys (Biddle, Braithwaite, & Pearson, 2014b; Colley et al., 2011; Craggs et al., 2011; Dumith, Gigante, Domingues, & Kohl, 2011; Pearson et al., 2015). Body composition measurements in local schools in Butte County indicated that 59.7% of fifth grade students, 61.5% of seventh grade students, and 64% of ninth grade students were within the healthy fitness zone, which was better than the state average. More specific to this study, Pearson et al. through their research review found that aerobic fitness assessments, FG 1-mile and Pacer®, had the most significant age-related decline in scores as compared to other fitness components and revealed a greater disparity between students than all other physical fitness assessments. Results from FitnessGram® aerobic assessment indicated that over 30% of students in fifth, seventh, and ninth grades were not meeting the HFZ criteria for aerobic fitness.

Table 1

Fitnessgram® 1-Mile Run and Body Composition Summary

	FG 1-mile	FG 1-mile	FG 1-mile	Body comp.	Body comp.	Body comp.
	Met HFZ standard	Needs improvement	High risk zone	Met HFZ standard	Needs improvement	High risk zone
California						
5th grade	63.5	29.9	6.6	59.7	19.4	20.9
7th grade	65.4	24.6	10.0	61.5	19.4	19.1
9th grade	63.8	23.5	12.7	64.0	18.8	17.2
Butte Co.						
5th grade	63.3	30.2	6.5	60.6	19.6	19.8
7th grade	68.0	22.5	9.5	63.3	18.8	17.9
9th grade	67.0	19.6	13.4	66.8	16.8	16.4

Note. From 2014-15 California Physical Fitness Report: Summary of Results (CDE, 2015)

Alternative aerobic fitness assessments. Exercise energy is commonly called effort and reflects exercise intensity. According to the WHO (n.d.), “intensity refers to the rate at which the activity is being performed or the magnitude of the effort required to perform an activity or exercise” (p. 1). Along with exercise duration and exercise frequency, exercise intensity determines fitness quality and benefits. Generally, one can exercise for a short duration with high intensity exercise that uses anaerobic energy sources, which is considered vigorous exercise at 85% or more above VO2max; or one can exercise aerobically with moderate intensity at 65-85% VO2max; or one can exercise below 65% VO2max for a longer duration to gain health benefits (Thomas, Dennis, Bandettini, & Johansen-Berg, 2012). Intensity and duration of exercise are inversely related; that is, low intensity exercise needs to have a longer duration than high intensity exercise for health related benefits to occur. VO2max reflects the maximum rate that the cardiovascular, cardiorespiratory, and muscular systems in the body can take in, transport, and utilize oxygen during exercise (Colantonio & Peduti Dal Molin Kiss, 2013). Typically, measuring VO2max levels accurately is complicated and requires a laboratory environment. FitnessGram® estimates VO2max from several variables, namely, age, height, body mass index (BMI), and 1-Mile Run result (time) (Cureton et al., 2014). Exercise frequency refers to how often exercise happens during the week, month, or year. A two-year intervention with 9-10 year old children to increase cardiorespiratory fitness by maintaining a purposeful 60-minute per day, five days per week, exercise program of moderate intensity significantly improved VO2max levels as compared to the control group that exercised 45-minutes twice weekly during physical education (Resaland et al., 2011). NASPE (2013) and SHAPE (n.d.d) recommended that students have purposeful physical education for 150 minutes per week, whereas, AAHPERD (2013) recommends 60-minutes per day of physical activity. Measuring VO2max levels during exercise is one method to determine cardiorespiratory fitness.

A method to measure effort and exercise intensity is to check personal heart rates or to use heart monitors during exercise. Exercise physiologists and physical educators use personal heart rate levels to monitor exercise intensity due to practicality and immediacy. Heart rate increases when exercise intensity increases and heart rate monitors can measure various intensity levels and duration of exercise. Educators and researchers have been using a formula based on age to determine maximal heart rate needed to achieve optimum training effects from exercise. This formula, 220 minus current age (HRmax-age) of participant has been used since the 1930s and has been accepted as the norm; however, the formula was not based on original research and has been found to be faulty with no scientific merit (Robergs & Landwehr, 2002). Several studies have examined the HRmax-age formula and determined that the formula did not fit all populations with variations between genders, body mass index, ethnicity, able/disable, and physical fitness status, which affected the heart rate monitoring results (Colantonio & Peduti Dal Molin Kiss, 2013; Sarzynski et al., 2013; Verschuren, Maltais, & Takken, 2011). Although experts agree that monitoring heart rate is important and reflects exercise intensity, the HRmax-age formula does not fit all groups.

Another method to measure exercise intensity is to use "Metabolic Equivalents" (METs) system, which is a person's working metabolic rate during moderate to vigorous exercise as compared to their resting metabolic rate when sitting quietly (WHO, n.d.). Energy usage is calculated into calories per hour with quiet sitting equivalent to one MET, moderate exercise equivalent to 3-6 METs, and vigorous exercise equivalent to 6 or more METs. WHO (n.d.) classified various fitness and everyday activities into moderate-intensity or 3-6 METs and vigorous-intensity or greater than 6 METs (see Table 2). Students and teachers choose the type of activity according to the potential MET energy expenditure required for engaging in a game or practice. Physical activity choices rather than heart rate levels maintained during exercise determine exercise intensity. Physical activity choices rather than heart rate levels maintained during exercise determine exercise intensity.

Table 2

Met Energy Chart

Exercise Type	Definition	Examples
Moderate intensity	Approximately 3-6 METs Moderate effort with noticeable heart rate increase	Brisk walking Walking pets Dancing Gardening House work Hunting/hiking Active games involvement Home repairs (roofing) Carrying moderate loads (groceries/laundry)
Vigorous intensity	Approximately >6 METs Substantial effort with rapid breathing and elevated heart rate	Running Walking briskly up a hill Fast cycling Fast swimming Aerobics Competitive games involvement Heavy shoveling (snow) Digging ditches (hard labor) Carrying/moving heavy loads

Note. Energy expenditure for different physical activities (WHO, n.d.) METs are commonly used to express the intensity of physical activities.

Research that compared self-efficacy assessments to MET data concluded that these measurements were consistent and related. Dishman, Saunders, McIver, Dowda, and Pate (2010) measured fifth and sixth grade students exercise engagement and found scores from the self-efficacy survey were supported by physical activity findings, which demonstrated construct validity. Similar results were found among a multi-ethnic cohort of 6th and 8th-grade girls that concluded physical activity self-efficacy assessments predicted physical activity participation levels (Dishman et al., 2010). Zhang and DeBate (2006) measured self-efficacy of children nine years or younger and found student physical activity levels were up to six times higher with high self-efficacy levels as compared to students with low self-efficacy levels. Another study conducted by Annesi, Faigenbaum, and Westcott (2010) that examined African American children physical activity choices found that self-efficacy was related to the amount of physical activity participation, which demonstrates that more engagement in physical activity will build self-efficacy and confidence to participate more. Furthermore, children with higher self-efficacy beliefs expended more energy during exercise, whereas, children with lower self-efficacy beliefs expended less energy (Foley et al., 2008). Building confidence during learning activities is key to student success as research has shown that "fitness tests that measure aerobic capacity are not effective in motivating students to become active for a lifetime, rather students are likely to be physically active and exert effort when they believe they can accomplish certain activities in PE" (Gao et al., 2011, p. 32). Lawman, Wilson, Van Horn, Resnicow, and Kitzman-Ulrich (2011) conducted research with sixth grade students concluded that self-efficacy was found to be associated with physical activity motivation. The relationship between self-efficacy beliefs and physical activity participation levels is significant, which in turn predicts physical fitness and health.

Assessments in physical education have evolved over the years and are still under scrutiny. Educators disagree as to what and how to evaluate student learning. Some teachers in physical education will grade primarily on participation, attitude, behavior, and effort (Baghurst, 2014) while others include formative assessments on performance and knowledge (Leirhaug & MacPhail, 2015; López-Pastor et al., 2013) to evaluate student learning. While alternative methods of authentic styles of assessment are slowly emerging, PFTs are universally used to evaluate student performance and remains a common and unwavering practice. There has been a conscientious effort to reform physical education assessment practices with little progress toward change from a lack of consensus about appropriate and practical assessment procedures (Leirhaug & MacPhail, 2015). However, “the use of PFTs has been widely criticized in the research literature and students have reported that these tests often result in a negative experience conveying little knowledge about their meaning and applications to real life” (López-Pastor et al., 2013, p. 60). Indeed, older students were found to avoid fitness-testing days due to student’ distain and perceived irrelevance of the assessments. When referring to the mile run researchers reported that, “Avoidance strategies were common to all students with low scores in the test [mile run], but not exclusively, since some of the students with high scores displayed similar reactions” (López-Pastor et al., 2013, p. 60). It would be reasonable to assume that these students’ efficacy to perform these fitness assessments was below average. Indeed, facilitating fitness tests may be counter to building physical activity self-efficacy beliefs (Macdonald, 2011). Assessments in physical education continue to be under scrutiny with alternative methods suggested.

Review of Literature Summary

The CDC (n.d.c) defined physical fitness as “the ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and respond to emergencies” (p. 1). Student aerobic fitness levels predict overall health, academic achievement, psychological moods, emotional control, and weight status. Physical activity self-efficacy, or the perception that one can complete a task, was the prominent factor that predicted aerobic capacity. Sources to gain physical activity self-efficacy beliefs include performance, vicarious influence, verbal and social persuasion, and psychological factors. Significant effort by the student is needed to perform well on an aerobic assessment, which requires students to become physically uncomfortable to produce a best result. It seems reasonable for students not to try during these assessments if their physical activity self-efficacy about reaching this task is low.

Experts in physical education pedagogy specify that teachers need to consider current student fitness levels, previous movement experience, genetic disposition, and provide ample practice opportunities to improve student motor learning and personal fitness (Graham et al., 2013, Chapter 27). In order for students to reach the SHAPE (n.d.b) goal of becoming physically active for a lifetime, physical education practitioners need to consider student self-efficacy during planning, instruction, and assessments. Student success in physical education is dependent on effective teaching practices that develop student self-efficacy about achieving motor skills and fitness standards. Lessons that are developmentally appropriate that intentionally build student confidence during learning activities have high success rates. In return, students are more motivated by their own positive outcomes to participate in physical activity, improve motor skill learning, and elevate their physical fitness levels. Standardized tests, such as the nationally used FitnessGram® in physical education, determine standards for students to achieve. Current assessments that measure aerobic capacity are discouraging students from participating in the evaluation process due to the lack of building confidence and physical activity self-efficacy through active participation and success. Studies have shown that more effort was exerted and participation was greater in physical education if students had high self-efficacy toward achieving goals (Gao et al., 2011). It would seem reasonable to ask students to set their own goals regarding aerobic fitness that were personal and achievable. Working toward these ongoing fitness goals and becoming physically active should not stop on test day, and should not stop after graduation, or anytime as an adult. An evaluation of aerobic capacity that measures personal improvement and success rather than a predetermined time standard is the proposed alternative to the current practice of using the FG 1-mile as the assessment for aerobic capacity. The intent of prescribing the AABI protocol for assessing aerobic capacity is to build youth physical activity self-efficacy beliefs that result in increased daily physical activity and to gain health benefits associated with improved fitness.

Students failing to meet FitnessGram® Healthy Fitness Zone® standards demonstrate the urgent need to address youth aerobic fitness and obesity levels while in school. Students with greater aerobic fitness have greater academic achievement, less anxiety and stress, and have higher overall health and wellness than peers that do not meet the FG 1-mile aerobic fitness standards (Lees & Hopkins, 2013). Increasing youth physical activity and aerobic fitness combats obesity and increases health benefits gained from participation (AAHPERD, 2013). How to motivate students to improve their aerobic fitness is the challenge of educators and the focus of this study. Previous research strongly suggests that educators need to build students' physical activity self-efficacy during aerobic assessments by providing a positive experience (Parschau et al., 2013; Gao, Lee et al., 2008a). A closer and ongoing examination of the effect of the FG 1-mile aerobic assessment on students' physical activity self-efficacy is warranted. The AABI aerobic assessment based on improvement was suggested as an alternative style of measuring cardiovascular fitness and investigated during the study.

In the literature review, the problems regarding the high level of youth inactivity and obesity statistics have been presented and identified as serious and compelling. Likewise, a significant number of students fail the FG 1-mile aerobic fitness assessment every year (CDE, 2015), which is the original and traditional aerobic assessment used in schools (Plowman et al., 2006). In this study I question whether these phenomena are related. Similarly, a historical perspective on PFTs was described including the FG 1-mile aerobic assessment and health benefits from becoming physically active were explained. Building positive physical activity self-efficacy beliefs are significant in increasing youth physical activity (Barz et al., 2016). Bandura's (1977) SCT provides a theoretical foundation and insight as to how to increase efficacy and change behaviors. Feltz et al. (2008) identified and categorized sources that influence physical activity self-efficacy beliefs: personal performance, vicarious sources, verbal and social persuasion, and physiological factors. These sources of influence contribute to physical activity self-efficacy beliefs, which in turn are connected to aerobic fitness. In conclusion and supported by this literature review, the most effective approach to increase youth physical activity is to build positive physical activity self-efficacy beliefs (Voskuil & Robbins, 2015).

Implications

Researchers have determined that physical activity self-efficacy beliefs were a predictor of aerobic fitness levels with student interest, as well as, perceived importance and usefulness of fitness as predictors of physical activity levels. Most importantly according to Gao et al. (2008b), physical activity self-efficacy was the only predictor of aerobic fitness. Muscular strength and muscular endurance fitness were not associated with physical activity self-efficacy beliefs (Plowman, 2014; Vaara et al., 2012). Significant effort by the student is needed to perform well on the FG 1-mile aerobic assessment, which requires students to become physically uncomfortable to produce a best result. It seems reasonable for students not to try during these assessments if their self-efficacy beliefs about reaching the time standard are low. Concerns with standardized, one-size-fits-all, approach to measuring students' academic achievements has been well documented in other disciplines. Kearns (2011) examined literacy testing and found that high-stakes, large-scale, standardized testing influenced learners sense of "well being" and "equity" between peers while promoting a sense of "shame" and "marginalization" due to this type of testing environment (p. 12). It is the responsibility of teachers to build student confidence in achieving fitness levels; however, researchers have found that these goals need to be achievable and self-determined by students to have success in physical education (Craggs et al., 2011; Gao et al., 2011). And finally, the element of fun and enjoying physical activity at a early age has been found to be critical in building physical activity beliefs (Lewis et al., 2016). Student physical activity self-efficacy beliefs surrounding two modes of aerobic fitness assessments were analyzed and compared. Implications from these results indicate that the current practice of using the FG 1-mile aerobic assessment based on standards should be replaced by an aerobic assessment based on improvement.

There are three potential projects that could have been developed from the findings of this study. A policy evaluation and/or position paper discussing the effect of aerobic assessments on student physical activity self-efficacy were considered. The 1-

Mile Run is the only fitness assessment that has not changed (improved) from previously used methods to measure fitness in schools (Baghurst, 2014; Plowman et al., 2006) and needs be evaluated as to the potential impact on student motivation and physical activity self-efficacy. Another potential project would be a program evaluation that would use the research and findings from this study to stress building student self-efficacy beliefs in all fitness and physical education learning activities. Further study surrounding youth physical activity self-efficacy beliefs and the effect on student behavior and motivation during physical activity and leisure time is needed to increase understanding about how to increase youth and adult physical activity and fitness levels, and achieve the SHAPE (n.d.b) goal of becoming physically active for a lifetime. The third and actual project type selected was a professional development (PD) activity that included a plan for a 3-day workshop for physical education teachers and others involved in youth exercise training (see Appendix A). The goal for these PD activities is to share results from this study, introduce the AABI aerobic assessment protocols, and to promote and advocate for inclusive practices surrounding aerobic fitness testing that builds students' physical activity self-efficacy and motivation to become physically fit.

Fifth grade students' physical activity self-efficacy was examined and analyzed during two modes of aerobic assessments in order to discover if assessment styles affect student motivation and performance. Section 2 describes the research approach, setting and sampling, qualitative and quantitative procedures, data collection and analysis process, and gives evidence of research methods quality for this concurrent mixed methods design to the study.

Section 2: The Methodology

Introduction

Six physical education specialists participated in a concurrent quasi-experimental research design that examined fifth grade student physical activity self-efficacy after two aerobic fitness assessments in this mixed methods approach. Students provided quantitative data while the teachers provided data that were qualitative. Students provided quantitative data by completing a pre/post survey related to physical activity self-efficacy and by student scores recorded after two aerobic assessments. Teachers provided qualitative data by observing student behavior and recording their perceptions regarding student effort and motivation during the two aerobic assessments.

Mixed Methods Research Design and Approach

A mixed methods approach was determined to be the best method to capture the various components of exploring student physical activity self-efficacy and behavior. A concurrent triangulation strategy was used to collect and analyze data. This type of research design gives equal priority to both qualitative and quantitative approaches with the primary purpose of collaborating, confirming, and/or validating findings within a single study (Terrell, 2012). Integrated data were analyzed and interpreted to find commonalities and differences in the findings while exploring whether an alternative aerobic assessment had an impact on student physical activity self-efficacy and behavior. Data triangulation from different sources strengthens results and validates findings (Creswell, 2012). Mixed method concurrent triangulation strategy uses integrated data and analysis to validate findings, has a shorter collection time when compared to other mixed method strategies, and off-sets the weaknesses inherited by using a single research approach (Terrell, 2012). Data were collected, analyzed, and interpreted that examined student physical activity self-efficacy and behavior during two modes of aerobic assessments through a mixed methods research design, which validated results and provided insightful and accurate findings.

This study explored three variable components, (a) student physical activity self-efficacy beliefs, (b) student performance, and (c) perceptions of teachers regarding student effort and motivation. Components (a) and (b) were researched quantitatively, while component (c) was addressed qualitatively. These components are related to student physical activity behaviors and self-efficacy beliefs; and they can be measured separately, compared, and contrasted. For instance, does improvement on the performance assessment result in an increase in physical activity self-efficacy beliefs, and can these beliefs be confirmed by teacher perceptions of student behaviors related to effort and motivation? Analyzing both qualitative and quantitative data provides a richer description of the phenomenon and clearer understanding of the association between components. Researchers have found a connection between developing physical activity self-efficacy beliefs through positive experiences and learning activities (Gao et al., 2008; Lewis et al., 2016; Parschau et al., 2013; Parschau et al., 2014). Using a mixed method approach explored these components and examined whether an aerobic assessment based on improvement is different than an assessment based on standards.

Setting and Sample

Participants

Six teacher-participants were purposely selected from five different school districts and schools for this study. The teacher-participants taught in public school districts and were credentialed physical education (PE) specialists. The teacher-participants contributed qualitative data and facilitated pretest and posttest student aerobic assessments to their students while surveys that measured physical activity self-efficacy beliefs were completed by the students. These PE specialists were selected because they teach several grade levels, they were responsible for fitness testing and reporting the results to CDE at their schools, they had close proximity to students to record comments, and they had insight to student motivation during aerobic assessments. While five teacher-participants were veteran PE teachers with at least 10 years of teaching experience, one teacher-participant was a student teacher and inexperienced with fitness testing at public schools. The elementary schools that participated in the study had two to three day-a-week physical education programs with a PE specialist. Together, the classroom teachers and PE specialists were responsible for teaching PE with students partaking in physical education the recommended 150 minutes per week. The teacher-participants taught between two to five fifth grade classrooms at their schools depending on the school size. Fifth grade was used for this study because FG 1-mile aerobic assessment scores are reported to the CDE for the first time in the fifth grade. Fifth grade students are relatively new to fitness testing with limited experience with aerobic testing before entering the fifth grade. Teacher-participants chose which aerobic test to facilitate to their fifth grade students, either the FG 1-mile aerobic assessment or AABI, using school site facilities and/or personal rationale to determine the style. Four PE teachers from three schools with students from seven fifth grade classrooms (n = 136) chose the 1-mile aerobic assessment while two PE teachers from two schools with students from seven classrooms (n = 211) facilitated the AABI aerobic assessment. All fifth grade classrooms at the same school site used the same aerobic assessment to avoid threats to external validity through controlling interaction of participants, setting, and knowledge of the alternative assessment (Creswell, 2012). Classroom teachers were informed of the study and assisted with administrating the student survey, "Self-efficacy for Daily Physical Activity Questionnaire" (SEPAQ), online; however, teacher-participants from three schools administered the student survey using paper and pencil that I manually entered into the data file. Teacher-participants and school administrators followed local school protocols and agreed to share student data collected, survey results, and aerobic fitness scores with me, and teacher-participants agreed to record their perceptions about student behaviors during the aerobic assessments through a teacher-participant consent process.

The total student sample had 347 students. The FG group consisted of 136 students and the AABI group consisted of 211 students. Large sample numbers in quantitative research are more likely to represent an accurate estimate of the population mean and can better assess the variables with a greater ability to generalize results to the general population than small samples (Fink, 2009; Suresh & Chandrashekara, 2012). Calculating the confidence level for the aerobic assessments with a sample size of 340 resulted in an interval of 5.31 at 95% confidence level; whereas, calculating the confidence level for the SEPAQ surveys with a sample size of 194 students (note: not all surveys were accepted; see Results) resulted in 95% confidence with a 7.04 confidence interval (margin of error), which indicated high level of confidence for both sample sizes (Creative Research Systems. n.d.). Smaller sample numbers are recommended in qualitative research due to the time demands and in-depth analysis of the narrative data

(Yoshikawa, Weisner, Kalil, & Way, 2013). Yoshikawa et al. (2013) stated that, "Many researchers who use quantitative analyses to understand causal impacts of a treatment or phenomenon intend to eliminate selection effects [by using larger sample size]; in contrast, qualitative analysis is often aimed at describing in detail these same processes, taking into account human agency" (p. 8). Teacher-participants were selected to comment on student attitudes and behavior during the aerobic assessments due to their proximity to students, experience with administrating aerobic assessments, and insight to student motivation and effort. The sample sizes for the quantitative and qualitative data collection and analysis processes were appropriate and demonstrated sound research practice.

Researcher-Participant Working Relationship

Due to my teaching assignment and student teacher responsibilities in the Kinesiology Department and School of Education (teacher education program) at California State University, Chico (CSU, Chico), I have professional relationships with several teacher-participants, especially the physical education specialists mentoring student teachers. I have no supervisory authority and professionally collaborate with these teachers when student teachers are placed under their tutelage. Likewise, student teachers were not required to participate in my study and did so through proper consent process. Teacher-participants were informed and trained as to how and when to conduct the aerobic assessments and student survey, and instructed how to use SurveyMonkey® to record student performance scores and report their comments about student behaviors, effort, and motivation. Teacher-participants' comments were kept confidential with no outside access to the data. There was no direct researcher-student contact. Teachers and administrators had my contact information, could ask questions anytime, and knew that their participation was voluntary.

Measures Taken for Protection of Participants' Rights

Measures taken to protect teacher-participant and student rights were submitted and approved by Walden University Instructional Review Board (IRB; approval number: 08-25-15-0306345), which included data collection and security procedures, consent and confidentiality protocols, and the right to withdraw, as well as ethical practice related to data collection with children. Table 3 gives a visual description of the data collection process and steps taken that ensured teacher-participants' rights were protected. District superintendents were personally contacted and presented information about the study in order to gain authorization to contact school principals and to conduct research at school sites, which resulted in a signed letter of cooperation. School principals were contacted and signed a letter of cooperation that gave permission to proceed with the study, to contact teachers, and to share student data with me. After a personal meeting, selected PE specialists signed a participant consent form by responding to an e-mail that outlined participation expectations before joining in the study. Teacher-participants were asked to gather student data through facilitating the pretest and posttest student survey and to conduct pretest and posttest aerobic assessments that were shared with me, and to contribute qualitative data by commenting on student behaviors during the aerobic assessments. Teacher-participants were informed that their participation in the study was voluntary and that they could withdraw without any repercussions at any time.

Table 3

Methodology Chart

Schedule	Action	Purpose	Result
Stage 1	Submit proposal; oral defense; IRB approval	Gain permission to proceed with study	Ethical procedures are confirmed
Stage 2	Contact school district superintendents	Present "research proposal"; gain permission to conduct study; schools with PE specialists identified	Letter of Cooperation with school partner is signed.
Stage 3	Meet with local school principals request data	Present "research proposal"; answer questions	Letter of cooperation is signed, PE specialists' contact information
Stage 4	Contact PE specialists and classroom teachers	Present "research proposal"; inform teachers and PE teachers purpose & research design; distribute materials & web links	PE specialists understand design protocol & procedures; materials & web links are shared; gain consent
Stage 5	Students complete online PA self-efficacy survey (paper/pencil accepted)	Gain an initial level of self-efficacy related to physical activity	Begin data collection process; quantitative data source
Stage 6	Students engage in aerobic assessment: either FG or AABI	Determine initial level of aerobic fitness	Quantitative data source; shared data with school
Stage 7	Students engage in second aerobic assessment; (8-12 weeks after initial assessment)	Determine final level of aerobic fitness	Quantitative data source; same groupings; shared data with school site
Stage 8	Teachers comment on student behavior, motivation, & effort; follow-up interviews	Gain insight from teacher perceptions regarding student confidence/self-efficacy	Qualitative data source
Stage 9	Students repeat SEPAQ survey	Gain final level of self-efficacy related to physical activity	End the data collection; quantitative data source

Note: FG denotes FitnessGram® 1-Mile Run aerobic assessment. AABI denotes the 15-Minute Aerobic Assessment Based on Improvement aerobic assessment, which is the alternative style of assessing aerobic fitness.

Data Collection Strategies

Quantitative Procedure

There were three quantitative instruments used by teacher-participants to collect data from students. There were two aerobic fitness instruments, the FG 1-mile and AABI aerobic assessments with corresponding groups, and one survey, the SEPAQ, that measured student physical activity self-efficacy beliefs and used by both groups. Teacher-participants from selected schools agreed to share student performance and survey data with me, according to IRB ethical protocols that were established in the letter of cooperation signed by district superintendent. I did not have direct contact with students. Fifth grade students measured physical activity self-efficacy twice; the pretest was before the first aerobic assessment and the posttest was after the second aerobic assessment between 8-12 weeks apart. A modified version of a physical activity self-efficacy survey, "Self-efficacy for Daily Physical Activity Questionnaire" (SEPAQ), was used to measure student physical activity self-efficacy at school and during leisure and recreation time (see Appendix B). Permission to use the SEPAQ was granted by Campbell, June 2014 (see Appendix C). Campbell verified the SEPAQ as valid and reliable by using an expert review of the questionnaire and by examining internal consistency of the physical activity domains (school, leisure) through an exploratory factor and reliability analysis of the findings. Reliability statistics were not reported. In addition, reliability of this survey was verified as trustworthy by several measures explained in the "Evidence of Quality" section. The SEPAQ was administered at school sites using SurveyMonkey® online; however, some teacher-participants opted to take the survey using paper and pencil with manual entry of surveys needed. Obtaining information from electronic sources versus paper and pencil methods has been shown to be reliable and more efficient (Norman, Sallis, & Gaskins, 2005). One group of students (*n* = 136) from three schools measured aerobic fitness using the standardized FG 1-mile (Welk & Meredith, 2007) as the assessment tool. The alternative aerobic assessment for the other group of students (*n* = 211) from two schools followed the AABI assessment protocol. Student risks were minimal and consistent with normal physical education activity. Demographic information on students includes age and gender, which was used to further identify physical activity trends and understand the phenomenon more deeply. Student identity was coded and unknown to me and I did not have direct contact with students. Data gathered provided evidence related to student physical activity self-efficacy beliefs as well as measured student performance and improvement. According to Fink (2009), population size and frequency of data collection must be considered in order to determine the analysis method and ensure reliability of the results. "Appropriately-sized samples are essential to infer with confidence that sample estimated are reflective of underlying population parameters" (Suresh & Chandrashekara, 2012, p. 12). The population size was important and considered large enough to compute reliable averages and variations that can be generalized to a larger population. SurveyMonkey® assisted with data collection and analysis involving both quantitative and qualitative experimental methods and was used to record data and store results. Data collected were analyzed by using the SPSS version 21 statistical program, as well as, organized and stored through the services of SurveyMonkey®, and available upon request. Data collected from the FG 1-mile and AABI aerobic assessments were manipulated using descriptive statistics and bivariate analysis (*t*-test). Similarly, continuous data from the

SEPAQ student survey were manipulated and examined. Fink concluded by stating, high quality studies are dependent on the reliability of the survey [assessment], which has been confirmed by Campbell (2012), sampling number and procedure, and by recording data accurately. These considerations for a high quality study were implemented.

FitnessGram® 1-mile. FG information and fitness assessments with instructions are publically available (Cooper Institute, n.d.b). Cooper Institute (n.d.a) supports FG fitness reporting and research related to youth health and fitness and more. FG provides an assessment and reporting software program that schools use to measure student physical fitness levels. Although the assessment tests may be administered to any group/grade at any time as a learning or practice opportunity, official results are reported in the spring for fifth, seventh, and ninth grade students. Various fitness components are measured including muscular strength and endurance, flexibility, body composition, and cardiovascular endurance or aerobic capacity. Teachers and administrators report scores online through the FG website. In addition, teachers have the option to use ActivityGram® to measure study daily physical activity levels through a survey that asks students to recall two school days and one weekend day physical activities. Reporting physical fitness data online is common practice for teachers that report scores for the fifth, seventh, and ninth grades. The reliability of FG 1-mile aerobic assessments have been determined to be reasonably consistent and valid if the teachers are properly trained (Morrow, Martin, & Jackson, 2010). Reliability coefficients were above .66 for the FG 1-mile aerobic assessment; however, FG results for younger children under 10 years old were not as reliable as for older children (Welk & Meredith, 2007). In addition, according to FG data, schools that were in compliance with state physical education mandates were more likely to meet or exceed physical education fitness standards; however, half of the districts reporting data were noncompliant (Sanchez-Vaznaugh et al., 2012). Teacher-participants in this study were experienced and understood how to properly administer and report FG test items and in compliance with all national guidelines in physical education.

The 15-minute Aerobic Assessment Based on Improvement (AABI). Students recorded their performance twice during a pretest and posttest AABI aerobic assessment held 8-12 weeks apart. As a whole group starting and ending at the same time, students measured the distance achieved during a 15-minute attempt with the intent to travel the greatest distance possible around a track during the assessment. Students were instructed to try their hardest, that they can change from running to walking as needed, or push their wheelchair and rest as needed, and to try to improve on the second attempt. Eight cones were placed evenly around a typical 400 meter track or evenly placed around the same facility/field used for the FG 1-mile aerobic assessment (see Appendix D). Numbers were listed on the cones ranging from 1-8. In addition, colored strips (red, orange, yellow, green, teal, blue, purple or rainbow), which indicate lap numbers, aided students in reporting their scores to the teacher-participant. Each color represented one lap around the track or course of eight cones. Students reported scores by lap color and cone number. For example, a count of “orange-6” indicates that the student accomplished two laps around the course plus six more cones. Already printed lap counters that attach onto cones were provided to the AABI schools to use for their aerobic testing. Students reported scores to the teacher-participant, who recorded and shared the pretest and posttest data with me. Data collected was converted into a score for the attempt. For instance, “orange 6” calculates to a distance of 22 cones (two laps equals 16 cones plus six more), which in turn can be calculated to “percent improvement” and comparable to the FG 1-mile aerobic assessment results. The AABI aerobic assessment diagram and directions can be found in Appendix D.

Physical activity self-efficacy survey. There is a lack of consensus among researchers about the best method to measure physical activity efficacy. The language surrounding self-efficacy measurements has been confusing with similar terms used differently, factors to measure uncertain (Van Der Horst, Paw, Twisk, & Van Mechelen, 2007; Warner et al., 2014), and methods to gather data about physical activity inconsistent and with questionable accuracy (Campbell, 2012; Corder, Ekelund, Steele, Wareham, & Brage, 2008). A variety of methods to measure self-efficacy and physical activity have been either subjective (survey, recall) or objective styles of inquiry (accelerator, heart rate monitors) with limited connection between the findings (Campbell, 2012). In addition, there are different domains that physical activity can occur that cause unreliable results due to the situation. These domains include exercise opportunities at school, at work, at home, during leisure, and for transportation (walking to school). Challenges or barriers to physical activity include transportation (lack of), environment, and/or opportunity, all of which are variables to physical activity opportunities that can cause unreliable results when measuring daily physical activity levels. Researchers agree that it is impossible to measure daily free-living physical activity behavior as a whole; however, a domain-specific approach to assessing physical activity efficacy is more logical and practical solution to predict physical activity behavior (Bandura, 2006; Campbell, 2012; Perry et al., 2012; Roberts, Maddison, Magnusson, & Prapavessis, 2010; Voskuil & Robbins, 2015). In this study, it was not be appropriate to include all domains of physical activity, that is, fifth grade students do not have a job (work) nor make decisions about transportation. Campbell (2012) found that there was a significant relationship between student physical activity efficacy at school and physical activity efficacy during leisure time with many skill sets and sport activities duplicated and crossing over.

There are two broad categories of self-efficacy, namely task and regulatory. Task self-efficacy refers to having confidence about a specific activity, whereas, regulatory self-efficacy refers to the ability to manage the challenges or difficulties surrounding physical activity in general (Bandura, 2006). Campbell (2012) recommended tailoring scale items on the self-efficacy survey to accurately reflect and measure the specific task efficacy associated with performance tasks. This concurs with Feltz' et al. (2008) contention that performance tasks are the strongest source of efficacy. In this case, being physically active during the day is the general performance task or regulatory efficacy and maintaining activity for at least 15 minutes is the specific measurement of task efficacy. Effort was made in this study to ensure scales in the SEPAQ student survey consider the type of physical activity efficacy, task efficacy and not regulatory efficacy, physical activity domains during school and leisure time (not work or at home), and frequency (number of days) when measuring student physical activity self-efficacy. Therefore, a modified SEPAQ was used that only measured physical activity efficacy at school and during leisure and recreation, which does not change the reliability, rather discards questions for adults and customizes the survey for youth. The modified SEPAQ was 20 questions that asked students how "confident" they were to be physically active at school and during leisure and recreation time after school, which are specific domains and youth appropriate. In addition, levels of exercise intensity, exercise duration, and exercise frequency were included in the questions to measure task efficacy. Students indicated their confidence using a 1-10 scale and rated themselves as "not at all confident" through "completely confident" on various questions with different domains (school and leisure), different exercise intensities (light, moderate, vigorous), different exercise durations (15, 30, 60 minutes), and different frequencies (every day or 3 days a week). "How confident are you that you can walk 15 MINUTES during school time at a LIGHT INTENSITY level EVERY DAY of the school week?" is an example of a question from the SEPAQ survey. The SEPAQ is described in greater detail in the "Data Analysis and Results" section with descriptive and inferential data analysis, and evidence of quality and reliability of the findings. According to Campbell's findings related to the reliability of SEPAQ, "…compared with general physical activity efficacy, domain-specific physical activity efficacy was found to be the most significant predictor of physical activity behavior" (p. 104). Measuring domain related efficacy increases the reliability of the results in predicting physical activity efficacy and is consistent with Campbell's research and advancements made in the realm of physical activity self-efficacy measurement. The SEPAQ student survey can be examined in Appendix B.

Qualitative Procedure

Five elementary schools with fifth grade classrooms that met the criteria of students participating in 150 hours of physical education instruction per week and employed PE specialists were purposely selected. Physical education specialists were contacted and informed of the study by e-mail(s) after consent from the district superintendent and school principal to proceed was granted. Thereafter the teacher-participants were personally contacted, informed of the purpose of the study, and signed a consent form to participate. Teacher demographic and other information was collected that included total years of teaching and number of days and hours physical education was taught each week at their school. Teachers and school administrators determined their placement into one of two groups without coercion. One group of four teachers administered the FG 1-mile aerobic assessment, and the other group with two teachers administered the AABI aerobic assessment. Both groups of PE teachers were fully informed about each other and understood the importance of following protocol and maintaining consistency in reporting scores. I explained how to administer the AABI aerobic assessment during the initial meeting to all teacher-participants before they chose the assessment type. Teacher names and schools were coded to protect identities during the study; likewise, teacher contact information has been recorded and protected. Students were placed in the same group as their teachers.

Process of reporting data. Open-ended questions were used to prompt teacher perspectives about student motivation and effort during the pretest and posttest aerobic assessments via an online blog. A worksheet form (see Appendix E and Appendix F) was provided to maintain a hard copy of students' scores and to record personal remarks related to student behaviors as field notes. Teachers were asked to keep notes, quote student comments, notice student behaviors during the assessments, and then reflect on the event. Follow-up interviews and member checks with the teacher-participants clarified statements and further explained their perceptions about student behaviors. SurveyMonkey® stored the teacher-participant data, assisted with coding key words and phrases, organized themes, and facilitated searching for specific text. Comments were analyzed and coded while searching for data that either supported or did not support student physical activity self-efficacy survey findings. After data were collected members were interviewed to check for accuracy and content of the results.

Teacher blog prompts. Teachers were asked to report their perceptions about student motivation and effort during the FG 1-mile and AABI after the pretest and posttest aerobic assessments. Teacher-participants were asked to keep field notes related to student comments and to observe student behaviors related to the aerobic assessments. In addition they were asked to comment via an online blog powered by SurveyMonkey®. The blog instructions were:

> Thank you for participating and contributing to this research project about physical activity self-efficacy, student confidence, and aerobic fitness assessments. After posting student scores, please record your comments and perceptions about student effort, attitudes, and motivation before, during, and after their aerobic fitness assessment. You can quote student comments directly, assess student behaviors, compare and contrast from previous semesters, and offer your insight and thoughts surrounding this experience...

The SurveyMonkey® website was programmed to thank teacher-participants for contributing. Teacher-participants were interviewed to confirm, clarify, and/or correct comments after data was collected.

Data Analysis

Introduction

Quantitative and qualitative data were collected simultaneously, triangulated from different sources, and analyzed using a convergent mixed methods design to enhance the accuracy of the findings and increase validity of the study. A greater understanding of the problem is gained when examining data collected from both quantitative and qualitative sources (Creswell, 2012). Using a pretest and posttest design, students completed the SEPAQ regarding physical activity self-efficacy before the first aerobic assessment, and then again after 8-12 weeks of regular physical education and the completion of the second aerobic assessment. Students provided two sources of quantitative data, performance data through the aerobic assessments (FG and AABI) and physical activity self-efficacy data through the SEPAQ survey. Descriptive and inferential data analyses were used to determine significance and trends of the SEPAQ scores, and percent improvement calculations were completed to compare and contrast student performance results. Reliability of the quantitative data is derived from the number of student participants and consistency of assessment procedures. Concurrently, teacher-participants recorded comments and perceptions about student motivation and effort during the aerobic assessments and contributed qualitative data to the study. Comments were submitted and confirmed by teacher-participants at the follow-up meeting and interview. The qualitative research question, “what were student behavior characteristics during an aerobic fitness assessment?” guided the interpretation and analysis of teacher-participant comments.

Quantitative Data Collection and Analysis

Aerobic assessments. To answer the research question, will student performance scores from the aerobic assessments improve from the first to last attempt, student performance scores measuring aerobic fitness were collected from fifth grade students (*n* = 347) who attended five different public elementary schools. Students' names were coded and kept confidential with age and gender noted; ethnicity was not collected. Students from three schools (*n* = 136) were tested using the FG 1-mile aerobic assessment, and students (*n* = 211) from two schools were tested using the Aerobic Assessment Based on Improvement (AABI) aerobic assessment. Pretest and posttest scores were collected 8-12 weeks apart. Students from the FG group were asked to improve their time on the posttest attempt for the distance of one mile. Students from the AABI schools were asked to improve their score by going farther (distance) on the posttest attempt for 15-minutes. The total population and disaggregated data were analyzed by gender and assessment type. The FG 1-mile and AABI scores were compared and contrasted using descriptive, inferential, and percent improvement statistical analysis using SPSS version 21. Analyzing performance scores provided deferential results that included finding the mean, median, minimum and maximum scores, standard deviation (SD), and overall and gender specific improvement frequency. Calculating the mean and median values gave an indication of central tendencies and determined the average performance scores for the two groups. Minimum and maximum scores and SD give insight to the dispersion or differences between performance scores for comparison (Dunn & Palermo-Kielb, 2015). Inferential analysis included comparing the pretest and posttest scores and finding the differences of the means and determining significance (p = <.05) through a paired sample t-test. Percentage improvement was calculated to compare student improvement results between the aerobic assessments. FG 1-mile aerobic scores reported in minute:second format were converted to total seconds, whereas, AABI scores reported in color:number format were converted to total cones (see Table 4). See Appendix D for a diagram of the AABI aerobic assessment set-up and cones placement around the track.

Table 4

FitnessGram(r) 1-Mile Run and 15-minute Aerobic Assessment Based on Improvement Conversion Examples

Run type	Sample score	Sample conversion
FG 1-mile	Minute:Second	1 min.=60 sec.
"How fast can you run/walk a mile?"	6:00; 6 min. 10:00; 10 min. 12:30; 12 min. 30 sec.	360 seconds 600 seconds 750 seconds
AABI	Colors/Numbers/Cones	Red=1 lap/8 cones
"How far can you go in 15 minutes?"		Orange=2 laps/16 cones Yellow=3 laps/24 cones Green=4 laps/32 cones Lt. Blue=5 laps/40 cones Blue=6 laps/48 cones Purple=7 laps/56 cones
	Red 2 Green 6 Purple 4	10 (8 + 2) cones 38 (32 + 6) cones 60 (56 + 4) cones

Note. Physical education specialists at the school sites recorded aerobic assessment scores on a worksheet provided by the researcher, who converted scores before calculations were performed.

Physical activity self-efficacy assessment. To answer the research question, Does changing the aerobic fitness assessment focus affect student physical activity self-efficacy beliefs?, data measuring physical activity self-efficacy were collected through the SEPAQ (Campbell, 2012) student survey. Surveys were administered to fifth grade students (*n* = 194) from five different schools. In addition, these schools were identified as either a FG 1-mile or AABI site reflecting the aerobic assessment administered. Surveys were administered before the first aerobic assessment (pretest) and after the last aerobic assessment (posttest), which were 8-12 weeks apart. Not all students that participated in the aerobic assessments are represented in the survey samples due to errors such as incomplete submissions, unknown student codes, or lack of either the aerobic assessment pretest or posttest scores. Students took the survey electronically, paper and pencil, and a combination of both styles depending on the preference of the teacher at the school site. All surveys were anonymously completed and recorded with codes. Similarly, teachers followed district policies regarding administering surveys and protecting students' anonymity.

The SEPAQ student survey (Appendix B) had several variables and asked students to rank their confidence about participating in physical activity. The term "confident" was defined and used in every question (see Figure 2). A Likert scale (0-10) was used with "Not at all confident" through "completely confident" rankings respectively with a possible maximum score of 200 or minimum score of 0; that is, student could mark all 10s or conversely mark all 0s on the survey (see Figure 3). The dependent variable was "confidence" and whether students' confidence changed in various situations. Students were asked to consider two domains or opportunities to engage in physical activity, during school (everyday), and after school (3 or more days). Specific domains are important to consider when measuring self-efficacy due to the nature of building confidence and motor skill competence through active participation (Gao et al., 2011; Perry et al., 2012).

Levels of intensity were described, illustrated through pictures, and included in the survey questions (see Figure 4). And finally, the amount of time of participation (duration) at a particular intensity was included in the survey. The domains, levels of intensity, and duration (time) are independent variables that affect the outcome of measuring confidence and physical activity self-efficacy (see Figure 2 for question examples).

> In answering the following questions you will be asked to think about HOW CONFIDENT you are that you can participate in a variety of physical activities at increasing intensity levels (light, moderate, and/or vigorous) and increasing periods of time (in minutes). The word "confident" refers to your belief that you can do something well. Please see the definitions below to help familiarize you with what is considered a light, moderate, and vigorous physical activity. See the examples of light, moderate, and vigorous activities below.
>
> Question example for during school time/light intensity: How confident are you that you can walk 15 MINUTES during school time at a LIGHT INTENSITY level EVERY DAY of the school week?
>
> Question example for after school time/light intensity: How confident are you that you can complete 15 MINUTES of after school physical activities at a MODERATE INTENSITY level on THREE OR MORE days of the week?

Figure 2. SEPAQ instructions and explanation of the term "confident." Included is an example of a question using the terms confident, intensity (exercise), duration (15 and 30 minutes), and frequency (daily and three or more days per week), which measures students' physical activity self-efficacy. Campbell (2012) created the survey and provided the definitions and directions.

In answering the following questions think about HOW CONFIDENT you are in performing the following physical activities AT SCHOOL.

At school you may walk to and from class and/or through the halls during lunch break, which can often involve a few stairs. These walking activities are typically LIGHT in intensity level.

Using the scale below, please check the appropriate response (0-100%) for each question.
0% not at all confident
10%
20% little confidence
30%
40%
50% somewhat confident
60%
70%
80% mostly confident
90%
100% completely confident about my ability to engage in physical activity at this intensity level and time of activity (duration).

Figure 3. Directions and example of Likert scale used to collect student responses are shown in this figure. Campbell (2012) created the survey and provided the Likert scale definitions.

LIGHT activity: You are moving around, but your heart rate and breathing do not increase very much. You probably will not be sweating doing these activities unless the weather is really hot. You would be able to talk easily through the activity.

MODERATE activity: Your breathing and heart rate increase. You may start to sweat, your legs might feel a little bit tired and you may feel out of breath. You may also find it hard to talk during the activity.

VIGOROUS activity: your heart beats very fast, your breathing is fast and you start sweating. You may feel exhausted and out of breath. Your legs would probably feel heavy. It would be very hard to talk during the activity.

LIGHT Intensity

MODERATE Intensity

VIGOROUS Intensity

Figure 4. Levels of intensities definitions and illustrations. Stents were directed by their teachers to read the definitions, examine the illustrations, and recognition the level of intensity in the question before answering the questions. Campbell (2012) provided the definitions for the survey.

The survey had 23 questions. The first three questions asked students to indicate their assigned student code, school name, age, and gender. Twenty questions asked students to indicate their confidence in the following categories: light intensity for 15, 30, 60 and 120 minutes during school time; moderate intensity for 15, 30, 60, 120 minutes during school time; vigorous intensity for 15, 30, 60, 120 minutes during school time; moderate intensity for 15, 30, 60, 120 minutes during after school time, vigorous intensity for 15, 30, 60, and 120 minutes during after school time. Disaggregated data gained from the survey regarding self-efficacy beliefs or confidence related to exercise intensity and duration were organized by FG 1-mile or AABI groups, pretest and posttest scores, and gender. Survey results were analyzed and means compared using descriptive and inferential statistics. Question means and SDs were determined for all conditions. Inferential analysis compared the question means between the pretest and posttest attempts, and between genders through an independent *t*-test with the confidence level set at 95% (p>.05).

Qualitative Data Collection and Analysis

To answer the third research question—What are student behavior characteristics during an aerobic fitness assessment?—qualitative analyses of teacher-participant perceptions were used to describe student behaviors during the FG 1-mile and AABI pretest and posttest aerobic assessments. Six physical education teachers were asked to share their perceptions through field notes, an online blog, an interview, and/or through teacher-participants reviewing the data summaries and checking for accuracy. The process of "corroborating evidence from different individuals, types of data, or methods of data collection" (Creswell, 2012, p. 259) produced the results and increased accuracy. Physical education teachers have experience with administering aerobic assessments and were informed of the purpose of the study. They were asked to take field notes during the aerobic assessments (pretest and posttest) that were 10-12 weeks apart. In addition they were asked to comment via an online blog powered by SurveyMonkey®. Interviews were used to clarify and update information as well as an alternative method to the online blog reporting. Teacher-participants were asked to check for accuracy of the data summaries. Table 5 illustrates how data were collected and triangulated.

Table 5

Qualitative Data Collection Triangulation Summary

Aerobic assessment	Teachers $n = 6$	Field notes	Online blog	Interview	Member check
AABI	A	X		X	X
AABI	B	X		X	X
FG 1-mile	C	X	X		X
FG 1-mile	D	X	X	X	X
FG 1-mile	E	X		X	X
FG 1-mile	F			X	X

Both datasets from the FG and AABI groups were analyzed separately, compared, contrasted, and interpreted as to whether the results were significant and supported or contradicted each other. The two sets of data were analyzed with the question, how does the qualitative findings support the quantitative results? In other words, were qualitative findings (teacher perceptions) consistent with the quantitative results (student survey and improvement) or contradict the findings with comments that were not consistent with student results? All data sources were considered equally important to this research design. A direct comparison of the two datasets provided a convergence of data sources and ensured a greater understanding of the problem.

Limitations

The purpose of the research design was to measure two youth aerobic fitness assessments and compare the potential impact on physical activity self-efficacy and performance. There is an assumption that if the physical activity self-efficacy is elevated during youth that as an adult this efficacy will continue and individuals will be active for a lifetime. Indeed, those that are inactive and obese in childhood are more likely to be inactive and obese as adults (Jones et al., 2013). However, this research does not extend beyond the scope of the findings with fifth grade students. Another expectation was that students with strong physical activity self-efficacy beliefs would be motivated to improve their performance or results on the AABI and FG 1-mile aerobic assessments. According to Campbell's (2012) research, "Self-efficacy's application within physical activity research suggests that a strong belief in one's ability to be physically active relates to higher levels of physical activity performance" (p. 70). However, improvement could be related to other factors such as weather, time of day, and/or exposure to the assessment. In addition, the quasi-experimental design lacks random assignment of groups and repeats the physical activity self-efficacy survey and aerobic fitness assessments, which may lead to potential threats to internal validity through the interaction between maturation, history, and instrument exposure (Creswell, 2012). Another potential threat to validity could come from student reading levels and the ability to read and understand the physical activity self-efficacy survey. Teachers were instructed to aid students with taking the survey, reading survey questions if needed, and to literally explain the word, "motivation" before taking the survey to ensure that students understood that the intent of the survey was to measure their motivation during specific physical activities that were presented in the survey. Pictures on the survey further explained light, moderate, and vigorous exercise intensities in addition to a teacher explanation of these terms. And finally, student accuracy when reporting their aerobic assessment scores could pose a threat to valid results, which may affect their improvement percentage. Informing teacher-participants of the potential threats before collecting data and consistent assessing procedures with clear directions from the teacher-participants were implemented to control most threats to results validity.

Data Analysis Results

Introduction

Three sources of data were collected and analyzed: (a) FG 1-mile and AABI aerobic assessments measured student performance; (b) the SEPAQ measured student physical self-efficacy beliefs, and (c) teacher comments regarding student behaviors, motivation, and effort. According to Yoshikawa et al.'s (2013) discussion about the use of mixed methods to strengthen findings, quantitative methods are used to predict the influence and outcome that an intervention might have on a problem; whereas, qualitative methods are used to uncover the explanation and reasons behind any cause-effect relationship. Student physical activity self-efficacy beliefs, performance results, and teachers' perceptions were different perspectives of the same problem related to student inactivity and low aerobic fitness scores; and provided integrated data while gaining a greater understanding about how to increase student physical activity self-efficacy levels than any one source of data alone.

RQ 1: Performance on Aerobic Assessments

Results from the FG 1-mile and AABI aerobic assessments were used to investigate the question, will student performance scores from the FG 1-mile and AABI aerobic assessments improve from the pretest to the posttest?

Descriptive Analysis. The scores and results from FG group (n = 136) showed mixed results that indicated slight student performance improvement on the posttest aerobic assessments (see Table 6). The FG 1-mile aerobic assessment had an overall range from 427 to 1020 seconds on the pretest and 412-1326 seconds on the posttest with means of 646.66 and 650.43 respectfully (note: lower number denotes faster time/run, higher number denotes slower time/run). The range was greater on the posttest with the maximum score clearly much higher, indicating a slower walk/run time, than the maximum score of the pretest, while the minimum score on the posttest decreased, indicating a faster walk/run time and improvement on the assessment.

Table 6

FitnessGram(r) 1-Mile Run: Descriptive Statistics

Run type	N	Mean	Median	Min./ fastest score	Max./ slowest score	Improvement frequency: Yes	No	Standard deviation
FG 1-mile Pretest								
Total	136	646.7	613.5	427	1020			141.65
Female	69	677.6	655.0	454	1020			141.43
Male	67	614.9	587.0	427	951			135.68
FG 1-mile Posttest								
Total	136	650.4	620.5	412	1326	95	41	158.38
Female	69	673.1	635.0	466	1015	47	22	138.6
Male	67	627.0	574.0	412	1326	48	19	174.47

Note. FG 1-mile performance data are reported in seconds (see Table 4 for conversion equation and examples).

The pretest mean of 646.70 seconds was slightly lower than the posttest mean of 650.40 seconds indicating no improvement was evident when examining the means. Similarly, the pretest median of 613.50 seconds was smaller (faster) than the posttest median of 620.50 seconds indicating no overall improvement from examining the medians. Frequency of performance improvement found that 70% of the students decreased their time with 95 students improving their performance while 41 students did not improve or remained the same on the FG 1-mile aerobic assessment.

Disaggregated data on the FG 1-mile aerobic assessment showed girls' scores ranged 454 to 1020 seconds on the pretest and 466 to 1015 seconds on the posttest with means of 677.60 and 673.1 seconds respectively, which denotes a slight improvement. The girls' median scores were 655 and 635 seconds indicating an improvement in performance. Frequency of improvement of girls' scores found 47 students improved their performance while 22 students did not improve or stayed the same; 68% of the girls improved. Disaggregated data showed boys' scores ranged from 427 to 951 seconds on the pretest and 412 to 1326 seconds on the posttest with means of 614.9 and 627.0 seconds respectively, which indicates no improvement. Frequency of improvement of boys' scores found 48 students improved their performance while 19 students did not improve or stayed the same; 72% of the boys improved their performance.

The AABI groups showed positive results that indicated student performance improvement on the posttest aerobic assessments (see Table 7). The AABI assessment had a range from 15 to 64 cones on the first attempt and 17 to 76 cones on the second attempt with means of 36.66 and 42.72 respectfully (note: lower numbers denotes shorter distance, higher numbers denotes farther distance). The range was greater on the posttest attempt with both the minimum and maximum scores increasing indicating positive student performance improvement. The pretest mean was lower than the posttest mean indicating students traveled farther on the second attempt and improved their performance. The pretest median improved from 36 to 41 cones indicating an overall five-cone improvement when examining the medians. Frequency of improvement found 73% of the students increased the distance for 15 minutes with 153 students improving their performance while 58 students did not improve or remained the same on the AABI aerobic assessment.

Table 7

15-minute Aerobic Assessment Based on Improvement: Descriptive Statistics

Run Type	N	Mean	Median	Min./ fastest score	Max./ slowest score	Improvement frequency: Yes	No	Standard deviation
AABI Pretest								
Total	211	36.66	36.00	15	64			11.14
Female	103	34.13	33.00	16	63			9.04
Male	108	39.08	38.00	15	64			12.39
AABI Posttest						153	58	
Total	211	42.72	41.00	17	76	76	27	9.81
Female	103	40.50	39.00	20	68	77	31	8.84
Male	108	44.83	44.00	17	76			10.26

Note. AABI performance data is reported in distance that is designated by cone numbers (see Table 4 for conversion equation and examples).

Disaggregated data on the AABI aerobic assessment showed that girls' scores ranged 16 to 63 cones on the pretest and 20 to 68 cones on the posttest with means of 34.13 and 40.50 cones respectively, which denotes considerable improvement. The girls' median scores were 33 and 39 cones indicating an improvement in performance. Frequency of girl's improvement scores found 76 students improved their performance while 27 students did not improve or stayed the same; 74% of the girls improved their performance. Disaggregated data showed that boys' scores ranged from 15 to 64 cones on the pretest and 17 to 76 cones on the posttest with means of 39.08 and 44.83 cones respectively, which indicates positive performance improvement. Frequency of improvement of boys' scores found 77 students improved their performance while 31 students did not improve or stayed the same; 71% of the boys improved their performance.

There were contradictory results that suggest outlier scores may have affected the outcome of the descriptive analysis conclusions. Outlier scores are extremely high or extremely low values in the data. More specifically, these scores fall outside the normal probability curve of average scores and not within the area of confidence. Likewise, the SD indicates the dispersion of the scores and measures variability (Creswell, 2012). The large difference of SDs supports this conclusion of potential outlier scores affecting the results. The pretest-posttest SD calculations were relatively similar in size with the exception of the boys' posttest SD, which greatly exceeded the norm. Figure 5 illustrates the inconsistency of the boys' posttest performance scores with several students clearly not close to the mean or median scores of this assessment. Outlier scores do not reflect the average student performance score, cannot be used for the general population, and are outside the accepted level of confidence (*NIST/SEMATECH e-Handbook of Statistical Methods*, (n.d.). Scores outside the desired level of confidence ($p > .05$) were determined and removed during the inferential analysis of both the FG 1-mile and AABI data.

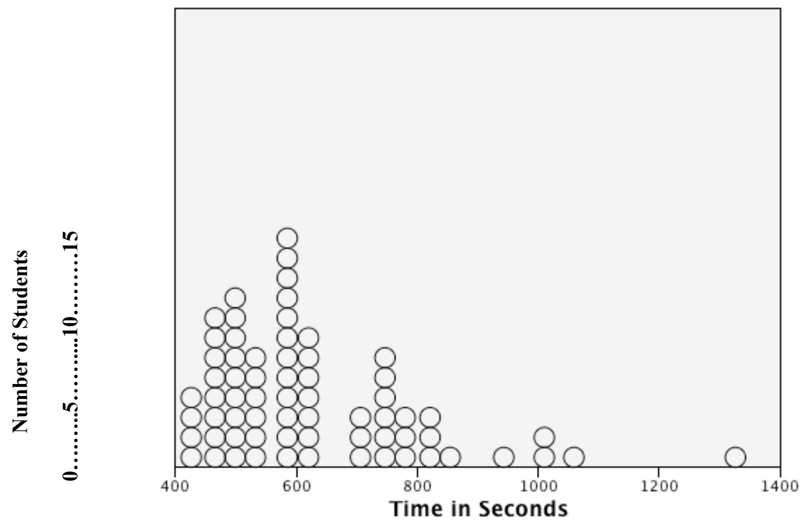


Figure 5. Boys' posttest performance scores on the FG 1-mile illustrate the potential for outlier scores. Each bubble represents a student (*n* = 67) and their aerobic assessment time. At least one student is visibly outside the norm of performance scores.

Inferential Analysis. Outlier scores were found in both the FG 1-mile and AABI aerobic assessments through analyzing confidence levels within a normal probability curve of scores. Figure 6 illustrates that the outlier data using the same boys' performance posttest data was outside a normal probability curve. Additional outlier scores were discovered through determining confidence levels in all data sets. These scores were removed before conducting further statistical analysis of the data; however, the unusable scores were included and highlighted in Appendix G.

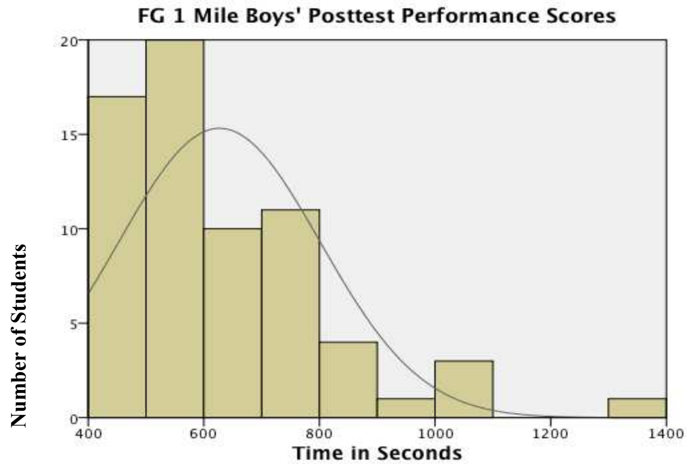


Figure 6. Boys' posttest performance scores with bell curve on the FG 1-mile illustrate the potential for outlier scores. The top of the curve is the mean of the sample. At least one student is visibly outside the norm of performance scores.

A two-sample paired *t*-test was used to compare the means of the FG 1-mile and AABI aerobic assessments. Simply, a two-sample paired *t*-test examined whether the FG 1-mile and AABI samples were different or the same; that is, did students perform differently or the same on these aerobic assessments? *T*-tests are commonly used with normal distributions, unknown variances, and small sample sizes to statistically analyze data (Creswell, 2012). *T*-tests calculate means, SDs, confidence levels and intervals, degrees of freedom, and determine the significance level (*p* value) of the data.

Table 8 is a summary of the descriptive statistics after outliers were removed from both data sets. The AABI mean and SD remained relatively the same. However, the results of the FG group clearly changed from students not improving to slightly improving on the aerobic assessment. The FG 1-mile performance means changed from the initial average calculations of 646.70 seconds on the pretest and 650.40 seconds posttest indicating no improvement on the data with outliers to 651.84 seconds pretest and 640.41 seconds posttest that showed insignificant improvement on the aerobic assessment with outlier scores removed. Looking closer at the results of the *t*-test, this adjustment for outlier scores on the FG aerobic assessment did not sufficiently change or improve the *t*-test significance. The differences between the FG 1-mile pretest and posttest scores were not statistically significant (p = .093). Students' performance on the AABI aerobic assessment showed significant improvement (p = .001) from the pretest to the posttest attempt (see Table 9). Table 10 shows that the paired samples correlation between the pretest and posttest were significant (p < .001) indicating that the *t*-test was appropriate to measure the significance of the data sets (Creswell, 2012).

Table 8

FitnessGram(r)1-mile and Aerobic Assessment Based on Improvement: Descriptive Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	FG 1-mile Pretest	651.84	131	141.115	12.329
	FG 1-mile Posttest	640.41	131	151.605	13.246
Pair 2	AABI Pretest	36.86	209	11.016	.762
	AABI Posttest	42.76	209	9.853	.682

Note. Outlier results have been removed from both data sets.

Table 9

FitnessGram(r) 1-Mile and Aerobic Assessment Based on Improvement: t*-test Results*

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	FG 1-mile Pretest - FG 1-mile Posttest	11.427	77.402	6.763	-1.952	24.807	1.690	130	.093
Pair 2	AABI Pretest - AABI Posttest	-5.900	9.959	.689	-7.258	-4.541	-8.564	208	.000

Note: FG 1-mile n = 131; AABI n = 209

Table 10

FitnessGram(r) 1-Mile and Aerobic Assessment Based on Improvement: Sample Correlation

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	FG 1-mile Pretest & FG 1-mile Posttest	131	.863	.000
Pair 2	AABI Pretest & AABI Posttest	209	.549	.000

If the FG 1-mile results were converted to minutes:seconds format, the average performance time was 10 minutes 52 seconds (M = 651.84 seconds) on the first attempt and 10 minutes 41 seconds (M = 641.40 seconds) on the second attempt, which is very close. The converted AABI results reveal that the first attempt average was about 37 cones (M = 36.86 cones) or Green 4 score, and the second attempt average was 43 cones

(*M* = 42.76 cones) or Light Blue 2 score, which were six cones farther (nearly one lap more) and a significant improvement.

Percent improvement. Percent calculation allows the comparison of two sets of data that measures the same phenomena in different ways. Hiller, Schindler, and Lambert (2012) found that percent improvement was a valuable and independent approach to measuring improvement that also considers the extent and severity of the pre assessment condition. Percent improvement scores were individually determined by calculating the difference between sessions, then dividing the difference by the first (original) score, then the result is multiplied by 100 to make the outcome a percentage ("Percentage Change - Percentage Increase and Decrease | SkillsYouNeed," n.d.). This percentage can be a positive number indicating improvement or a negative number signifying no improvement. Table 11 summarizes the percent improvement calculations for both data sets. The overall percent improvement for the FG 1-mile was 1.49% with boys improving more (*M* = 10.80%) than girls (*M* = -7.56%). The overall percent improvement for the AABI was 22.53% with boys improving less (*M* = 22.92%) than the girls (*M* = 24.21%), although relatively even (see Appendix G and Appendix H for calculations).

Table 11

FitnessGram(r) 1-Mile Run and Aerobic Assessment Based on Improvement: Percent Improvement

Run type	Total students	Students Above 0 percent improvement	Students Below 0 percent improvement	Percent improvement	Std. deviation
FG 1-mile	131	95	36	1.49%	19.22
Boys	64	48	16	10.80%	
Girls	67	47	20	-7.56%	
AABI	209	151	58	22.53%	31.34
Boys	107	76	31	20.92%	
Girls	102	75	27	24.21%	

Note. See Appendix G and Appendix H for specific data regarding percent improvement calculations and frequencies.

Figure 7 illustrates that most students were centered around 0% improvement with 95 students improving and 36 students not improving or staying the same on the FG 1-mile run. Similarly, Figure 8 illustrates that the AABI percent improvement scores centered near 0% improvement with 151 students improving and 58 students not improving or staying the same. The overall percent of students improving on the FG 1-mile was 73%, that is, 95 improved their performance out of 131 total students. The overall percent of students improving on the AABI was 72%, that is, 151 improved their performance out of 209 total students.

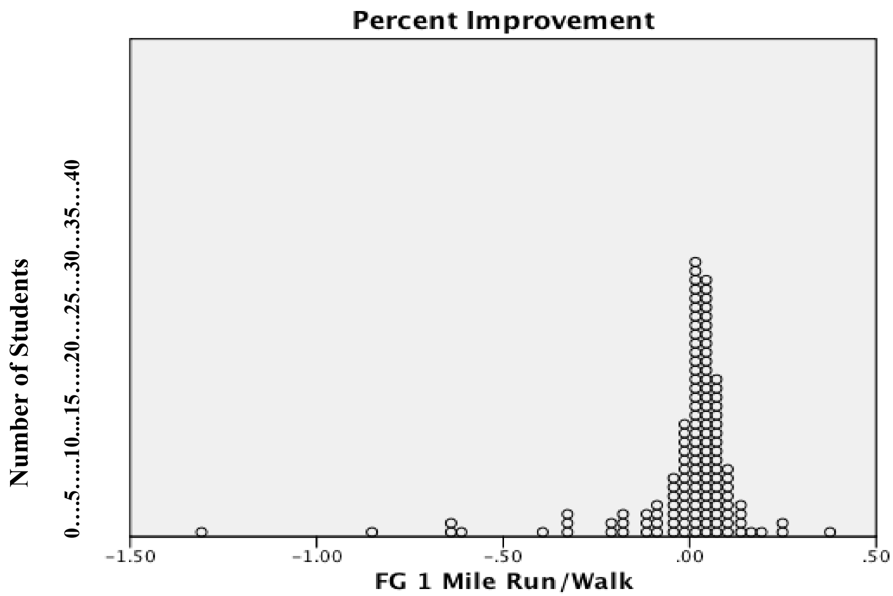


*Figure 7.*FG 1-mile Percent Improvement: This figure illustrates individual percent improvement data from the FG 1-mile aerobic assessment. Each dot represents one-fifth grade student. Negative numbers indicate faster times or improvement, positive numbers indicate slower times or no improvement, and no change in performance is at 0% on the chart.

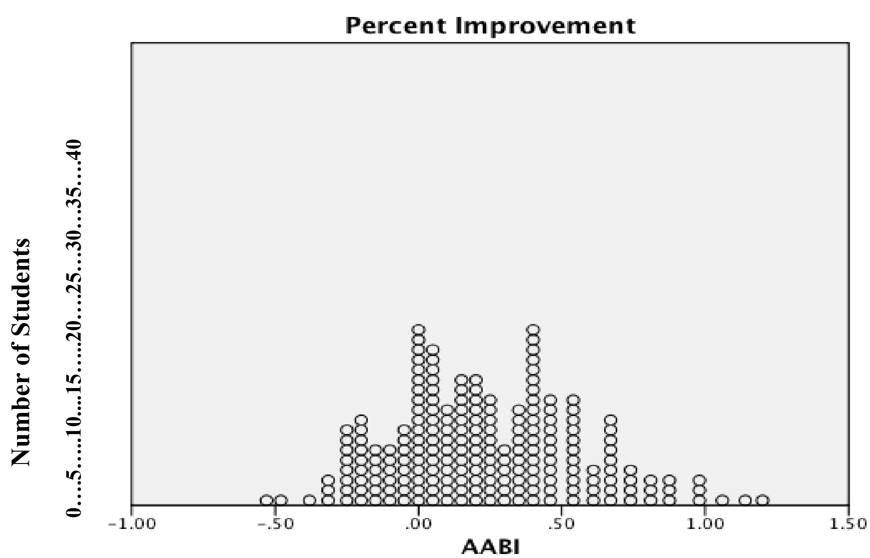


Figure 8. AABI Percent Improvement: This figure illustrates individual percent improvement data from the AABI aerobic assessments. Each dot represents one-fifth grade student. Positive numbers indicate more cones were passed in 15 minutes or improvement, negative numbers indicate less cones were passed in 15 minutes or no improvement, no change in performance is at 0% on the chart.

Summary of RQ 1 Findings

Descriptive, inferential, and percent improvement statistical procedures were used to analyze FG 1-mile and AABI student aerobic fitness scores. The hypothesis that student performance scores from the aerobic assessments will improve from the first to last the attempt had mixed results. Analyzing performance means and student improvement frequencies combined with analyzing individual and combined student performance percent improvement figures revealed that the FG 1-mile aerobic assessment had a slight overall improvement that was significantly smaller than the student improvement achieved on the AABI aerobic assessment. The FG 1-mile scores slightly improved (1.49%) and results were not significant (p = .093) on the t-test, 73% of the students tested improved their performance. The AABI scores greatly improved (22.53%) with statistically significant (p = .001) results on the t-test, 72% of the students tested improved their performance. The null hypothesis that there would be no difference between the aerobic assessments is rejected. There is a significant difference in student performance between the FG 1-mile and the AABI aerobic assessments. The alternative hypothesis that there will be a difference in the percentage of student improvement between aerobic assessments is accepted. The results are mixed because the percentage of students that improved was similar; however, the degree of improvement was significantly different.

RQ 2: Physical Activity Self-Efficacy Beliefs

Results from the SEPAQ survey were used to investigate the question, does participation in the AABI aerobic assessment result in difference in student physical activity self-efficacy belief levels as compared to FG 1-mile aerobic assessment participation?

Descriptive analysis. The results from the SEPAQ survey indicated that students' physical activity self-efficacy was not affected by the type of assessment; however, results varied by gender. Students were mostly 10 years old (78%) and had similar gender distribution (girls = 46%, boys = 54%). The total student surveys accepted (*n* = 194) had 44% from the designated FG schools and 56% from the AABI schools. Not all surveys were accepted (*n* = 153) due to issues surrounding incompleteness, missing student codes, or not completing both pretest and posttest surveys. In addition, student surveys were rejected for lacking either the pretest or posttest aerobic assessment. The surveys accepted represented 56% (194/347) of the population under investigation. See Tables 12-14 for a summary of the gender, age, and pretest-posttest frequencies.

Table 12

Frequency Chart of Fifth Grade Participants: Age

		Age	
		Frequency	Percent
Valid	9	11	2.8
	10	304	78.4
	11	68	17.5
	12	5	1.3
	Total	388	100.0

Note. Table represents all fifth grade students that took the pretest and posttest surveys

Table 13

Frequency Chart of Fifth Grade Participants: Gender

	Gender		
		Frequency	Percent
Valid	Female	180	46.4
	Male	208	53.6
	Total	388	100.0

Note. Table represents all fifth grade students that took the pretest and posttest surveys

Table 14

Frequency Chart of Fifth Grade Participants: Pretest and Posttest Surveys

	Pretest and Posttest Surveys		
		Frequency	Percent
Valid	FG 1-mile	86	44
	AABI	108	56
	Total	194	100

Note. Table represents the number and percentage of fifth grade students that took the pretest and posttest surveys from the FG 1-mile and AABI groups

An analysis of the question scores revealed that many students scored 10 on all questions, while others had questions marked with only a 10 or 9 rating on the Likert scale. These high scores indicate a lack of discrimination between questions with varying exercise duration and intensities. A summation of each question was performed that counted 51 students from the FG 1-mile group (35%) who scored 190-200 points on the SEPAQ survey indicating all 10s (n = 14) were marked or a combination of 9s and 10s with little discrimination between intensity levels and duration of exercise. A summation of each question was performed that counted 34 students from the AABI group (16%)

who scored 190-200 on the SEPAQ survey indicating all 10s (n = 9) were marked or a combination of 9s and 10s with little discrimination between intensity levels and duration of exercise. Table 15 summarizes the cumulative scores frequency on all 20 questions from both aerobic assessment groups. Survey questions cumulative score statistics were determined to compare variability between the FG 1-mile and AABI groups. Table 16 shows that the FG 1-mile cumulative score survey mean (M = 172.28), minimum and maximum scores (65-200) and SD (SD = 30.04) are different from the AABI mean (M = 148.02), minimum and maximum scores (26-200), and SD (SD = 43.76). The frequencies, range, and statistics from the SEPAQ survey indicate that the FG 1-mile group and the AABI group had different results and potentially varying outcomes from the data collected.

Table 15

SEPAQ Cumulative Scores Frequency

Cum Score	200-190	189-180	179-170	169-160	159-150	149-140	139-130	129-120	119-110
FG	51	20	18	28	17	6	6	2	6
AABI	34	27	29	25	16	8	15	9	11

Cum Score	109-100	99-90	89-80	79-70	69-60	59-50	49-40	39-30	29 & below
FG	3	10	1	1	3	0	0	0	0
AABI	9	12	7	5	8	1	5	2	1

Note. This table represents frequency scores from the pretest and posttest survey questions illustrating the differences between the FG and AABI groups and potential for outlier data. FG 1-mile: n = 86; AABI: n = 108

Table 16

SEPAQ Cumulative Scores Statistics

Statistics			
		AABI Survey Cum Scores	FG Survey Cum Scores
N	Valid	216	172
	Missing	0	39
Mean		148.02	172.28
Std. Deviation		43.758	30.044
Range		174	135
Minimum		26	65
Maximum		200	200

There was a concern about outlier scores when analyzing the survey data and frequencies of indiscriminate answers. An effect size was determined by taking .5 of the SD, which determines the strength of the results and confidence intervals (Creswell, 2012). A bar chart with accompanying bell curve illustrates the unusual distribution of scores and potential to influence the statistical outcomes (see Figures 9-12). Diagrams of both data sets were either left untouched or altered by deleting outlier scores. From these illustrations a normal bell curve did not emerge after the outlier scores were removed from either data set. The means and SDs changed but not significantly to make a difference in the pretest and posttest outcomes through inferential analysis and *t*-test results. For this reason, original scores were accepted to maintain an appropriate effect size of the data collected.

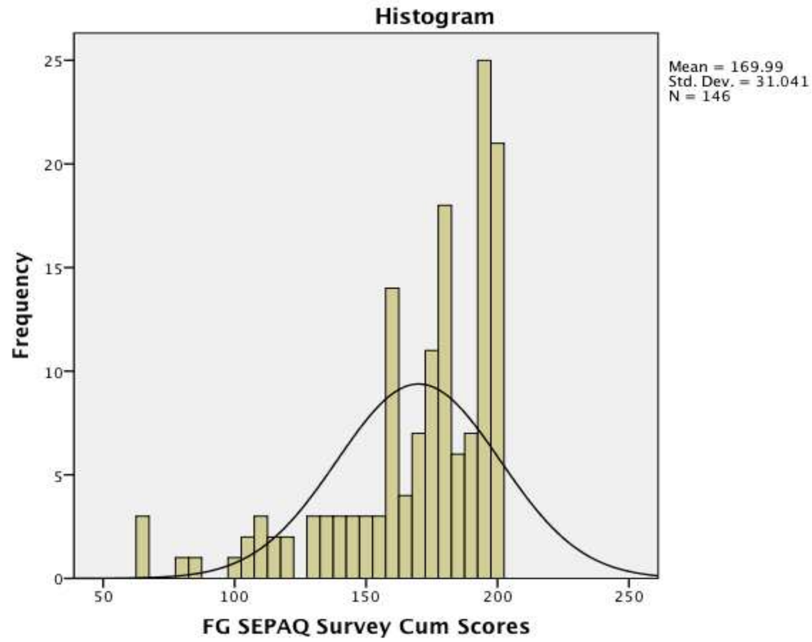


Figure 9. Cumulative scores from the FG SEPAQ cohort illustrating frequency of survey answers and potential outlier scores. The bell curve overlay indicates normal probability of student answers. Note: a score of 200 indicates that students marked all 10s on the survey questions.

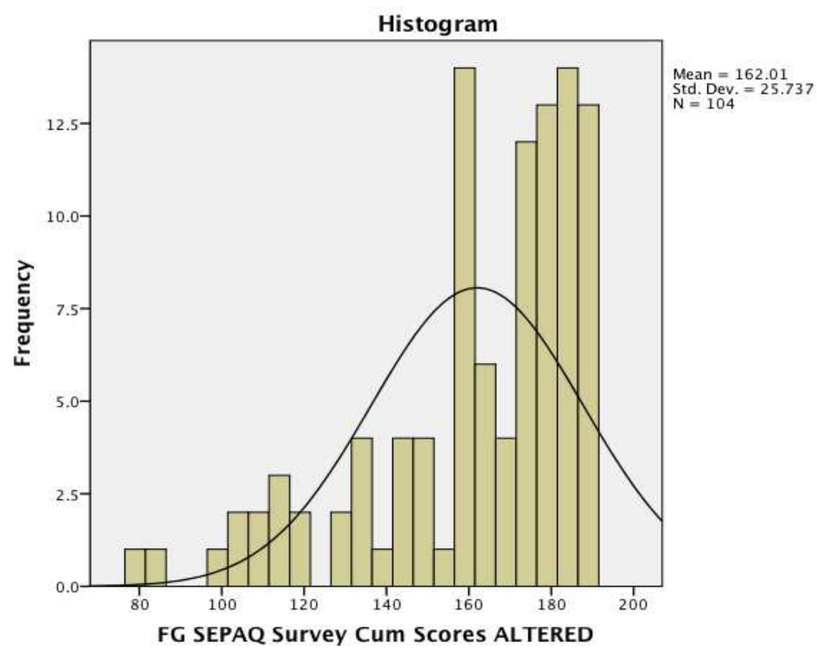


Figure 10. Cumulative scores from the FG SEPAQ cohort with a bell curve illustrate frequency of survey answers and the removal of outlier scores. Note: the curve alternative did not improve the probability of the survey answers.

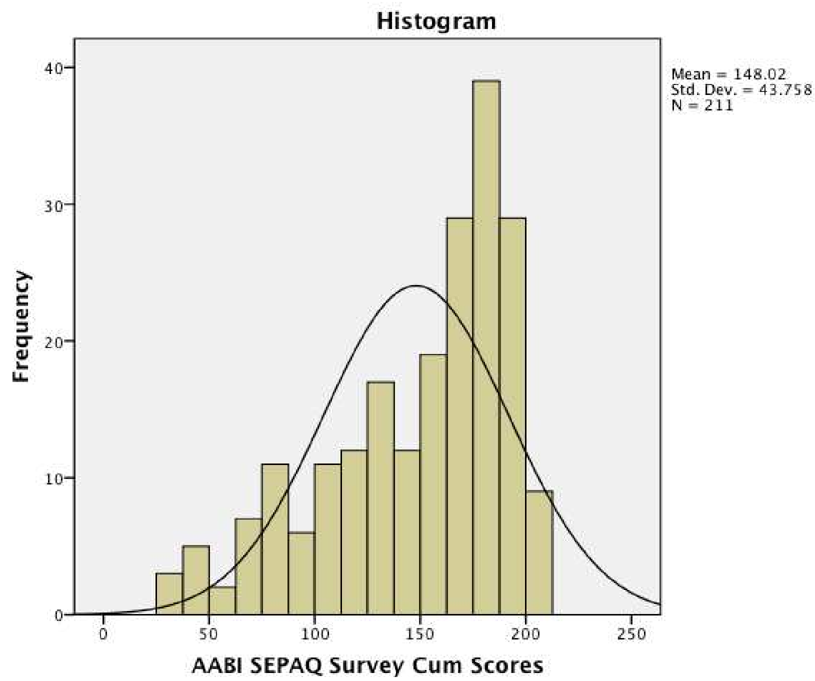


Figure 11. Cumulative scores from the AABI SEPAQ cohort illustrating frequency of survey answers and potential outlier scores. Note: a score of 200 indicates that students marked all 10s on the survey questions.

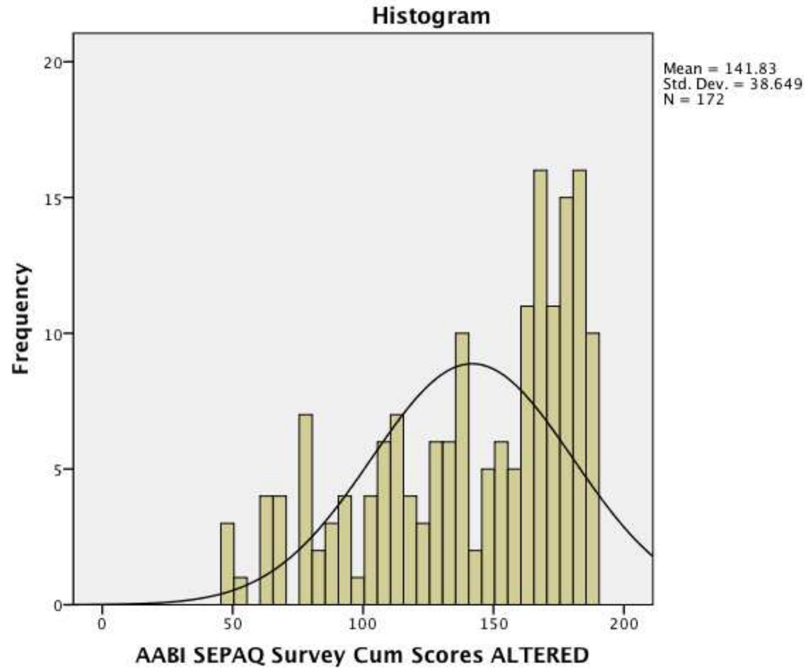


Figure 12. Cumulative scores from the AABI SEPAQ cohort with bell curve illustrating frequency of survey answers and the removal of outlier scores. Note: the curve alternative did not improve the probability of the survey answers.

Inferential analysis. The pretest and posttest mean of each survey question was calculated and compared with mixed results. An independent *t*-test was used to determine if there was a significant difference between the pretest and posttest means while examining gender, FG 1-mile, and AABI groups. Levene's Test for Equality of Variances (Levene's test) determined if variances or differences between pretest and posttest means, cumulative scores means, and gender means on questions sets were significant. Levene's test "determines if the two conditions have about the same or different amounts of variability between scores" (Statistics Help for Students, (n.d.), para. 6). There were mixed findings and limited significant differences between the FG 1-mile and AABI pretest and posttest means ($p > .05$); however a pattern of positive results can be observed. Cumulative means on question sets were analyzed with significant findings.

The gender means for each question were compared using an independent *t*-test with significant differences found ($p > .05$) between boys and girls on the FG 1-mile and cumulative means that surround moderate and vigorous intensity levels.

When examining the FG 1-mile and AABI pretest and posttest means a pattern can be observed, although mostly not significant. Generally, categorical means improved from the first to the second survey attempt and means decreased as the time (duration) and intensity increased. There were three exceptions out of 20 questions on the FG group survey results and seven exceptions for the AABI group to this trend of improvement as noted and highlighted on Tables 17 and 18. The survey calculations from the AABI group had lower means, however the pattern of improvement from the pretest to the posttest was notable and positive.

The positive increase of the survey means indicates a slight but not significant improvement in physical activity self-efficacy. For instance on Table 17 for the FG group, the moderate intensity for 15, 30, 60, 120-minute means increased from 9.47 to 9.58, 8.88 to 9.42, 8.22 to 8.83, and 7.52 to 8.01 respectively, which shows improvement of self-efficacy beliefs by the elevating posttest scores and reflects progressive duration increments through the declining pairs of scores. Likewise, examining the intensity levels of the FG school time domain with the same duration of 30 minutes, 9.31 to 9.71 for light, 8.88 to 9.42 for moderate, and 8.48 to 8.84 for vigorous intensities, demonstrates that scores decreased with intensity increments.

Table 17

SEPAQ Pretest and Posttest Mean and Standard Deviation: FG Cohort

Domain & time LIGHT INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation	Domain & time MODERATE INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
School time 15 minutes	9.79 SD .576	9.81 SD .819	After school time 15 minutes	9.58 SD 1.000	9.56 SD 1.325
School time 30 minutes	9.31 SD 1.220	9.71 SD .749	After school time 30 minutes	9.26 SD 2.385	9.24 SD 1.762
School time 60 minutes	8.70 SD 1.763	9.20 SD 1.353	After school time 60 minutes	8.84 SD 1.814	8.78 SD 1.843
School time 120 minutes	8.62 SD 1.803	8.66 SD 2.015	After school time 120 minutes	7.90 SD 2.590	8.17 SD 2.143

Domain & time MODERATE INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation	Domain & time VIGOROUS INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
School time 15 minutes	9.47 SD 1.224	9.58 SD 1.132	After school time 15 minutes	8.64 SD 2.401	9.10 SD 1.789
School time 30 minutes	8.88 SD 1.931	9.42 SD 1.163	After school time 30 minutes	8.01 SD 2.541	8.70 SD 2.081
School time 60 minutes	8.22 SD 2.225	8.83 SD 1.558	After school time 60 minutes	7.31 SD 3.046	8.12 SD 2.303
School time 120 minutes	7.52 SD 2.482	8.01 SD 2.072	After school time 120 minutes	6.62 SD 3.118	7.62 SD 4.522

Domain & time VIGOROUS INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
School time 15 minutes	9.30 SD 1.542	9.31 SD 1.441
School time 30 minutes	8.48 SD 2.385	8.84 SD 1.840
School time 60 minutes	7.80 SD 2.629	8:10 SD 2.186
School time 120 minutes	6.86 SD 2.995	7.22 SD 2.559

Note. Survey scores from the FG group (*n*=86) are included in this chart to determine general trends. Highlighted data indicates no improvement from pretest to posttest.

The AABI results were different with not all survey categories improving from pretest to posttest attempts; however, scores decreased as the exercise duration increased. For instance, during the school time and vigorous category, the posttest means for the AABI group decreased from 8.43, 7.72, 6.98 to 5.70 as the duration increased from 15 to 120 minutes respectively; however, the vigorous score of 5.70 did not significantly improve from the pretest mean of 6.16 (see Table 18). This trend in the results was consistent, however, not fully significant. Further examination of the means revealed that the SD increased with intensity and time. The SD indicates the dispersion or distribution of scores from the mean, which is important to know when there is a range of scores or abilities (Laerd Statistics, n.d.b). Higher SD values indicate that the difference between students grew as the intensity and duration increased. The largest SD or spread of scores was found under the "posttest 120 minutes during school time at vigorous intensity" categories with 4.522 (SD) for FG 1-mile and 3.571 (SD) for AABI respectively.

Table 18

SEPAQ Pretest and Posttest Mean and Standard Deviation: AABI Group

Domain & time LIGHT INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
School time	8.62	9.04
15 minutes	SD 2.375	SD 2.009
School time	8.14	8.28
30 minutes	SD 2.656	SD 2.426
School time	7.55	7.47
60 minutes	SD 2.566	SD 2.750
School time	6.53	6.66
120 minutes	SD 3.101	SD 3.253

Domain & time MODERATE INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
After school time	8.15	8.79
15 minutes	SD 2.995	SD 2.280
After school time	7.87	8.09
30 minutes	SD 2.875	SD 2.603
After school time	7.25	7.31
60 minutes	SD 3.103	SD 2.723
After school time	6.55	6.31
120 minutes	SD 3.305	SD 3.211

Domain & time MODERATE INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
School time	8.54	8.88
15 minutes	SD 2.478	SD 2.008
School time	8.12	8.33
30 minutes	SD 2.654	SD 2.032
School time	7.62	7.39
60 minutes	SD 2.546	SD 2.557
School time	6.52	6.40
120 minutes	SD 2.940	SD 3.186

Domain & time VIGOROUS INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
After school time	7.50	7.89
15 minutes	SD 3.098	SD 2.943
After school time	7.12	7.46
30 minutes	SD 3.153	SD 2.756
After school time	6.72	6.64
60 minutes	SD 3.078	SD 3.025
After school time	6.03	5.76
120 minutes	SD 3.219	SD 3.312

Domain & Time VIGOROUS INTENSITY	Pretest Mean & standard deviation	Posttest Mean & standard deviation
School time	8.29	8.43
15 minutes	SD 2.503	SD 2.365
School time	7.62	7.72
30 minutes	SD 2.716	SD 2.689
School time	6.87	6.98
60 minutes	SD 2.910	SD 3.171
School time	6.16	5.70
120 minutes	SD 3.302	SD 3.571

Note. Survey scores from the AABI group (n = 108) are included in this chart to determine general trends. Highlighted data indicates no improvement from pretest to posttest.

The cumulative scores and means of all questions for both groups were calculated and compared using an independent *t*-test with no significance ($p > .05$) found between the pretest and posttest scores. Table 19 shows that the overall posttest mean on the survey questions for the FG group was higher than the AABI group with means of 173.54 and 149.53 respectfully; likewise, there were corresponding SD differences between the pretest and posttest scores. An independent *t*-test was performed to compare the pretest and posttest means of the cumulative scores with no significance found ($p > .05$). Table 20 shows that the FG group significance between means was .162 and the AABI group significance was .610, which indicates that there was a difference of significance between groups but not within the pretest and posttest scores.

Table 19

SEPAQ Groups Statistics of Cumulative Scores

Group statistics					
	Survey	*N*	Mean	Std. deviation	Std. error mean
FG SEPAQ	Pretest	86	166.35	32.638	3.846
	Posttest	86	173.54	29.189	3.393
AABI SEPAQ	Pretest	108	146.45	43.544	4.291
	Posttest	108	149.53	44.110	4.245

Table 20

SEPAQ Groups Statistics of Cumulative Scores

Independent samples test									
	Levene's test for equality of variances		*t* test for equality of means						
	F	Sig.	*t*	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
								Lower	Upper
FG SEPAQ Cum scores	1.352	.247	-1.405	144	.162	-7.193	5.121	-17.316	2.929
AABI SEPAQ Cum scores	.135	.714	.510	209	.610	-3.081	6.035	-14.979	8.817

An independent *t*-test was performed to compare the pretest and posttest means of the survey questions for both groups. The FG 1-mile and AABI pretest and posttest mean differences were mostly not significant ($p > .05$) as indicated on Table 19 and Table 20 respectfully. The FG group had significant difference between means surrounding the 30 and 60-minute time and during light and moderate intensities with corresponding variance equality significance that indicate improvement in physical activity self-efficacy beliefs in these categories. The overall significance (2-tailed) calculations ranged from .029 to .949 on the survey questions for the FG group with most questions considered not significant ($p > .05$). Although mostly not significant, the survey independent *t*-test confirms that pretest and posttest scores improved by the negative *t* scores and negative mean differences with few exceptions as shown in Table 21.

Table 21

SEPAQ Pretest and Posttest t*-test of Significance: FG Group*

Independent samples test										
		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
SCHOOL TIME	EV+	0.597	0.441	0.294	144.0	0.769	0.036	0.121	-0.204	0.275
LGT/15 MIN.	EV-			0.296	121.6	0.768	0.036	0.12	-0.203	0.274
SCHOOL TIME	EV+	10.53	0.001	-2.212	144.0	0.029	-0.37	0.167	-0.702	-0.039
LGT/30 MIN.	EV-			-2.2	123.6	0.03	-0.37	0.168	-0.704	-0.037
SCHOOL TIME	EV+	4.643	0.033	-2.057	144.0	0.041	-0.552	0.268	-1.082	-0.022
LGT/60 MIN.	EV-			-2.051	135.3	0.042	-0.552	0.269	-1.084	-0.02
SCHOOL TIME	EV+	0.135	0.713	-0.412	144.0	0.681	-0.137	0.332	-0.792	0.519
LGT/120 MIN.	EV-			-0.413	143.1	0.68	-0.137	0.331	-0.791	0.518
SCHOOL TIME	EV+	1.492	0.224	-0.663	144.0	0.508	-0.139	0.209	-0.551	0.274
MOD/15 MIN.	EV-			-0.662	142.2	0.509	-0.139	0.209	-0.552	0.275
SCHOOL TIME	EV+	7.643	0.006	-1.959	144.0	0.052	-0.546	0.279	-1.097	0.005
MOD/30 MIN.	EV-			-1.946	115.7	0.054	-0.546	0.281	-1.102	0.01
SCHOOL TIME	EV+	5.23	0.024	-2.152	144.0	0.033	-0.716	0.333	-1.373	-0.058
MOD/60 MIN.	EV-			-2.142	127.3	0.034	-0.716	0.334	-1.377	-0.054
SCHOOL TIME	EV+	3.368	0.069	-1.314	144.0	0.191	-0.518	0.394	-1.296	0.261
MOD/120 MIN.	EV-			-1.311	138.2	0.192	-0.518	0.395	-1.298	0.263
SCHOOL TIME	EV+	0.284	0.595	-0.239	144.0	0.811	-0.063	0.264	-0.584	0.458
VIG/15 MIN.	EV-			-0.239	142.5	0.811	-0.063	0.264	-0.585	0.459
SCHOOL TIME	EV+	4.464	0.036	-1.175	144.0	0.242	-0.439	0.374	-1.177	0.3
VIG/30 MIN.	EV-			-1.17	132.9	0.244	-0.439	0.375	-1.18	0.303

(table continues)

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference: Lower	Upper
SCHOOL TIME	EV+	4.121	0.044	-0.729	144.0	0.467	-0.307	0.421	-1.141	0.526
VIG/60 MIN.	EV-			-0.727	137.3	0.468	-0.307	0.423	-1.143	0.528
SCHOOL TIME	EV+	3.181	0.077	-0.569	144.0	0.571	-0.277	0.488	-1.242	0.687
VIG/120 MIN.	EV-			-0.567	138.6	0.571	-0.277	0.489	-1.244	0.69
AFTER SCHOOL	EV+	0.431	0.512	0.131	144.0	0.896	0.027	0.209	-0.385	0.44
MOD/15 MIN.	EV-			0.132	136.0	0.895	0.027	0.208	-0.383	0.438
AFTER SCHOOL	EV+	0.177	0.675	0.063	144.0	0.949	0.018	0.278	-0.532	0.567
MOD/30 MIN.	EV-			0.064	137.1	0.949	0.018	0.277	-0.53	0.565
AFTER SCHOOL	EV+	0.031	0.861	0.186	144.0	0.853	0.06	0.321	-0.575	0.694
MOD/60 MIN.	EV-			0.186	143.9	0.853	0.06	0.321	-0.575	0.694
AFTER SCHOOL	EV+	2.943	0.088	-0.501	144.0	0.617	-0.209	0.417	-1.033	0.615
MOD/120 MIN.	EV-			-0.499	136.1	0.618	-0.209	0.418	-1.036	0.618
AFTER SCHOOL	EV+	3.748	0.055	-1.379	144.0	0.17	-0.515	0.373	-1.252	0.223
VIG/15 MIN.	EV-			-1.373	130.4	0.172	-0.515	0.375	-1.256	0.227
AFTER SCHOOL	EV+	4.618	0.033	-1.794	144.0	0.075	-0.721	0.402	-1.516	0.073
VIG/30 MIN.	EV-			-1.788	134.4	0.076	-0.721	0.403	-1.519	0.076
AFTER SCHOOL	EV+	6.822	0.01	-1.761	144.0	0.08	-0.822	0.467	-1.745	0.101
VIG/60 MIN.	EV-			-1.755	131.5	0.082	-0.822	0.469	-1.75	0.105
AFTER SCHOOL	EV+	0.029	0.866	-1.464	144.0	0.145	-1.003	0.685	-2.356	0.351
VIG/120 MIN.	EV-			-1.472	128.5	0.143	-1.003	0.681	-2.35	0.345

Note. EV+ = Equal variances assumed; EV- = Equal variances not assumed. Significant findings are highlighted.

The AABI group had few and random significant differences on an independent *t*-test with no evidence to indicate improvement in physical activity self-efficacy beliefs in any category. Table 22 shows that the overall significance (2-tailed) calculations ranged from .049 to .893 on the survey questions for the AABI group with all questions considered not significant ($p > .05$) except one. An independent *t*-test confirms that random pretest and posttest scores improved by the negative t scores and negative mean differences but not significantly.

Table 22

SEPAQ Pretest and Posttest t *test of Significance: AABI Group*

Independent samples test										
		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference	
									Lower	Upper
SCHOOL TIME	EV+	5.705	0.018	-1.585	209.0	0.114	-0.484	0.305	-1.085	0.118
LGT/15 MIN.	EV-			-1.579	198.7	0.116	-0.484	0.306	-1.088	0.12
SCHOOL TIME	EV+	0.302	0.583	-0.541	209.0	0.589	-0.19	0.352	-0.884	0.504
LGT/30 MIN.	EV-			-0.539	204.5	0.59	-0.19	0.353	-0.886	0.505
SCHOOL TIME	EV+	1.343	0.248	0.223	209.0	0.824	0.081	0.364	-0.637	0.799
LGT/60 MIN.	EV-			0.223	208.7	0.823	0.081	0.363	-0.635	0.797
SCHOOL TIME	EV+	0.542	0.462	-0.327	209.0	0.744	-0.143	0.437	-1.003	0.718
LGT/120 MIN.	EV-			-0.328	209.0	0.744	-0.143	0.436	-1.002	0.717
SCHOOL TIME	EV+	4.319	0.039	-1.323	209.0	0.187	-0.414	0.313	-1.03	0.203
MOD/15 MIN.	EV-			-1.316	195.0	0.19	-0.414	0.314	-1.033	0.206
SCHOOL TIME	EV+	4.158	0.043	-0.931	209.0	0.353	-0.304	0.327	-0.948	0.34
MOD/30 MIN.	EV-			-0.925	189.9	0.356	-0.304	0.329	-0.953	0.345
SCHOOL TIME	EV+	0.239	0.626	0.438	209.0	0.662	0.155	0.354	-0.542	0.852
MOD/60 MIN.	EV-			0.438	208.4	0.662	0.155	0.354	-0.542	0.852
SCHOOL TIME	EV+	0.598	0.44	0.207	209.0	0.836	0.087	0.422	-0.744	0.919
MOD/120 MIN.	EV-			0.207	208.7	0.836	0.087	0.421	-0.742	0.917
SCHOOL TIME	EV+	0.271	0.603	-0.629	209.0	0.53	-0.212	0.338	-0.878	0.453
VIG/15 MIN.	EV-			-0.628	206.1	0.531	-0.212	0.338	-0.879	0.454

(table continues)

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference	
									Lower	Upper
SCHOOL TIME	EV+	0.002	0.966	-0.583	209.0	0.561	-0.217	0.373	-0.953	0.518
VIG/30 MIN.	EV-			-0.582	208.2	0.561	-0.217	0.373	-0.953	0.518
SCHOOL TIME	EV+	1.902	0.169	-0.581	209.0	0.562	-0.244	0.42	-1.071	0.584
VIG/60 MIN.	EV-			-0.582	208.7	0.561	-0.244	0.419	-1.069	0.582
SCHOOL TIME	EV+	1.378	0.242	0.665	209.0	0.507	0.316	0.475	-0.62	1.251
VIG/120 MIN.	EV-			0.666	208.8	0.506	0.316	0.474	-0.618	1.25
AFTER SCHOOL	EV+	11.69	0.001	-1.977	209.0	0.049	-0.729	0.369	-1.456	-0.002
MOD/15 MIN.	EV-			-1.964	189.0	0.051	-0.729	0.371	-1.461	0.003
AFTER SCHOOL	EV+	2.603	0.108	-0.805	209.0	0.421	-0.306	0.38	-1.056	0.443
MOD/30 MIN.	EV-			-0.803	203.8	0.423	-0.306	0.381	-1.058	0.445
AFTER SCHOOL	EV+	1.843	0.176	-0.156	209.0	0.876	-0.062	0.399	-0.849	0.724
MOD/60 MIN.	EV-			-0.156	203.3	0.876	-0.062	0.4	-0.851	0.727
AFTER SCHOOL	EV+	0.112	0.738	0.554	209.0	0.58	0.248	0.447	-0.634	1.13
MOD/120 MIN.	EV-			0.554	207.9	0.58	0.248	0.448	-0.635	1.131
AFTER SCHOOL	EV+	0.989	0.321	-0.978	209.0	0.329	-0.403	0.413	-1.217	0.41
VIG/15 MIN.	EV-			-0.977	207.5	0.33	-0.403	0.413	-1.218	0.411
AFTER SCHOOL	EV+	3.766	0.054	-0.905	209.0	0.367	-0.366	0.404	-1.163	0.431
VIG/30 MIN.	EV-			-0.902	203.2	0.368	-0.366	0.406	-1.166	0.434
AFTER SCHOOL	EV+	0.011	0.917	-0.134	209.0	0.893	-0.056	0.42	-0.885	0.773
VIG/60 MIN.	EV-			-0.134	208.1	0.894	-0.056	0.421	-0.886	0.773

(table continues)

		Levene's test equality of variances		t test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ-ence	95% Confidence interval of the difference Lower	Upper
AFTER SCHOOL	EV+	0.125	0.724	0.361	209.0	0.718	0.163	0.451	-0.726	1.053
VIG/120 MIN.	EV-			0.362	208.9	0.718	0.163	0.451	-0.726	1.052

Note. EV+ = Equal variances assumed; EV- = Equal variances not assumed. Significant findings are highlighted.

Survey questions were analyzed while comparing the differences between genders. Genders were compared through descriptive and inferential analysis with mixed results. A strong pattern was revealed with boys scoring higher than girls on all question sets. The differences between genders were somewhat significant (> .05) while examining cumulative question scores and FG gender differences, whereas, the AABI group had differences in means that were not significant.

Examination of the cumulative scores descriptive statistics for gender revealed that boys had higher mean score than girls on all question sets (see Table 23). In other words, during school time or after school, for all intensities of light, moderate, and vigorous, and for all durations of 15, 30, 60, and 120-minute increments of time, boys' cumulative mean scores on the survey questions were higher than the girls' cumulative mean scores. For instance, the school time, light intensity, 60-minute duration mean score for boys was 8.31 and the girls' mean score was 7.96, which was a significant difference (p = .021). The SD was greater for girls than boys on nearly all questions with a greater spread and deviation from the mean. The range of SD for girls was 1.920 to

4.038 and the boys SD range was 1.711 to 3.257, which shows a greater variance for girls.

Examination of the inferential statistics of cumulative mean scores for gender revealed significant findings (*p* > .05) on the *t* test (2 tailed) between boys' and girls' mean scores that include seven question sets surrounding vigorous intensity level of effort (see Table 24). Other survey questions were found not significant, that is, there was little to no difference between the genders when answering the survey questions. For instance, vigorous intensity for 15 minutes during school time category showed a mean score of 8.47 for girls and 9.04 for boys (p > .008) and vigorous intensity for 15 minutes during after school time category that showed a mean score of 7.92 for girls and 8.48 for boys (p > .043), which demonstrates a significant difference between genders on those two question sets. The Levene's test statistics showed random significant findings that indicated positive variability or difference between genders. There were five question sets with significant findings with all other question sets not significant. The negative numbers in the *t* and Mean Difference columns confirm that there were differences between girls' and boys' findings on all question sets.

Table 23

SEPAQ Gender Comparison

Domain & time LIGHT INTENSITY	Girls Mean & standard deviation	Boys Mean & standard deviation
School time 15 minutes	9.13 SD 1.920	9.38 SD 1.637
School time 30 minutes	8.57 SD 2.270	8.98 SD 1.955
School time 60 minutes	7.96 SD 2.449	8.31 SD 2.259
School time 120 minutes	7.14 SD 3.004	7.81 SD 2.715

Domain & time MODERATE INTENSITY	Girls Mean & standard deviation	Boys Mean & standard deviation
School time 15 minutes	8.93 SD 2.092	9.19 SD 1.711
School time 30 minutes	8.49 SD 2.178	8.76 SD 2.048
School time 60 minutes	7.77 SD 2.475	8.12 SD 2.231
School time 120 minutes	6.84 SD 2.903	7.21 SD 2.739

Domain & time VIGOROUS INTENSITY	Girls Mean & standard deviation	Boys Mean & standard deviation
School time 15 minutes	8.47 SD 2.263	9.04 SD 1.949
School time 30 minutes	7.80 SD 2.581	8.38 SD 2.416
School time 60 minutes	6.98 SD 2.857	7.73 SD 2.752
School time 120 minutes	6.18 SD 3.143	6.63 SD 3.257

Domain & time MODERATE INTENSITY	Girls Mean & standard deviation	Boys Mean & standard deviation
After school time 15 minutes	8.82 SD 2.261	9.08 SD 2.161
After school time 30 minutes	8.35 SD 2.482	8.71 SD 2.274
After school time 60 minutes	7.75 SD 2.649	8.14 SD 2.549
After school time 120 minutes	6.88 SD 2.989	7.37 SD 3.001

Domain & time VIGOROUS INTENSITY	Girls Mean & standard deviation	Boys Mean & standard deviation
After school time 15 minutes	7.92 SD 2.764	8.48 SD 2.663
After school time 30 minutes	7.44 SD 2.689	8.04 SD 2.760
After school time 60 minutes	6.77 SD 2.944	7.46 SD 2.921
After school time 120 minutes	6.13 SD 4.038	6.70 SD 3.176

Note. Cumulative survey means for genders are included in this chart to illustrate general trends. All categories showed a difference between genders with boys scoring higher than girls.

Table 24

SEPAQ Gender Comparison t *test of Significance*

		Independent samples test								
		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference	
									Lower	Upper
SCHOOL TIME	EV+	4.13	0.043	-1.369	386.0	0.172	-0.247	0.181	-0.602	0.108
LGT/15 MIN.	EV-			-1.353	353.9	0.177	-0.247	0.183	-0.606	0.112
SCHOOL TIME	EV+	8.035	0.005	-1.909	386.0	0.057	-0.409	0.214	-0.831	0.012
LGT/30 MIN.	EV-			-1.888	355.8	0.06	-0.409	0.217	-0.836	0.017
SCHOOL TIME	EV+	3.649	0.057	-1.493	386.0	0.136	-0.357	0.239	-0.827	0.113
LGT/60 MIN.	EV-			-1.484	367.4	0.139	-0.357	0.241	-0.83	0.116
SCHOOL TIME	EV+	7.491	0.006	-2.32	386.0	0.021	-0.674	0.29	-1.245	-0.103
LGT/120 MIN.	EV-			-2.303	364.1	0.022	-0.674	0.293	-1.249	-0.098
SCHOOL TIME	EV+	6.445	0.012	-1.316	386.0	0.189	-0.254	0.193	-0.634	0.125
MOD/15 MIN.	EV-			-1.297	345.9	0.195	-0.254	0.196	-0.639	0.131
SCHOOL TIME	EV+	1.449	0.229	-1.235	386.0	0.218	-0.265	0.215	-0.687	0.157
MOD/30 MIN.	EV-			-1.23	370.3	0.22	-0.265	0.216	-0.689	0.159
SCHOOL TIME	EV+	2.793	0.096	-1.48	386.0	0.14	-0.354	0.239	-0.823	0.116
MOD/60 MIN.	EV-			-1.469	363.7	0.143	-0.354	0.241	-0.827	0.12
SCHOOL TIME	EV+	1.318	0.252	-1.3	386.0	0.194	-0.373	0.287	-0.936	0.191
MOD/120 M.	EV-			-1.294	370.8	0.196	-0.373	0.288	-0.939	0.193
SCHOOL TIME	EV+	6.587	0.011	-2.67	386.0	0.008	-0.571	0.214	-0.992	-0.151
VIG/15 MIN.	EV-			-2.642	355.8	0.009	-0.571	0.216	-0.996	-0.146

(table continues)

		Levene's test equality of variances		t test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference Lower	Upper
SCHOOL TIME	EV+	2.509	0.114	-2.264	386.0	0.024	-0.575	0.254	-1.074	-0.076
VIG/30 MIN.	EV-			-2.254	369.6	0.025	-0.575	0.255	-1.077	-0.073
VIG/60 MIN.	EV-			-2.597	373.6	0.01	-0.743	0.286	-1.305	-0.18
SCHOOL TIME	EV+	0.285	0.594	-1.4	386.0	0.162	-0.457	0.326	-1.098	0.185
VIG/120 MIN.	EV-			-1.404	381.4	0.161	-0.457	0.325	-1.097	0.183
AFTER SCHOOL	EV+	2.026	0.155	-1.158	386.0	0.248	-0.26	0.225	-0.702	0.182
MOD/15 MIN.	EV-			-1.154	372.6	0.249	-0.26	0.226	-0.704	0.183
AFTER SCHOOL	EV+	1.602	0.206	-1.497	386.0	0.135	-0.362	0.242	-0.837	0.113
MOD/30 MIN.	EV-			-1.487	366.3	0.138	-0.362	0.243	-0.84	0.117
AFTER SCHOOL	EV+	0.37	0.543	-1.474	386.0	0.141	-0.389	0.264	-0.909	0.13
MOD/60 MIN.	EV-			-1.47	373.5	0.142	-0.389	0.265	-0.91	0.132
AFTER SCHOOL	EV+	0.002	0.966	-1.599	386.0	0.111	-0.488	0.305	-1.087	0.112
MOD/120 M.	EV-			-1.599	378.5	0.111	-0.488	0.305	-1.087	0.112
AFTER SCHOOL	EV+	1.319	0.251	-2.027	386.0	0.043	-0.559	0.276	-1.102	-0.017
VIG/15 MIN.	EV-			-2.022	373.6	0.044	-0.559	0.277	-1.103	-0.015
AFTER SCHOO	EV+	0.371	0.543	-2.177	386.0	0.03	-0.604	0.278	-1.15	-0.059
VIG/30 MIN.	EV-			-2.181	380.6	0.03	-0.604	0.277	-1.149	-0.06
AFTER SCHOOL	EV+	0.272	0.602	-2.294	386.0	0.022	-0.685	0.298	-1.271	-0.098
VIG/60 MIN.	EV-			-2.292	377.2	0.022	-0.685	0.299	-1.272	-0.097

(table continues)

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference Lower	Upper
AFTER SCHOOL VIG/120 MIN.	EV+	0.782	0.377	-1.566	386.0	0.118	-0.574	0.367	-1.295	0.147
	EV-			-1.54	338.1	0.125	-0.574	0.373	-1.308	0.159

Note. EV+ = Equal variances assumed; EV- = Equal variances not assumed. Significant findings are highlighted.

Examination of the inferential statistics of FG group for gender revealed significant findings ($p > .05$) on the *t*-test (2 tailed) between boys' and girls' mean scores that include seven question sets surrounding moderate and vigorous intensity levels of effort (see Table 25). Other survey questions were found not significant, that is, there was little to no difference between the genders when answering the survey questions. For instance, moderate intensity for 30 minutes during after school time category found a significant ($p = .003$) difference in question means between girls and boys. Similarly, vigorous intensity for 30 minutes during school time category found a significant ($p = .034$) difference in questions means between girls and boys. The Levene's test found over half (11/20) of the question sets were significant ($p < .05$) indicating that the variability between the genders was not the same on those questions and that girls' and boys' answers were different. There were seven questions sets that had significant findings on both the t-test (2 tailed) and Levene's test. The negative numbers in the *t* and mean difference columns confirm that there were differences between girls' and boys' findings on all question sets.

Table 25

SEPAQ Gender Comparison t *Test of Significance: FG Group*

Independent samples test

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference: Lower	Upper
SCHOOL TIME	EV+	3.193	0.076	-1.038	144.0	0.301	-0.128	0.123	-0.372	0.116
LGT/15 MIN.	EV-			-0.998	105.7	0.32	-0.128	0.128	-0.383	0.126
SCHOOL TIME	EV+	4.436	0.037	-1.627	144.0	0.106	-0.281	0.172	-0.621	0.06
LGT/30 MIN.	EV-			-1.586	111.3	0.116	-0.281	0.177	-0.631	0.07
SCHOOL TIME	EV+	5.014	0.027	-1.667	144.0	0.098	-0.459	0.275	-1.004	0.085
LGT/60 MIN.	EV-			-1.585	101.2	0.116	-0.459	0.29	-1.034	0.115
SCHOOL TIME	EV+	7.542	0.007	-1.6	144.0	0.112	-0.538	0.336	-1.202	0.127
LGT/120 MIN.	EV-			-1.53	103.4	0.129	-0.538	0.351	-1.235	0.159
SCHOOL TIME	EV+	6.836	0.01	-1.596	144.0	0.113	-0.338	0.212	-0.757	0.081
MOD/15 MIN.	EV-			-1.478	91.4	0.143	-0.338	0.229	-0.792	0.116
SCHOOL TIME	EV+	9.458	0.003	-2.636	144.0	0.009	-0.743	0.282	-1.3	-0.186
MOD/30 MIN.	EV-			-2.396	84.9	0.019	-0.743	0.31	-1.36	-0.126
SCHOOL TIME	EV+	2.927	0.089	-1.575	144.0	0.117	-0.539	0.342	-1.216	0.138
MOD/60 MIN.	EV-			-1.485	97.9	0.141	-0.539	0.363	-1.26	0.181

(table continues)

		Levene's test equality of variances		t test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference Lower	Upper
SCHOOL TIME	EV+	1.414	0.236	-0.947	144.0	0.345	-0.382	0.404	-1.18	0.416
MOD/120 MIN.	EV-			-0.923	111.5	0.358	-0.382	0.414	-1.202	0.438
SCHOOL TIME	EV+	16.51	0	-2.897	144.0	0.004	-0.759	0.262	-1.276	-0.241
VIG/15 MIN.	EV-			-2.637	85.4	0.01	-0.759	0.288	-1.33	-0.187
SCHOOL TIME	EV+	4.282	0.04	-2.137	144.0	0.034	-0.807	0.378	-1.553	-0.06
VIG/30 MIN.	EV-			-2.052	105.2	0.043	-0.807	0.393	-1.586	-0.027
SCHOOL TIME	EV+	1.095	0.297	-1.899	144.0	0.06	-0.809	0.426	-1.651	0.033
VIG/60 MIN.	EV-			-1.864	114.3	0.065	-0.809	0.434	-1.669	0.051
SCHOOL TIME	EV+	0.168	0.682	-1.085	144.0	0.28	-0.539	0.497	-1.522	0.443
VIG/120 MIN.	EV-			-1.089	123.6	0.278	-0.539	0.495	-1.52	0.441
AFTER SCHOOL	EV+	16.63	0	-2.467	144.0	0.015	-0.515	0.209	-0.927	-0.102
MOD/15 MIN.	EV-			-2.262	87.7	0.026	-0.515	0.228	-0.967	-0.062
AFTER SCHOOL	EV+	20.54	0	-3.05	144.0	0.003	-0.839	0.275	-1.383	-0.295
MOD/30 MIN.	EV-			-2.707	77.7	0.008	-0.839	0.31	-1.457	-0.222
AFTER SCHOOL	EV+	8.391	0.004	-2.431	144.0	0.016	-0.782	0.322	-1.417	-0.146
MOD/60 MIN.	EV-			-2.305	100.1	0.023	-0.782	0.339	-1.455	-0.109
AFTER SCHOO	EV+	1.273	0.261	-1.299	144.0	0.196	-0.551	0.424	-1.388	0.287
MOD/120 MIN.	EV-			-1.271	113.0	0.206	-0.551	0.433	-1.409	0.308

(table continues)

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference Lower	Upper
AFTER SCHOOL	EV+	9.407	0.003	-2.57	144.0	0.011	-0.964	0.375	-1.706	-0.223
VIG/15 MIN.	EV-			-2.428	98.8	0.017	-0.964	0.397	-1.752	-0.176
AFTER SCHOOL	EV+	2.756	0.099	-1.877	144.0	0.063	-0.77	0.41	-1.582	0.041
VIG/30 MIN.	EV-			-1.832	112.0	0.07	-0.77	0.42	-1.603	0.063
AFTER SCHOOL	EV+	2.169	0.143	-1.69	144.0	0.093	-0.807	0.477	-1.751	0.137
VIG/60 MIN.	EV-			-1.635	108.4	0.105	-0.807	0.493	-1.785	0.171
AFTER SCHOOL	EV+	1.484	0.225	-0.075	144.0	0.941	-0.053	0.705	-1.445	1.34
VIG/120 MIN.	EV-			-0.067	79.5	0.947	-0.053	0.789	-1.622	1.517

Note. EV+ = Equal variances assumed; EV- = Equal variances not assumed. Significant findings are highlighted.

Examination of the inferential statistics of AABI group for gender revealed no significant findings ($p > .05$) except for two categories on the t-test (2 tailed) between boys' and girls' mean scores (see Table 26). In other words, there was little to no difference between the genders when answering the survey questions. The significant questions include the light intensity for 60 minutes during school time category ($p = .020$) and moderate intensity for 60 minutes during after school time category ($p = .035$). The Levene's test found no significant findings, which indicates that the variability or difference between the genders was similar, which means the two scores were about the same. The negative numbers in the t and Mean Difference columns confirm that there were differences between girls' and boys' findings, however, mostly not significant.

Table 26

SEPAQ Gender Comparison t *Test of significance: FG group*

Independent samples test

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference Lower	Upper
SCHOOL TIME	EV+	0.71	0.4	-0.6	208.0	0.549	-0.185	0.308	-0.792	0.423
LGT/15 MIN.	EV-			-0.601	208.0	0.548	-0.185	0.307	-0.79	0.421
SCHOOL TIME	EV+	1.232	0.268	-0.821	208.0	0.412	-0.29	0.353	-0.986	0.406
LGT/30 MIN.	EV-			-0.824	208.0	0.411	-0.29	0.352	-0.984	0.404

(table continues)

		Levene's test equality of variances		t test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ -ence	95% Confidence interval of the difference Lower	Upper
SCHOOL TIME	EV+	0.276	0.6	-0.055	208.0	0.956	-0.02	0.366	-0.742	0.701
LGT/60 MIN.	EV-			-0.055	206.3	0.956	-0.02	0.366	-0.742	0.702
SCH OOL TIME	EV+	0.768	0.382	-0.822	208.0	0.412	-0.36	0.438	-1.224	0.503
LGT/120 MIN.	EV-			-0.823	207.2	0.412	-0.36	0.438	-1.223	0.503
SCHOOL TIME	EV+	1.177	0.279	-0.193	208.0	0.847	-0.061	0.315	-0.682	0.561
MOD/15 MIN.	EV-			-0.194	207.8	0.847	-0.061	0.314	-0.68	0.558
SCHOOL TIME	EV+	0.824	0.365	0.48	208.0	0.632	0.158	0.329	-0.491	0.806
MOD/30 MIN.	EV-			0.478	202.3	0.633	0.158	0.33	-0.493	0.809
SCHOOL TIME	EV+	0.094	0.759	-0.287	208.0	0.774	-0.102	0.355	-0.803	0.599
MOD/60 MIN.	EV-			-0.287	206.8	0.774	-0.102	0.355	-0.803	0.599
SCHOOL TIME	EV+	0.065	0.799	-0.396	208.0	0.693	-0.168	0.424	-1.003	0.667
MOD/120 MIN.	EV-			-0.396	206.2	0.693	-0.168	0.424	-1.003	0.668
SCHOOL TIME	EV+	0.091	0.763	-0.962	208.0	0.337	-0.322	0.335	-0.983	0.338
VIG/15 MIN.	EV-			-0.963	207.8	0.337	-0.322	0.334	-0.982	0.337
SCHOOL TIME	EV+	0.007	0.931	-0.717	208.0	0.474	-0.268	0.373	-1.004	0.468
VIG/30 MIN.	EV-			-0.717	206.8	0.474	-0.268	0.373	-1.004	0.468
SCHOOL TIME	EV+	0.176	0.675	-1.13	208.0	0.258	-0.477	0.42	-1.306	0.352
VIG/60 MIN.	EV-			-1.13	205.2	0.259	-0.477	0.421	-1.307	0.354

(table continues)

		Levene's test equality of variances		*t* test equality of means						
		F	Sig.	*t*	df	Sig. (2-tailed)	Mean differ-ence	Std. error differ-ence	95% Confidence interval of the difference Lower	Upper
SCHOOL TIME	EV+	0.82	0.366	-0.541	208.0	0.589	-0.258	0.476	-1.196	0.681
VIG/120 MIN.	EV-			-0.54	203.1	0.59	-0.258	0.477	-1.199	0.684
AFTER SCHOOL	EV+	0.114	0.736	0.189	208.0	0.85	0.07	0.369	-0.658	0.797
MOD/15 MIN.	EV-			0.189	205.4	0.851	0.07	0.369	-0.659	0.798
AFTER SCHOOL	EV+	0.539	0.464	0.384	208.0	0.702	0.146	0.38	-0.603	0.894
MOD/30 MIN.	EV-			0.383	205.5	0.702	0.146	0.38	-0.604	0.895
AFTER SCHOOL	EV+	0.526	0.469	0.087	208.0	0.931	0.035	0.401	-0.755	0.824
MOD/60 MIN.	EV-			0.087	206.6	0.931	0.035	0.401	-0.755	0.825
AFTER SCHOOL	EV+	1.113	0.293	-0.41	208.0	0.682	-0.184	0.449	-1.068	0.701
MOD/120 MIN.	EV-			-0.409	204.2	0.683	-0.184	0.45	-1.07	0.703
AFTER SCHOOL	EV+	0.198	0.657	-0.673	208.0	0.502	-0.275	0.409	-1.081	0.531
VIG/15 MIN.	EV-			-0.672	206.2	0.502	-0.275	0.409	-1.081	0.531
AFTER SCHOOL	EV+	1.764	0.186	-1.2	208.0	0.231	-0.482	0.401	-1.273	0.31
VIG/30 MIN.	EV-			-1.19	202.2	0.233	-0.482	0.403	-1.276	0.313
AFTER SCHOOL	EV+	2.734	0.1	-1.03	208.0	0.3	-0.438	0.422	-1.269	0.393
VIG/60 MIN.	EV-			-1.03	201.1	0.302	-0.438	0.423	-1.273	0.397
AFTER SCHOOL	EV+	0.921	0.338	-1.41	208.0	0.16	-0.635	0.45	-1.521	0.252
VIG/120 MIN.	EV-			-1.4	201.1	0.161	-0.635	0.452	-1.525	0.256

Note. EV+ = Equal variances assumed; EV- = Equal variances not assumed. Significant findings are highlighted.

Summary of RQ 2 Findings

Descriptive and inferential statistical procedures were used to analyze SEPAQ survey questions designed to measure student physical activity self-efficacy. The student survey responses from the designated FG 1-mile and AABI groups pretest and posttest findings were analyzed and compared. The domains measured were during school time and after school time and the variables included the type of intensity (light, moderate, and vigorous) and duration (15, 30, 60, 120-minute increments). There were mixed significant results. Generally, students improved physical activity self-efficacy from pretest to posttest attempts with category means reflecting positive results on most question sets; however, most of these findings were not statistically significant. A strong pattern emerged with the FG group findings that indicate that most students improved their pretest and posttest score with significant findings on four questions (p = .029, .041, .052, .033). Likewise a weaker pattern of improvement can be observed from the AABI group with one question found significant (p = .049). The cumulative score on each question was calculated and analyzed to determine if there were differences between pretest and posttest means with no significant findings. The FG group' pretest and posttest means for the cumulative score were 166.35 and 173.54 respectfully, (p = .162) and the AABI group was 146.45 and 149.53 respectfully (p = .610). Genders were compared with strong and significant findings indicating that there were differences between girls and boys on the survey. The category means for all questions were higher for boys than for girls. The FG group had seven questions that were significantly different while the AABI had two questions that were significantly different between girls and boys.

To answer the research question, does changing the aerobic fitness assessment focus affect student physical activity self-efficacy beliefs, the null hypothesis was accepted. There was not enough significant difference on the pretest and posttest results of the FG 1-mile and AABI aerobic assessments to indicate a difference in student physical activity self-efficacy beliefs. There were significant differences and large variability between genders.

RQ 3: Student Behaviors

Teacher-participant comments regarding student behavior, motivation, and effort were used to investigate the question, what are student behavior characteristics during an aerobic fitness assessment?

Qualitative data and collection and analysis. The data collected from the teacher-participants provided insight to student behaviors during aerobic assessments. The analysis of the data was coded and categorized into four distinct themes. The themes were: external influences, run preparation, student behaviors, and student performance outcomes. Figure 13 illustrates how the themes are linked and related to student performance outcomes. These themes can be further delineated into sub-themes that better described the phenomena. Teacher-participant quotes in this section are distinguished by the type of aerobic assessment they administered followed by a letter (e.g., AABI Teacher A or FG Teacher C). I also indicate whether the quote was taken from the interview, blog, or field notes. External influences were described by all teacher-participants, which included comments about the weather, track conditions, time of year/day, and student confusion about directions. Preparation for the aerobic assessments (both FG and AABI groups) was described by four of the six teacher-participants while explaining past practices and how students prepare for aerobic assessments in general. Student behaviors, such as motivation and effort, were described by all teacher-participants and included comments about student success. And finally, comments regarding student performances were recorded that indicated improvement or not. Teacher-participant coding of the data collected and described is indicated in Table 5. These three themes and self-efficacy domains, external influence, run preparation, and student behaviors are connected and give understanding to student performance on the aerobic assessments (Perry et al., 2012). Figure 14 illustrates these themes and sub-themes that were found in the data.

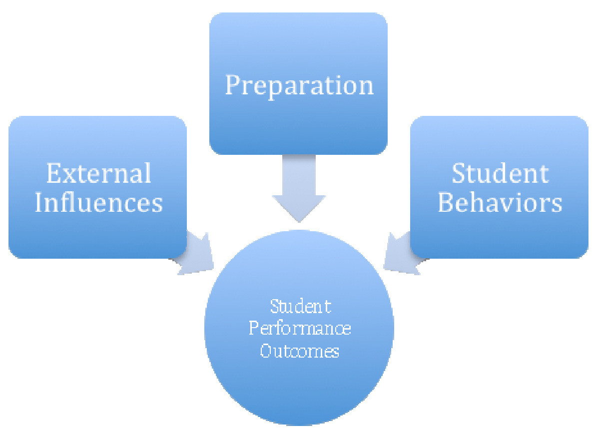


Figure 13. Teacher-participant data results illustrate that external influences, preparation, and student motivation affect student performance on aerobic assessments.

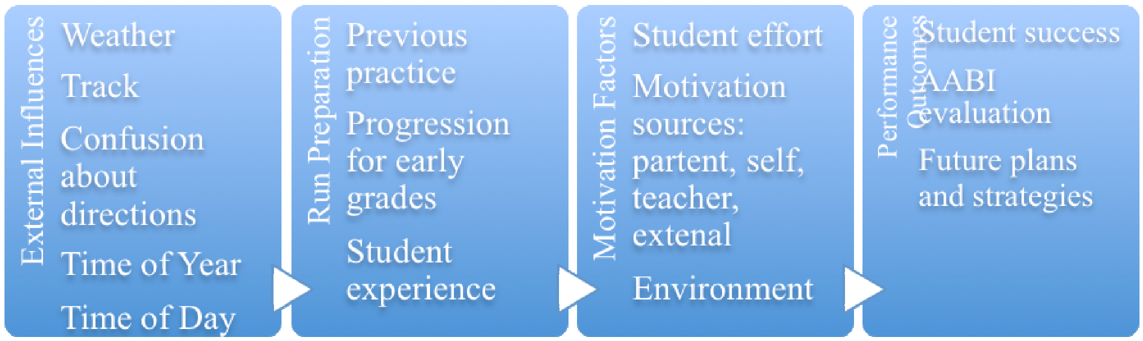


Figure 14. Factors that influence student performance (results from qualitative sources).

External influences. External influences were factors that teacher-participants had little or no control over during the assessments and perceived to affect student performance. These factors included the weather, track conditions, time of the year/day, and student confusion about directions. Comments regarding external factors from both FG and AABI teacher-participants regarding the weather included the following:

> It was cold when we ran the mile for assessment #2 (FG Teacher C, field notes); the weather was cold but it cleared up for a couple days at the end and we got it done (FG Teacher E, interview); the weather was cooler than last month's mile (FG Teacher D, blog); before the run, they were complaining about the cold; and, the weather was OK but windy and cold (AABI Teacher A, interview).

There were combinations of weather and track condition comments from both FG and AABI teacher-participants, such as,

> [The] second time the weather was dry and the track was OK (FG Teacher D, interview); we had a course around the school and we ran on the HS dirt track if

> not muddy (FG Teacher C, interview); and, I had to pick a day that didn't rain and cause the track to be all muddy. (AABI Teacher B, interview)

Additional track condition comments were:

> We love our new track (FG Teacher D, blog); the new track helped, everyone was excited to try out the new track (FG Teacher E, interview); the new track was really exciting for everyone. . . . it's nice to be able to use it (AABI Teacher A, interview); and, during the run, students got to run on our new track, which made this run faster for them (a couple of students said). (AABI Teacher B, interview)

The time of year (Fall/Winter) and time of day were perceived factors with teacher comments such as, "It was almost winter break and they had been testing in class all morning (FG Teacher E, interview), and the mile test was ran after lunch recess" (FG Teacher C, blog). Student confusion or misunderstanding the directions on both FG and AABI aerobic assessments were considered a factor with comments that included:

> It (AABI) was confusing at first but I think that they got the idea better on the second run … students did better job of remembering their lap (color) and number [during run number two] (AABI Teacher B, interview); and, I hand out colored straws so that each student knows what # lap that they are on (FG Teacher F, interview).

One teacher-participant comment specific to the AABI aerobic assessment shared the following:

> I explained the track and the cones and then I explained the rainbow part, which was confusing at first...however, it made sense once they got started; the numbers

> and colors were confusing…I think that we got it though by the end. (AABI Teacher A, interview)

And finally teacher-participants connected external factors to student performance by stating:

> Due to the cold, I think the students ran a little quicker in general because they knew we would be going inside after the run (FG Teacher F, interview); and, students ran on a very cold day so scores are not a good as expected (AABI. Teacher A, interview)

External influences were identified by teacher-participants that were related to weather, track conditions, time of the year/day, and student confusion about the directions. These factors were perceived by the teacher-participants to be factors that affect student performance.

Run preparation. Teacher-participants commented about preparing students for the aerobic assessment through their interviews and comments from the online blog. Most comments about preparation were centered on past practices and how students gain experience with aerobic fitness testing over time. The subtheme of past practices was evident with comments such as the following:

> They start early in first grade with doing runs to the fence and back and to various locations on the campus before we start the real PE testing (AABI Teacher A, interview); the kids have been doing bits of the mile run since first grade so there was nothing new about the run, except it was the first time that we actually timed the mile (FG Teacher C, interview); . . . we start with just a walk, then we run,

> and most times it is just one or two laps (FG Teacher D, interview); we start them in first grade and gradually get longer in the runs . . . this works well with the little ones; and, in fourth grade we run three laps and then we run four laps in the Fall (in fifth grade), just like we did [for this assessment]. (FG Teacher F, interview)

Additional comments about the process of preparing students for aerobic fitness testing included:

> Last year they were able to see other students running the mile, so they were aware what to expect and what the perimeter looked like" (FG Teacher D, interview), and this comment regarding the AABI, The only thing is that I wish that I could have started them at 5 minutes first and then 10 minutes and then add more time to get used to how long the run was. (AABI Teacher B, interview)

In addition, there were comments that included a combination of preparation and external factors that influence student performance. For instance, teacher-participants indicated that the time of year influenced the preparation process with statements such as the following:

> They get ready for the run mostly in the Spring but also some in the Fall (FG Teacher C, interview); I feel like we are ready for our fitness tests in the Spring and prepare all year round.. . . . even our little guys get ready but at their level (FG Teacher D, interview); and, the students were less prepared for assessment #2 . . . due to time for testing [in the classroom]. (AABI Teacher A, interview)

In general, the teacher-participants indicated that they progressively prepare their students for all fitness testing throughout the grades with age appropriate activities. As shared by several teachers, "At my school students have PE every day. We work a lot on fitness by doing fun activities" (AABI Teacher A, interview). Teacher-participants' comments regarding external factors and preparation were related to student behaviors and performance.

Student behaviors. Student behaviors were observed by teacher-participants and recorded through field notes, online blog, and interview sources. Teacher-participants were directly asked to comment about student behaviors and to give their perceptions about effort and motivation. All teacher-participants indicated that student expectations were 'just to improve' from the previous attempt. Comments made by the teacher-participants to support this approach to "just improve" included the following:

> I encourage them and tell them to try their hardest, like I do for all the kids…sometimes this works (FG Teacher F, interview); two laps is kind of far for them . . . we just try to improve from the last time, that's all I ask…this seems to work best, you know, no pressure, just try your hardest (FG Teacher C, interview); [I give] a speech to try your hardest and to pace themselves (FG Teacher E, interview); and specifically about the AABI, it's the same with the mile, we just want them to improve, but this was different, something new and colorful . . . I just asked them to past the cone from last time. (AABI Teacher A, interview)

Teacher-participants had a combination of sub-themes and referred to making the "standard" as a motivator while mentioning an external factor related to the time of the year. Examples of this combination of sub-themes included the following:

> All I wanted was for my kids to improve from the last time . . . in the Spring we'll worry about making the standard (FG Teacher F, interview); we look at the standards when the kids get into fifth grade and we start in the Fall to see how close everyone is (FG Teacher D, interview); I think the kids know why we run and that we are getting ready for fitness testing in the Spring (AABI Teacher B, interview); and, we also said that the "real" run will be in the Spring…so we tried not to pressure them but to just do their best. (AABI Teacher A, interview)

Teacher-participants informed students of the FG standard as a way to motivate them to perform well. Teacher-participant comments that demonstrate the use of standards to encourage student effort included, "The standards help with knowing what is needed and some kids do well there . . . and we showed them the standard for boys and girls before we get started" (FG Teacher F, interview). Similarly, recording the run results made the aerobic assessment more serious, and, in the teacher-participants' opinion, encouraged students to give a good effort. Statements that shared this strategy included the following:

> It always helps when you record the scores, kids know that you mean it (FG Teacher D, interview); and, a different boy who came in first, asked about other students' time on the mile run in other classes . . . he wants to be the fastest kid in the school and competes very well to achieve his goals. (FG Teacher F, interview)

Teacher-participant comments from the interview and online blog sources indicated that most students tried hard and gave a good effort. In addition, the teacher-participants indicated other emotions in their comments, such as, excitement and nervousness. The following teacher-participant statements demonstrated this perception of good effort:

> I saw kids try really hard to go past their first color and lap (AABI Teacher A, interview)); and, everyone gave it a good effort I think . . . it was new and different (AABI Teacher B, interview); some students were nervous about getting better times than their last mile (FG Teacher D, interview); they were even talking about it (FG) at the beginning of the school day . . . during the 2nd assessment students were much more relaxed (FG Teacher C, interview); they acted like they knew what to expect . . . kids were excited to try to do better (Teacher E, interview); students were aware of the mile run that day and had brought water, wore running attire and we're excited (FG Teacher D, interview); the kids were excited and I think that they tried hard (AABI Teacher A, interview); and, . . . they were excited for the second time . . . and to be outside after so much rain (FG Teacher F, interview).

Insight to the reason why students tried hard to improve may come from outside sources, such as parents' expectations. One teacher recorded a student comment that indicated motivation can be external when the student said, "I felt like I couldn't breathe. I didn't want to get a bad time because my dad wants to know my time" (FG Teacher D, blog).

Several teacher-participant comments during the interviews and from field notes indicated that they make the "mile day" special that included outside encouragement (cheering) and support from others and going on a field trip in order to use the high school track. The comments that supported changing the environment to motivate students included these comments from FG teacher-participants:

> So when it's time to go to the HS, I make a big deal of it and get the kids all fired up . . . it's like a field trip next door (FG Teacher F, interview); it is a team effort here with the teaching staff at my school when kids run the mile . . . the teachers come out of the classrooms and cheer them on . . . Mr. C played the bongos . . . teachers of the student stood and cheered around the perimeter of the running area; some 2nd and 3rd grade classes came out to cheer them on. . . . [It was a] very exciting atmosphere; and some students were finished early ran to cheer on their classmates. (FG Teacher C, interview)

Teacher-participants' perspectives about student behaviors revealed several sub-themes. These sub-themes included comments about teacher expectations for students to try hard and to improve their performance from previous attempts, the use of standards to inform students of performance expectations. Likewise the data indicated that a variety of emotions contribute to motivation and effort, such as excitement and nervousness. And finally, the use of outside sources of encouragement was shared. The teacher-participants shared their environmental changes to increase excitement and motivation. Student behaviors and motivational strategies, preparation and experience, and external factors are connected to student performance outcomes.

Student performance outcomes. Teacher-participant perceptions regarding student performance outcomes had a range of comments regarding student behaviors during an aerobic assessment. Teacher-participant perceptions related to student performance had sub-themes that included comments related to student success, evaluation of the AABI aerobic assessment, and future plans and strategies. Teacher-participants indicated in their field notes, online blog, and interview sources that they were mostly pleased with the student performances. Positive comments regarding student performance outcomes included the following:

> The kids did great; after the run, students stated that they ran the fastest that they had ever run . . . most of them achieved a similar result as the October run (FG Teacher C, interview); I think most did OK and improved their time . . . many were proud and excited about the run (FG Teacher E, interview); one girl, who came in almost last, said, 'well, I did my best' (FG Teacher C, blog); they did OK . . . most tried hard to get to the purple color, however, some were OK at the yellow level (AABI Teacher B, interview); no one was upset about their time on the run . . . a handful of students were happy about their time . . . and at least 80% of their times improved from the last mile (FG Teacher F, interview).

Comments from teacher-participants indicated that they thought students' performance improved through experience and learning by stating the following:

> They knew what it was, you know, from the first time, and wanted to do better (AABI Teacher B, interview); I think that the kids knew how long 15 minutes was…that helped them time their run . . . pace and not to start to fast too soon (AABI Teacher A, interview); this is normal for kids to learn this, especially in fifth grade when they have to run the mile (FG Teacher D, interview); I don't

> know if these kids have run an entire mile yet . . . however, some of these guys ran over two miles in 15 minutes . . . now that's pretty good (AABI Teacher B, interview).

Several teacher-participants quoted students, who said:

> I was nervous at first, but I think it was easier than I thought it would be . . . it was much easier this time, I knew how to pace myself better because I listened to you yelling out the times (AABI Teacher A, interview); I did better Mrs. X, I ran more this time and only walked a little (FG Teacher D, blog); I wanted to get to the yellow lap because it was next in the rainbow; and, next time I can do better and get into the purple number (AABI Teacher B, interview).

Although most students had positive results, there were comments related to those students that did not perform well. From the field notes and interviews, all teacher-participants indicated that some students were either sick or injured during the aerobic assessments. Comments regarding illness and injuries included the following:

> Most kids did improve from September and a couple did not; some of those kids were not feeling well, one boy was injured but ran it away . . . you know, it's never 100%, but we did well (FG Teacher D, interview); there were a couple kids that didn't feel well but tried anyway, and I recorded their scores (AABI Teacher A, field notes); and, a few kids were sick on the day of the run (FG Teacher C, field notes).

One teacher-participant (FG Teacher C, field notes) gave reasons for students not performing well while assessing performance in the field notes and shared this quick outline:

- Some kids didn't do well managing their running/breathing.
    - Tried to run too much.
    - Wanted to stop due to hard breathing.
    - Did stop on far side of the track.

Most of the comments recorded online and during interviews regarding the lack of student success revolved around student attitude and effort. For instance, one teacher-participant stated the following:

> One boy who came in last said, 'I don't care about my time.' He is the same boy who doesn't care about his basketball layup, his soccer kicking, nor his Frisbee throw. His teachers have said that he has the same attitude about math, science, and writing. (FG Teacher F, interview)

Other teacher-participants had comments regarding student success with FG Teacher F explaining the following in the interview:

> There are always a couple kids that don't try or put for the effort. This one kid is so lazy and unmotivated; it's weird. Sometimes for some reason they might do better, but for the most part (referring to less athletic kids), their attitude or will to do better just isn't there, so, I try to be positive and say that you'll do better next time; and, . . . those in sports, and most other kids as well do OK in PE and learn how to do skills and play games. Most kids do really well, it's just a few that

> seem to struggle from the beginning . . . which grows by a couple kids each year; and . . . you can see these same kids sit around at recess and generally not the active type. They are usually bigger kids and sometimes awkward in PE and really don't care that much. Good is good enough. Again, I don't blame them . . . it's hard for some kids to run around the track without stopping or walking; and, then the athletic kids can run easily and try hard each time.

Comments were recorded that evaluated the AABI run and offered suggestions for improvement. One teacher-participant stated this positive remark in an interview, "I found that I could be with some students because we were all doing it together . . . that was nice that I could be anywhere, not just at the finish line" (AABI Teacher B, interview). Comments regarding the AABI format continue with the following:

> [The] time was too long for the first time runners (first AABI attempt) and still a little long for most students (second AABI attempt) (AABI Teacher A, interview); time seemed long but no one really complained; and . . . 15 minutes was much longer than I thought and I think for the kids as well (AABI Teacher B, interview).

In addition, suggestions on the AABI format were made with these comments:

> There should be eight colors on the rainbow, not seven. It would be easier to convert to a mile that way. Several kids ran the entire card and needed to repeat the card again, maybe if they do that they should just stop...or have more colors. (AABI Teacher B, interview)

Teacher-participants who facilitated the AABI run commented on future plans by stating the following:

> I am going to continue this style of practice run but drop the time limit to 10 minutes and see how the scores compare. I am looking forward to building on the 15-minute walk/run idea. Can I keep the rainbow cards? I want to use them with my younger kids...and to start slow. (AABI Teacher A, interview)

And finally, when asked about the future, during the interview one teacher-participant stated:

> [Our school] has a strong PE emphasis and things haven't changed much over the years. Sure online games have had an impact with after school stuff, but for the most part things are the same. We have added more things to teach and pay more attention to the standards, . . . so many hours per week, but kids are the same and need PE every day, which most are getting. (FG Teacher F, interview)

Several sub-themes emerged under the main theme of student performance outcomes. Comments related to student success included teacher-participants' perceptions about student effort or lack of and wanting to try hard, emotions of nervousness and excitement, and examples of how experience and learning had an impact on improving performance. Suggestions for improvement and evaluations of the AABI aerobic assessment were provided. And finally, future plans and strategies were shared.

Summary of RQ 3 Findings

Teacher-participants contributed qualitative data surrounding student behaviors observed during pretest and posttest aerobic assessments. Data were collected through field notes, online blog, interviews, and follow-up member checking. Three major themes emerged that affected student performance outcomes: external influences, preparation for the run, and student behaviors. Examples of external influences include changing the environment, teachers cheering, and weather and track conditions. Preparation for the run include past practices and student experience. Student behaviors included emotions such as nervousness and excitement, and attitude about caring and trying hard. Teacher-participants were mostly pleased with the student performance outcomes with most students giving a good effort to improve.

Qualitative data collected from teacher-participants clearly gave insight and categorically described “student behavior characteristics during an aerobic fitness assessment”, which was the main research question. However, the sub questions were not answered adequately. The sub questions were:

1. Are there differences in perceived student motivation and effort during an aerobic assessment based on improvement as compared to an assessment based on performance standards?
2. To what extent do student behavioral characteristics change after the first assessment attempt as compared to the last attempt?

There were no comments from the teacher-participants that would indicate that there were differences in motivation and effort between groups; and there were little to no distinguishable differences in student behavioral characteristics between the pretest and posttest assessments.

Mixed Methods Results

This concurrent mixed methods research study examined and compared fifth-grade students' physical activity self-efficacy while engaged in either the FG 1-mile or AABI aerobic assessments. Quantitative data were collected from students through pretest and posttest administration of the SEPAQ survey that measured student physical activity self-efficacy and through pretest and posttest scores on either the FG 1-mile or AABI that measured and assessed student performance. Qualitative data were collected from teacher-participants that were asked to comment on student effort and motivation during the aerobic assessments. Triangulation of the quantitative and qualitative data strengthened the findings and gave greater insight into the phenomena under study (Creswell, 2012). Greater understanding about student motivation and effort during aerobic assessments was gained through the collection, analysis, and triangulation of data during this research.

Summary of Overall Findings

Quantitative and qualitative data were collected to answer research questions related to students' physical activity self-efficacy during two modes of aerobic assessments. This section presents the findings of the data analysis. There were three main research questions that my study addressed.

RQ1: Will student performance scores from the FG 1-mile and AABI aerobic assessments improve from the pretest to the posttest? In other words, does the aerobic assessment affect student performance scores? Student performance was analyzed in two ways, the number or percentage of students who improved their scores (time or distance) and by measuring the amount of individual improvement by calculating "percent improvement." There were mixed findings regarding student performance when comparing the FG 1-mile and AABI aerobic assessments results. Descriptive calculations found similar results from the FG 1-mile and AABI aerobic assessments with 70% and 73% of the students tested improving their scores respectfully. For the FG 1-mile aerobic assessment, 72% of the boys and 68% of the girls improved their performance scores. For the AABI assessment, 71% of the boys and 74% of the girls improved their performance scores. To sum the gender differences, the boys improved about the same, 70 and 71%, whereas, the improvement of the girls' performance scores was different. The FG 1-mile girls' improvement was less than the FG 1-mile boys, whereas, the AABI girls' improvement was higher than the AABI boys' percent and far greater than the girls' FG 1-mile results with 68% and 74% of the girl students improving their scores respectfully (Table 27). This difference in gender improvement and mode of assessment is noteworthy and yet, not part of the hypothesis testing. From these results alone, the null hypothesis is accepted; the percentage of students improving their performance from pretest to posttest attempts was similar and not significantly different between groups. However, there was a significant difference between groups when performance scores and percent improvement were compared. The FG group had insignificant results (p = .093), whereas, the AABI group had significant results (p = .001) when examining pretest and posttest results. In addition, percent improvement results indicated that the FG group slightly improved their performance with an overall score at 1.49% improvement. In contrast, the overall performance score for the AABI had 22.53% improvement. For the FG 1-mile, the boys' percent improvement was 10.8%; however; the girls' percent improvement was a negative value at -7.56%. In other words, the girls' posttest performance was about 7% slower when compared to the pretest attempt. The AABI boys' and girls' percent improvement were similar with 22.92 and 24.21% improvement respectfully (see Table 28).

Table 27

Student Percentage that Improved Performance: Gender and Group Comparison

Run type	*N*	Percent that improved
FG		
Boys	67	72%
Girls	69	68%
Total/Cum	136	70%
AABI		
Boys	108	71%
Girls	103	74%
Total/Cum	211	73%

Table 28

Percent Improvement: Gender and Group Comparison

Run type	N	Percent improvement
FG		
Boys	67	10.80%
Girls	69	-7.56%
Total/Cum	136	1.49%
AABI		
Boys	108	22.92%
Girls	103	24.21%
Total/Cum	211	22.53%

In summary, the percent of students that improved their performance was about the same for both FG and AABI groups with some differences between genders. The pretest and posttest scores did not improve significantly for the FG group; however there was significant improvement for the AABI group, with 1.49% improvement for the FG group and 22.56% improvement for the AABI group. Likewise, there were significant differences between genders with boys improving their scores on the FG 1-mile 10.8% and 22.92% on the AABI aerobic assessments; whereas, girls on the FG 1-mile had a negative improvement value of -7.56% on the FG 1-mile and girls' scores improved 24.21% on the AABI aerobic assessments. From these findings, the null hypothesis was rejected and the alternative accepted; H_a2: There was a difference in student performance scores between the FG 1-mile and AABI aerobic assessments pretest and posttest attempts.

RQ2: Does the aerobic fitness assessment focus affect student physical activity self-efficacy beliefs? In other words, was there a difference in pretest and posttest self-efficacy beliefs after the aerobic assessments and were these results different for the FG and AABI groups? Students completed the SEPAQ survey before and after the aerobic assessments to measure student's physical activity self-efficacy. There were mostly insignificant findings ($p < .05$) from the data collected regarding student's physical activity self-efficacy beliefs. Most of the questions on the survey for both groups had insignificant results with a few exceptions of significant ($p < .05$) findings connected to 30 and 60 minutes bouts of moderate–to-vigorous exercise intensity from the FG group (Tables 16 and 17). However, there were strong patterns that indicated students' physical activity self-efficacy scores did slightly increase from the pretest measurement with a greater indication of improvement by the FG group. There were significant differences between genders with boys scoring higher on all survey question sets than girls from both FG and AABI groups (Table 18). Although a positive pattern was found from students' physical activity self-efficacy results, the null hypotheses for this research question must be accepted; $H_0$1**:** Participation in the FG 1-mile aerobic assessment will result in no difference in student physical activity self-efficacy belief levels on the pretest and posttest results, and, $H_0$2**:** Participation in the AABI aerobic assessment will result in no difference in student physical activity self-efficacy belief levels on the pretest and posttest results.

RQ3: What are student behavior characteristics during an aerobic fitness assessment? Teacher-participants were asked to give their perceptions about student effort and motivation during the FG 1-mile and AABI aerobic assessments. Their comments were coded and categorized into four themes: external influences, run preparation, student behaviors, and student performance outcomes. From the teacher-participants' comments, there were no differences in perceived student motivation and effort between FG and AABI groups. Teacher-participants were evenly concerned about external factors such as the track and weather conditions, described their methods to prepare students, and shared past and current practices. Comments about student behaviors included thoughts about motivation, effort, caring, excitement, as well as, external methods to motivate students to perform well. Student performance outcomes comments were related to student success or not, evaluation of the AABI assessment and suggestions for improvement, and future plans and strategies to motivate students. Although these comments gave insight to student motivation, there were no differences in teacher-participants' comments that would indicate the aerobic assessment made a difference with student performance. Likewise, comments did not differ from students' pretest or posttest attempts. There were comments about the weather, preparation, student behaviors, and student success for both assessments and about both pretest and posttest attempts. The sub questions include:

1. What are the differences in perceived student motivation and effort during an aerobic assessment based on improvement as compared to an assessment based on performance standards?
2. To what extent do student behavioral characteristics change after the first assessment attempt as compared to the last attempt?

There were no differences between teacher-participants from the FG or AABI groups regarding their perceptions about student behaviors during either aerobic assessment.

Evidence of Quality

Data regarding student physical activity self-efficacy during an aerobic assessment were collected and analyzed from three difference sources, a student survey, student performance, and teacher-participation perceptions regarding student behaviors during an aerobic assessment. Creswell (2012) suggests that a variety of methods to collect data increase reliability and accuracy of the results. The research design, data collection protocols, and analyzing techniques followed established procedures through all phases of the research effort to ensure that the findings were valid, reliable, and trustworthy. In addition, appropriate procedures were followed as directed by the IRB to ensure student and teacher-participant confidentiality.

Physical Activity Self-Efficacy Assessment

The SEPAQ student survey quantitatively measured physical activity self-efficacy beliefs before and after the FG 1-mile and AABI aerobic assessments. The SEPAQ student survey was a pre-established instrument previously verified as reliable by Campbell (2012). A modified version was used with only two domains (during and after school) that made the SEPAQ student survey appropriate for fifth-grade students. Previous discussion about the SEPAQ student survey questioned the consistency and discriminatory nature of the student answers with several students answering with all 10s on the 20 questions provided. Cronbach's alpha coefficient is the most common method to measure internal consistency when using a Likert-type scale (Laerd Statistics. (n.d.a). Table 29 shows that both FG 1-mile (a = .908) and AABI (a = .946) groups had strong coefficient relationships indicating that the survey answers were consistent and reliable. Similarly, the survey findings reflected expected results with mean scores decreasing as intensity and duration increased. Although the findings were not significant, a clear pattern was evident indicating that the survey was consistent and able to measure students' physical activity self-efficacy pretest and posttest differences. And finally, girls' scores were significantly lower than boys' scores on all question sets, which supports the review of literature surrounding girls by Pearson et al. (2015) who reported similar gender differences related to motivation and physical activity self-efficacy. From these measures, the SEPAQ student survey was verified as valid, reliable, and trustworthy.

Table 29

SEAPQ: Cronbach's Alpha (a) Coefficient

Run type	Cronbach's alpha	N of items
FG	.908	20
AABI	.946	20

Note. A reliability coefficient of .7 or higher is considered acceptable (UCLA Institute for Digital Research and Education. n.d.)

Aerobic Assessments

Student performance was measured through two different modes of aerobic assessments. The FitnessGram® 1-Mile Run is a pre-established instrument used nationally in schools to measure youth aerobic fitness. According to Cooper Institute (n.d.a), "It is a health-related youth fitness assessment that uses evidence-based standards to measure the level of fitness needed for good overall health." The FG 1-mile aerobic assessment is based on pre-established grade level standards that students strive to meet during fitness testing bouts. The 15-Minute Aerobic Assessment Based on Improvement (AABI) was introduced for this research and is an original method to measure student aerobic fitness. The AABI scores were based on student performance improvement from pretest to posttest bouts. The FG 1-mile was compared and contrasted to the AABI results with no noticeable differences in student behaviors as perceived by teacher-participants between the two modes of assessment. Similarly, the percent of students who improved from pretest to posttest bouts were nearly identical (FG = 70% and AABI = 73%) indicating the assessments were analogous. This consistency between aerobic assessments qualifies the AABI aerobic assessment to be valid and reliable measurement tool. Furthermore, this consistency strengthens the FG 1-mile and AABI percent improvement findings that showed significance difference in student performance between the two modes of aerobic assessments. Teacher-participants reported that they were consistent (same as past practices), followed appropriate testing procedures, and made sure to record student scores accurately. The two modes of aerobic assessments provided high quality results that are reliable and trustworthy.

Teacher-Participant Student Behavior Perceptions

Six physical education specialists were asked to observe students' behaviors during either the FG 1-mile or AABI aerobic assessments and to record their perceptions about student effort and/or motivation after a pretest and posttest bout. Teacher-participants had close proximity to students and experience to decipher comments and attitudes. Teacher-participants were asked to record their immediate reaction by using field notes, submit additional comments via an online blog, and were interviewed to gain additional data and insight about student behaviors. Data were organized and categorized to identify themes related to students' effort, motivation, and performance during the aerobic assessments. Teacher-participants were asked to verify comments, check for accuracy, and confirm the context of their statements in the results narrative. Teacher-participants were given the opportunity to review data, results narrative, and to make corrections to improve accuracy. The amount of comments submitted was plentiful and similar between teacher-participants and groups with one person not as engaged as the others. Unabridged teacher-participant transcripts that include interview summaries, online blog entries, and field notes about student motivation and effort are located in Appendix I.

Outcomes

The analysis of the qualitative and quantitative data provided a triangulated description of student motivation and effort while comparing two modes of aerobic assessments. Student motivation and effort during aerobic assessments are related to physical activity self-efficacy beliefs (Gao et al., 2011; Gao et al., 2008b; Ning et al., 2012; Standage et al., 2012) and considered a predictor of youth physical activity (Gao, Lee, & Harrison, 2008b). Student motivation and effort were measured through pretest/posttest performance scores on either the FG 1-mile or AABI aerobic assessment. Student physical activity self-efficacy beliefs were measured through the SEPAQ student survey. Teacher-participants provided their perceptions about student behavior and performance.

Students' percent improvement on the pretest and posttest performance results on the AABI (22.56%) when compared to the FG 1-mile (1.49%) overwhelmingly and significantly demonstrated higher student motivation and effort during the AABI aerobic assessment. The differences between the FG 1-mile and AABI aerobic assessments were even greater when gender was desegregated with AABI girls' percent improvement at 26% and boys 21% while the FG girls' had a negative percent improvement value of -7.5% and FG boys had 10.8% percent improvement (see Table 30). Similarly, 74% of the AABI girls improved, whereas, 68% of the FG girls improved. These findings are consistent with previous research that found interventions to increase physical activity were more successful with girls than with boys (Yildirim et al., 2011). From these results, the AABI style of measuring aerobic fitness based on individual improvement increased student effort and motivation to perform better on the posttest than the FG 1-mile aerobic assessment.

Table 30

Percent Improvement and Student Improvement Percentage Comparison: FG 1-mile and AABI Groups

Aerobic assessment type	Girls	Boys	Overall
FG			
Percent improvement	-7.56%	10.80%	1.49%
Improvement percentage	68%	72%	70%
AABI			
Percent improvement	24.21%	22.92%	22.56%
Improvement percentage	74%	71%	73%

Note. 'Percent Improvement' calculations are the average percent individuals improved on their pretest-posttest performances. 'Improvement Percentage' calculations are the percent of students that improved their pretest-posttest performances.

The results from the SEPAQ student survey revealed a consistent pattern of increasing physical activity self-efficacy beliefs. Self-efficacy increases with repeated positive experiences, however, it is unknown as to how much or how long for these experiences to take effect (Arslan, 2012). Consistent patterns of positive physical activity self-efficacy growth were clearly evident in the FG group. Similar to research conducted by Gao et al. (2011), the FG student survey had significant results surrounding moderate-to-vigorous physical activity levels. The results of the SEPAQ student survey for the AABI group were not as strong, which makes sense due to the newness and uncertainty of the aerobic assessment. The AABI aerobic assessment involved only two bouts of testing, and it would be reasonable to expect smaller increases in physical activity self-efficacy due to the limited exposure to a different mode of testing.

The SEPAQ student survey reflected a difference between the girls' and boys' physical activity self-efficacy beliefs. The results indicate that students' confidence in engaging physical activity was improving with boys' scores significantly higher than girls' scores on the survey. These findings support previous research indicating girls' physical activity levels and self-efficacy beliefs are different than boys' physical activity beliefs. Boys are more active during physical education than girls (Smith et al., 2009; Yildirim et al., 2011) and have stronger enjoyment, motivation, and physical activity self-efficacy beliefs (Dzewaltowski et al., 2010; Harmon et al., 2014; Pearson et al., 2015); whereas, girls prefer having assessment choices and enjoy social interaction more than boys (Biddle et al., 2014b; Metcalf et al., 2013; Wilkinson et al., 2012). The positive effect on physical activity self-efficacy beliefs by participating in an alternative aerobic assessment activity was significantly greater for girls than for boys.

Teacher-participant comments revealed that test conditions were equivalent between groups with similar external influences, student behaviors, and words of encouragement offered during the assessments. Indeed, the overall percent of students that improved were similar with 70% for the FG 1-mile aerobic assessment and slightly higher 73% for the AABI aerobic assessment group. Teacher-participants also noted that the AABI aerobic assessment needed more practice at shorter periods of time before the 15-minute pretest attempt. These comments mirror the FG teacher-participant comments related to preparation and the need to start students early (first grade) at shorter distances to gain experience before the actual mile run assessment. Teacher-participants provided appropriate opportunities for students to improve on their respective aerobic assessments with the AABI group performing significantly stronger than the FG group.

Conclusion

The FG 1-mile protocol measures how fast students perform for a predetermined distance (one mile), whereas, the AABI measures how far students perform for a predetermined duration (15 minutes). Students are attempting to make an established time standard during the FG 1-mile aerobic assessment, whereas, during the AABI aerobic assessment students are trying to improve from previous attempts. The FG teacher-participants said that although the “standards” for fifth grade students were mentioned, students were similarly asked to “improve” their time from pretest to posttest with little emphasis on achieving the standard at that time. Students know that there is a standard for fifth grade students to achieve in the spring during fitness testing. Teacher-participants indicated that the mile was a long distance for most students and similarly commented that 15 minute was a long time and difficult to manage at first. Students were equally engaged in traditional physical education learning activities between pretest and posttest aerobic assessment attempts.

The essential question must be asked when all the external factors are equable, why did the students from the AABI group improve so much more than the students from the FG group? First, the AABI aerobic assessment is based on individual improvement rather than a FG 1-mile pre-established standard for all fifth grade students. Gao et al. (2011) found that motivation to engage in physical activity decreases when the task is perceived to be too difficult. As indicated by the teacher-participants, the mile is challenging, comes with a problematic standard, and most likely perceived to be difficult by most students as indicated by the percent improvement results. Physical activity self-efficacy beliefs, motivation, and effort are connected (Gao et al., 2011; Warner et al., 2014), increased when the experience is positive (Arslan, 2012; Lewis et al., 2016) and goals achievable (Parschau et al., 2014). Although the overall improvement percentages were similar, the AABI students demonstrated greater effort and motivation to improve their score as indicated by the percent improvement results. Perhaps 15 minutes became more manageable and the aerobic assessment more doable. Gao et al. (2011) reported elevated student self-efficacy beliefs predicted moderate-to-vigorous exercise intensity levels during physical education classes. Furthermore, moderate-to-vigorous exercise intensity has the strongest correlation to benefits derived from aerobic fitness and daily physical activity (Lees & Hopkins, 2013). In this study, increased physical activity self-efficacy beliefs encouraged greater effort on the AABI as compared to the FG 1-mile aerobic assessments. In conclusion, it can be deducted that student physical activity self-efficacy and motivation to improve their aerobic assessment performance were higher, experience more positive (colorful cones to pass), and individual goals were perceived to be more achievable during the AABI aerobic assessment. In summary, those that tried hard to improve their performance, tried significantly harder during the AABI as compared to the FG 1-mile aerobic assessment.

Data Analysis Results Summary

Fifth grade students' physical activity self-efficacy and performance improvement, and teachers' perceptions about student behavior, effort, and motivation, were collected, statistically manipulated, coded, and analyzed during two modes of aerobic assessments through a mixed methods, concurrent, quasi-experimental research design. Fifth grade students and their physical education teachers from five schools were invited to join this study regarding two aerobic assessment styles and to examine the affect that these styles have on student physical activity self-efficacy. The FG 1-mile aerobic assessment is based on pre-determined standards and the current method used nationally and locally to measure student aerobic capacity. The AABI aerobic assessment based on personal improvement was introduced as an alternative style of measuring aerobic fitness. Students provided quantitative data regarding physical activity self-efficacy beliefs through the SEPAQ student survey taken before and after the aerobic assessments. Descriptive statistics, bivariate analysis (*t*-test) and percent improvement calculations were determined from student performance scores during two modes of aerobic assessments. Teacher-participants who administered the aerobic assessments and contributed their perceptions regarding student behaviors, effort, and motivation during the aerobic assessments provided qualitative data. Qualitative data were coded and categorized into four themes. The number of participants, consistency of the data gathering procedures, reliability of the self-efficacy survey, and teacher comments and insight were critical components to ensuring trustworthy results.

Significant outcomes were found when comparing student performance on the FG 1-mile and AABI aerobic assessments. Students significantly improved their performance on the AABI as compared to the FG 1-mile aerobic assessment. Students were more motivated and gave greater effort on the AABI and improved 22.56% overall, whereas the FG group improved 1.49% on the assessment. In addition, the girls benefitted from the intervention of an alternate aerobic assessment significantly more than the boys with greater gains in performance improvement. The SEPAQ student survey supported these findings with a partially significant and consistent pattern of physical activity self-efficacy growth indicating progress toward improving confidence in engaging in physical activity during and after school. The differences between boys and girls on the SEPAQ student survey were significant with boys demonstrating higher levels of physical activity self-efficacy beliefs than girls. Teacher comments indicated that testing conditions were similar for both aerobic assessment groups.

The findings from this research are significant and needs to be shared with others. The process of initiating change in physical education requires a plan that informs and energizes teachers, and the outcomes from the workshop need to be sustainable for the future. The proposed 3-day workshop for physical education specialists, administrators, and others connected to youth fitness and training would be the best method of delivering the results from my study and initiating change in how students are aerobically assessed. Likewise, an ongoing practice of using an aerobic assessment based on individual improvement needs further examination and verification from others. *The Rainbow Run Workshop* is introduced in Section 3 to inform educators about the results from my study and to initiate change in how to assess youth aerobic fitness.

Section 3: The Project

Introduction

As described in Section 1, the purpose of this study was to examine and compare the effect of two modes of aerobic assessments on student physical activity self-efficacy, motivation, and effort. The local problem surrounding students failing to meet the FG 1-mile run standard for aerobic fitness was established with about one third of the students tested at either the "needs improvement" or "high risk" categories of cardiovascular fitness (CDE, 2015). Likewise, about the same percentage of students were categorized as obese with high body composition scores. In addition, researchers found that students did not like running the mile and made efforts to avoid participating in the assessment event (López-Pastor et al., 2013). The benefits of becoming physically active and aerobically fit were discussed and illustrated the need to teach physical education in schools. The connections between aerobic fitness, obesity, school academic performance, brain growth, physical and emotional health, and overall wellness were presented in Section 1.

Section 2 explained the mixed methods concurrent research design and described the local problem for this study. Pretest and posttest quantitative data were collected from students that measured physical activity self-efficacy beliefs through a survey. Concurrently, aerobic fitness performance scores were recorded. Data from the survey was examined using descriptive statistics and compared using a *t* test while percent improvement calculations were used to compare and analyze performance data. Qualitative data were collected from teacher-participants who submitted their comments and perceptions about students' effort and motivation during the aerobic assessments. Teacher-participant comments from a blog and follow-up interviews were used to compare student behavior, motivation, and effort during the aerobic assessments. The results of the quantitative aerobic assessments were significant with the student survey and teacher-participant comments supporting the findings. The triangulated data suggests that an alternative style to measuring student aerobic fitness needs to be considered due to the impact of these assessments on students' physical activity self-efficacy beliefs and demonstrated motivation to improve their aerobic assessment performance.

Section 3 presents a professional development (PD) plan that includes content to further understand the results, findings, and implications of this study. This section will introduce a 3-day PD, called The Rainbow Run Workshop that will inform participants of the study with suggestions for implementation and use of appropriate practices in physical education. This section includes the project goals and learning outcomes, review of literature surrounding PD in physical education, workshop activities schedule and timeline, implementation plan, and evaluation method. And finally, the impact and implications from attending the workshop culminates this section.

Purpose and Goals

The purpose of my PD project is to deliver information about pertinent research related to aerobic assessments. In addition, The Rainbow Run Workshop will strive to empower physical education teachers and others to experiment with different instructional approaches that build students' physical activity self-efficacy. The main focus and ultimate goal of the PD project is to introduce and promote the protocols and procedures involving the AABI aerobic assessment, commonly called the *Rainbow Run*. In addition, information about exercise physiology, youth aerobic training, and exercise psychology related to physical activity self-efficacy and motivation are explored and presented.

Learning Outcomes

Understanding the importance and impact of purposely building student physical activity self-efficacy beliefs at a young age is the most important and critical outcome from the PD project. Early childhood experiences in physical education greatly affect student feelings of competence and worth that impacts physical activity as adults (Cardinal, Yan, & Cardinal, 2013; Jones et al., 2013; Lewis et al., 2016). Subsequent research has verified that providing positive physical activity experiences at a young age is critical to developing life-long habits of healthy physical activity behavior (Abadie & Brown, 2010; Jones et al., 2013). Understanding the role of aerobic fitness in the physical education curriculum and the connection between academic achievement, brain growth, and emotional and physical health are additional outcomes from the PD project. How to use fitness data to measure students' aerobic fitness improvement and progress are take-away and practical outcomes from this PD experience. Similarly, the understanding of physical education teachers regarding health related exercise programing has been found to be lacking with limited training in this content area. Consequently, how to increase health related exercise during lessons to increase aerobic fitness would be infused throughout the workshop. And finally, learning about motivation and factors that influence physical activity self-efficacy beliefs are the final pieces to this PD project.

Target Audience

The target audience for the 3-day Rainbow Run Workshop includes physical education educators, elementary school educators who are responsible for teaching physical education, youth coaches and sport trainers, and physical fitness instructors and providers. The local problem of youth inactivity, obesity, and poor aerobic fitness scores is well documented in Section 1. The local problem is also a systemic problem and public concern with similar issues and phenomena, thus the broader audience selection goes beyond public school personnel. This workshop plan is designed for 30 participants that will be recruited from Northern California.

Rationale

The 3-day Rainbow Run Workshop for physical education educators and others will provide the means to learn new subject matter content about aerobic fitness testing and the opportunity to share information, strategies, and best practices surrounding building positive physical activity self-efficacy beliefs. The PD literature review explains how effective workshop presentations increase content knowledge while motivating participants to change their approach to benefit student learning. The findings from the study in Section 2 are significant and offer an alternative method to assessing aerobic fitness that increases student physical activity self-efficacy beliefs and motivation to improve aerobic assessment performance. Improving aerobic fitness and participation in physical activity is a physical education national standard (SHAPE, n.d.e) and of interest to physical education educators, administrators, parents, and beyond.

As an instructor in kinesiology and student teacher supervisor in the School of Education, engaging in PD activities, maintaining current content and pedagogical knowledge, and establishing relationships with local schools and teachers as a professional resource are common expectations of my position at the university. Elliot and Campbell (2015) suggest that partnerships between schools and universities need to support teacher lifelong learning through purposeful PD opportunities that initiate *change* in physical education. Of course, the change mentioned is the challenge of increasing student, and eventually adult, daily physical activity. This change in human behavior is the problem addressed in this study, a problem that is systemic and ongoing. Section 1 contains the review of literature and issues surrounding sedentary life choices, obesity epidemic, and health-related consequences; Section 2 recommends an alternative mode of aerobic testing based on individual improvement. According to Parker, Templin, and Setiawan (2012), "much of the promise of educational reform resides in the positive partnerships or relationships between schools and universities" (p. 32). Elliott and Campbell concluded that a stronger partnership between schools and universities to support "building capacity and life long learning toward a sustainable transformational change" (abstract) is needed in physical education. No doubt the current trend is to embrace the school-university partnerships when it comes to PD and professional learning in physical education (Parker et al., 2012; Patton, Parker, & Neutzling, 2012); however, the contact is often limited to conferences and workshops due to limited time available for both the teachers and university personnel (Hastie, MacPhail, Calderón, & Sinelnikov, 2015). The proposed Rainbow Run Workshop has two days scheduled during the summer with only one day scheduled during the school year to avoid the limitation of taking time from work during the school year. Similarly, the Kinesiology Department and School of Education welcome collaboration with schools and educators and promote partnerships in the community.

Review of Literature

Introduction

Professional development in physical education is explored in this section with a thorough review of literature. The purpose of PD, types of PD offered in physical education, and effectiveness of PD experiences are the topics of this discussion.

Search Strategy

The amount of peer-reviewed articles surrounding physical education PD was limited with the need to use research that was more than five years old to fulfill an adequate and saturated search of this topic. There is a gap in the literature that connects PD engagement to student learning and outcomes (Guskey & Yoon, 2009). Similarly, according to Patton et al. (2012), “no study has exclusively focused on PD leaders [facilitators] in physical education” (p. 523) before their study was completed. In order to be thorough and comprehensive, this literature search included articles from 2002 through 2015 due to the lack of current physical education PD research. The literature search was conducted through Walden University Library using the databases from ERIC, SAGE, Educational Research Complete, EbscoHost, and ProQuest Central.

Boolean search terms included but were not limited to the following: *physical education, professional development, fitness training, exercise science, pedagogy,* and *adult learning.*

Purpose of Professional Development

The purpose of PD in physical education is to continue building upon educators' content knowledge, pedagogy skills, and experience. PD activities present specific and current information, consider the context, and help teachers become *change agents* by providing quality physical education experiences to their students. Centeio and Castelli (2011) explained how PD impacted teachers' effectiveness: "Because these individuals adopted the role of change agents, students increased their daily physical activity engagement, physical fitness, and self-efficacy toward being physically active" (p. 1). In addition, experts contend that for true and real change to occur, teachers must view themselves as learners and to be willing to try something new (Makopoulou & Armour, 2011). Furthermore, effective PD experiences should focus on transforming teacher beliefs, values, and skills by presenting new knowledge relevant to teacher needs while engaging teachers actively and collaboratively (Darling-Hammond & McLaughlin, 2011; Poekert, 2011). Aelterman et al. (2013) agreed with making PD content relevant while including theoretical knowledge and research and found that teachers "highly value opportunities for active participation, collaboration, and experiential learning" (abstract). Casey (2013) reported that effective PD includes both theory and practitioner research to stimulate teacher reflection and professionalism. Indeed, becoming aware of issues in physical education, such as the role of responsibility-based instruction, can bring change in teacher strategies that positively impact students (Hemphill, Templin, & Wright, 2015). PD especially needs to be contextualized and relevant to meet the personal and professional needs for those who have demonstrated the lack of self-initiated and self-funded PD participation (Casey, 2013; Kelly, Bluestone-Miller, Mervis, & Fuerst, 2012; Makopoulou & Armour, 2011). The validity of the content and the perceived value of the information gained from trainings has been shown to be an important factor to ensure effective PD outcomes (Awais Bhatti, Ali, Mohd Isa, & Mohamed Battour, 2014). Effective PD requires the facilitator to provide relevant and theoretical content, opportunity to collaborate and socialize, and opportunity to experiment and try something new to increase student learning.

Types of Professional Development

There is some debate as to the best method of conducting PD in the field of physical education. Professional conferences, summer institutes, and workshops are the typical styles with online blogs through SHAPE professional memberships gaining popularity (SHAPE, n.d.f). Similarly, plentiful professional peer-reviewed journals are available to stay current in the field of physical education. According to Makopoulou and Armour's (2011) work related to physical education PD, the most effective type of PD experiences for practicing physical educator teachers are uncertain and still need to be determined. Traditional PD involves attending a state or national conference sponsored by SHAPE (n.d.c) and associated organizations. One-day PD opportunities often provide impromptu and short-lived support groups and spontaneous conference communities that provided teachers an anticipated outlet and opportunity to talk with peers from other areas (Casey, 2013). Indeed, physical education teachers who attended short-term PD experiences have had success and immediate results with an increase in teacher performance and student engagement time (Derri, Vasiliadou, & Kioumourtzoglou, 2015). Aelterman et al. (2013) summed up the typical PD experience for educators in physical education at conferences by stating:

> [T]eachers are given the opportunity to update their knowledge and skills through the dissemination of applicable information by experts in the field, that is, a motivational psychologist and a university teacher in PE pedagogy. Furthermore, along the training there is room for active participation and collaborative activities, such as (spontaneous) conversations with colleagues and like-minded peers from other institutions, and microteaching, which allow teachers to reflect on their own and others' practice and to learn from each other. (p. 74)

Even though the 1-day workshops can quickly and successfully provide new content information and skills, summer institutes and workshops seem to be more effective. Guskey and Yoon (2009) explain,

> A lot of workshops are wasteful, especially the one-shot variety that offers no genuine follow-up or sustained support. But ironically, *all* of the studies that showed a positive relationship between professional development and improvements in student learning involved workshops or summer institutes. These workshops focused on the implementation of research-based instructional practices, involved active-learning experiences for participants, and provided

> teachers with opportunities to adapt the practices to their unique classroom situations. (p. 496)

Professionals in physical education have PD choices that include attending conferences, summer institutes, workshops, and access to peer-reviewed journals to gain and refresh content knowledge and pedagogy skills.

Professional Development Effectiveness

There have been mixed results and limited research published regarding the effectiveness of PD in physical education. Guskey and Yoon (2009) found that "sound, trustworthy, and scientifically valid evidence on the specific aspects of professional development that contribute to such improvement [student learning] is in dreadfully short supply and that dedicated efforts to enhance that body of evidence are sorely needed" (p. 498). Measuring student learning in physical education is the challenge. Kulinna (2012) reported that teachers who participated in a year-long study regarding a PD program to improve student physical activity levels and cognitive knowledge were successful and had significant findings; however, both the experimental and control groups became more physically active with little difference between the groups. Hagood (2007) reported that students' fitness scores in fourth and fifth grades improved in three of the seven categories (push-up, trunk lift, and mile run) and physical activity time increased after teachers engaged in PD activities.

Literature surrounding PD suggests that the information gained from trainings does not always improve job performance (Awais Bhatti et al., 2014), and that a performance-based approach to PD can be an effective method to ensure motivation to implement changes (Kazbour, McGee, Mooney, Masica, & Brinkerhoff, 2013). In this PD project, changes in how teachers assess aerobic fitness are performance-based, especially during the training and facilitating of the Rainbow Run aerobic assessment. Teachers are more inclined and motivated to use a new approach when they observe student success (Guskey, 2002). The findings of the research found that those students who tried to improve did so significantly by 22.5% of their previous effort. This increase in effort should be motivating to teachers to try a different approach when it comes to preparing for and assessing aerobic fitness. Although in physical education student learning can be measured in many ways, aerobic fitness is the only measurement that has been connected to academic achievement, and mental and physical health (Rasberry et al., 2011). There is a lack of ongoing research that links PD activities to student performance and achievement. Guskey and Yoon explained in their review of PD in physical education, "…this research synthesis confirms the difficulty of linking professional development to specific student achievement gains despite the intuitive and logical connection" (p. 498). In other words, more effort is needed to connect physical education PD activities to student learning and measureable outcomes. Patton et al. (2012) summed up the purpose of PD in physical education by stating the following:

> Where traditional PD often takes the form of one-shot workshops with a singular focus on content and leaders are hired largely on the basis of their content expertise, facilitators in this study identified the acquisition of content as only a starting point to fostering success and teacher change. (p. 530)

The intent is to promote and inform physical education professionals about the Rainbow Run and associated study findings through a 3-day research driven workshop.

Project Description

Introduction

The Rainbow Run that measures aerobic fitness is an original assessment created for this study. Sharing the results and information from my study regarding physical activity self-efficacy and aerobic assessments will be the focus and fundamental goal of this 3-day workshop. Indeed, students were clearly more motivated and gave greater effort on the Rainbow Run (22.53%) as compared to the traditional FG 1-mile (1.49%) method of measuring aerobic fitness. Participants will learn about the Rainbow Run through lectures, delving into data, and through personal experience by engaging in the assessment. The intent of the Rainbow Run is to measure aerobic levels based on personal improvement while increasing confidence and physical activity self-efficacy. As described in Section 2, the AABI, or Rainbow Run, records how far an individual can travel in 15-minutes with the intent to improve the distance from the previously recorded attempt. Student success is based on personal improvement that theoretically builds positive physical activity self-efficacy beliefs in the process. Section 1 explains the four sources that form self-efficacy beliefs while Section 2 connects the theoretical framework to the findings. Significant results from this study demonstrated that student effort and motivation were elevated during the AABI style of assessment as compared to the mile aerobic assessment based on achieving a specific grade-level standard. More importantly, the Rainbow Run is inclusive of all ability levels and modes of travel. For instance, students in wheelchairs or those with mobile and/or other disabilities can participate with their peers during the Rainbow Run aerobic assessment with the same expectations to improve from their previous attempt. All students start and end together, which allows students to participate without overt comparisons; that is, students observing and knowing who was the fastest or the slowest person during the assessment. Rather, the conversation changes to, which students improved the most? The inclusive nature of the Rainbow Run was my driving force and motivation for creating this assessment.

I have used similar approaches to measure student aerobic fitness in the past and currently. In my aquatics classes, students engage in periodic 10-minute swims and report the number of laps achieved. Scores indicate that swimming technique, pacing, and/or fitness levels have improved or not through this quick assessment. Swimming a timed 500 (20 laps) assessment would be the equivalent to the mile run assessment with some students not able to complete the task and quit, others would struggle, and some with swimming experience would finish in about ten minutes or less. This dilemma of managing varying skills levels and experience at the pool led me to using a 10-minute swim as an inclusive and intuitively accurate evaluative approach with my students. Likewise, I urge pre-service students as well as student teachers in the field to use a timed 5-minute warm-up instead of "running to the fence and back" approach to engaging students in their initial aerobic activity. The last student returning from the fence is often embarrassed and will quit before finishing. I have witnessed youngsters completing the warm-up task quickly, whereas, the slower paced students finish the task while their peers wait and watch. The non-inclusive approaches affect physical activity self-efficacy as explained in Section 1. Personal performances, outside influences (peers, parents), and perceived motor/physical ability strongly impact physical activity self-efficacy and influence student engagement in physical education (Block et al., 2010; Parschau et al., 2014; van Stralen et al., 2011; Warner et al., 2014). My personal experiences and information gained through my study were the motivating forces to design an aerobic assessment that was inclusive of all ability levels. These examples of inclusive learning environments and other examples from Rainbow Run Workshop participants will be a significant part of the Rainbow Run Workshop.

It should be noted that I have a considerable amount of experience conducting workshops and planning for professional development experiences. I was the co-director of the Northern California Physical Education and Health Project (NCPE-HP), which was a subject matter project grant through CDE. We provided a 2-week summer institute and follow-up sessions for seven years. We explored current topics and issues, reviewed content in physical education and health, polished pedagogy expertise, and developed leadership skills. Each session culminated with teacher-leaders designing personal action research type activities for their local school sites. Eventually we formed an ongoing senior group of teacher-leaders who engaged in providing physical education workshops for elementary school teachers. I was the administrator of these workshops, head facilitator, and collaborated with my colleagues with planning and organizing duties involved in providing an all-day workshop. We conducted workshops for two districts over a 3-year span. This experience with conducting elementary physical education workshops demonstrated my knowledge and expertise related to content, curriculum, and instruction. My master's degree in "exercise physiology" confirms my depth of content knowledge related to exercise science and training. In addition my experience as a swim coach and training athletes of all ability levels to improve their skills and competitive performance brings a unique perspective to this workshop agenda. My coaching experience and exercise science knowledge will be beneficial when explaining training principals and appropriate practices for youth during the Rainbow Run Workshop. My professional experiences, content knowledge, and desire to make a difference in the field of physical education and students' physical activity self-efficacy beliefs reflect the potential impact and quality of this workshop.

And finally, the term rainbow has many interpretations and meanings to several groups and organizations. Not to be confused with others' logos (e.g.: LGBT, State of Hawaii, Rainbow Brite®) and yet philosophically similar in some ways, the intended meaning was that rainbows are fun, happy, bright, and inclusive of all colors and abilities. And more importantly, the scoring method, Red-5 or Purple-6, makes it hard for students to compare with others, thus intrinsically building self-efficacy beliefs by comparing improvement (e.g., how many cones did you improve?) instead of using time to compare personal performances.

Rainbow Run Workshop Components

Workshop management and design. Workshop activities will use many research-driven practices as described in the literature review. The participants will be purposely engaged as learners in collaborative and problem solving activities that intends to transform beliefs and change instructional approaches while trying something new. Fundamentally based on Bandura's (1977) social cognitive theory, the four sources that influence physical activity self-efficacy beliefs as explained by Feltz et al. (2008) will be the corner stone of the workshop content and focus. Additional research as to physical activity self-efficacy sources will not be included to simplify the presentation. While supplemental research found similar sources that influence physical activity self-efficacy, the grouping of sources was most comprehensive in the Feltz et al.'s text than associated articles (Arslan, 2012; Harmon et al., 2014; van Stralen et al., 2011; Warner et al., 2014). Small group work and socialization between participants will promote healthy encouragement and feedback. Three days of meaningful PD experiences within an academic year will increase the effectiveness of the workshop with ongoing content development, follow-up sessions providing accountability, and personal goal setting. Sessions will be participant driven to meet professional needs.

Workshop content. The content of the Rainbow Run Workshop is described in the Timeline section with further details on the PowerPoint® in Appendix A. The following is a list of academic content that will be presented in addition to the shared participants' experiences who bring rich antidotal information to the discussions.

- Bandura's social cognitive theory
- Sources of physical activity self-efficacy beliefs
- Introduction to Rainbow Run protocols
- Research design, qualitative and quantitative methods
- Data analysis, interpretation, implications

- Appropriate practices, positive learning environments, inclusive teaching strategies
- Research regarding the benefits of engaging in physical activity and aerobic fitness
- Health related exercise programming
- Exercise physiology, training principals, youth vs adult training
- Fundamental Integrative Training (FIT) program

And finally, I plan to hold a Rainbow Run aerobic assessment during each day of the workshop for the participants to experience. Learning new assessment protocols, connecting social behavior and effort to theoretical framework, and calculating personal percent improvement are attempts to contextualize the workshop content and provide an effective and sound PD experiences. The PowerPoint® presentation located in Appendix A summarizes the introduction, outlines the planned activities, formative assessment questions, and includes findings, charts, and lecture content.

Timeline

The Rainbow Run Workshop will be offered 3-days during the academic year. The first session will occur before school starts, the second session will be scheduled midway through the academic year, while the final session will occur after the academic year ends. Scheduling PD activities throughout the year has been found to be more effective than other types of PD experiences that occur over a weekend on consecutive days (Kulinna, 2012). In addition, participants will examine student and personal aerobic fitness scores, which will need time between assessment bouts in order to train and practice adequately to improve performance. Similarly, friendships, socialization, networking, and ongoing collaboration can occur while engaging in changing their approach to teaching physical education with new knowledge about aerobic fitness, exercise programming, and assessments. Full days are planned with morning snack and lunch provided. It should be noted that workshop participants will receive a "gift" set of Rainbow Run cards to use at their school (see Figure 15) and a complimentary t-shirt. See Appendix A for a detailed hour-by-hour activity plan with trainer notes and specific content for the Rainbow Run Workshop.

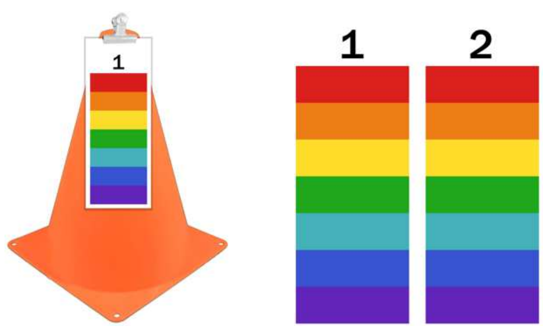


Figure 15. A set of Rainbow Run cards (1-8) will be "gifts" for the participants to take home and use with their students.

Day 1: Introduction to the workshop and Rainbow Run. The main focus of the first day will be to introduce the Rainbow Run. However, before that introduction a theoretical foundation needs to be established and common experiences with facilitating the FG 1-mile run shared. I always include an "ice-breaker" during workshops that teachers can take home and use immediately. Indeed, purposeful warm-up activities quickly engages participants, encourages socialization, introduces and/or reviews content, and allows for "late comers" to arrive before the actual presentation begins. I plan to use a cooperative activity called, “Railroad Cars” (source: unknown) that involves groups of six participants in a problem solving activity. Frankly, I remember observing this activity at a middle school while supervising a student teacher and have often used it in the past during workshops and lectures. I tried to find this activity through “Google” with no luck. Further explanation and diagram of the Railroad Car icebreaker activity can be found in Appendix J.

After a brief introduction and using the same groupings, I plan to ask teachers to chart their personal experiences with preparing students and administering the FG 1-mile aerobic assessment. Fitness testing using FitnessGram® protocols is a common experience among physical education teachers and will provide the background and rationale for my study, lecture with relevant information, and subsequent discussion surrounding student motivation and aerobic testing. Bandura’s (1977) social cognitive theory will be introduced and connected to Feltz’ et al. (2008) sources that influence physical activity self-efficacy beliefs. After learning about the Rainbow Run protocols and recording procedures, teachers will be asked to assess their students’ aerobic fitness using this alternative method according to their school’s policies. These student scores will be shared during the following workshop sessions. And finally, the workshop participants will assess their own aerobic fitness level by engaging in the Rainbow Run at the end of the day and will be asked to declare a personal training routine and to set aerobic fitness goals for the next workshop and Rainbow Run assessment.

Day 2: Rainbow Run research design, data analysis, results, and findings. The second day of the Rainbow Run Workshop will focus on my study and findings. The instant activity will begin the session with a "Scavenger Hunt" that will review math and physical education terms. Posters will be placed around the room for workshop participants to find practice math problems and to review training concepts. See Appendix K for more details about this activity and introduction to this session. Participants will learn about research design, data collection and analysis, and the findings from my study. Quantitative and qualitative processes will be reviewed with examples drawn from my study. Statistical analysis and percent improvement calculations with practice math activities will be included. The procedure used to compare the FG 1-mile run and the Rainbow Run aerobic assessment scores will be demonstrated and compared. Analyzing quantitative data and determining trends and themes from teacher comments and perspectives will be shared. The importance of triangulated data and the process of verifying results will be explained. Participants will explore possible ramifications and potential impact derived from the findings, which will be the main outcome from this day. And finally to culminate this day, participants will engage in their second Rainbow Run assessment and record personal scores.

Day 3: Research surrounding physical activity and rationale for physical education. This final workshop session will visit current research surrounding the importance and role of physical education in schools. A summary of current research will validate the benefits from engaging in physical education and the need to address aerobic fitness. This session will review the relationship aerobic fitness has with physical health and obesity, academic success, brain function and growth, and mental and emotional health. This content will add meaning and context to the effort teachers provide in assisting students' gains aerobic fitness. Teachers will share instructional methods that positively and purposely engage students in aerobic activities. Training principles about exercise intensity and duration appropriate for youth will be inserted to ensure appropriate practices are clarified. The acronym, FIT, will be introduced and reviewed with related research provided about the effectiveness of using this approach to increase aerobic fitness. "Fundamental Integrative Training (FIT) is a method of conditioning that incorporates age-appropriate strength and conditioning exercises into a well-designed lesson with the purpose of enhancing the health- and skill-related components of physical fitness" (Bukowsky, Faigenbaum, & Myer, 2014, p. 23). In addition, participants will examine student and personal Rainbow Run data while analyzing scores and performances. Student data will include past FG 1-mile performances as well as current Rainbow Run scores. Teachers will analyze their own Rainbow Run performance scores and determine percent improvement for all data sets. They will follow the same analytic process as I did by converting scores to common integers, determining the range, mean, and mode of the scores, and by calculating percent improvement. The session will begin with the final Rainbow Run assessment. Engaging teachers in the learning process of improving their own aerobic fitness, setting goals, and becoming the "student" in this process will make this experience more meaningful (Makopoulou & Armour, 2011). Delving into the data will give teachers insight to student aerobic levels, improvement, and future needs to continue progress (Holcomb, 2004). However, data driven instruction is not common in typical physical education lessons with only standardized fitness tests reported to FitnessGram® in fifth, seventh, and ninth grades. Concern about using only fitness assessments to measure student achievement in physical education had been documented with concern for authentic assessment of student learning (Leirhaug & MacPhail, 2015). To improve overall instruction there needs to be broader scope of assessments that are contextualized to improve student learning (Pella, 2012; Plowman, 2014). Discussion about appropriate practices and becoming able to contextualize fitness training and aerobic assessments will culminate the workshop content. Workshop participants will conclude the session with a greater understanding about aerobic fitness training and assessments, benefits from aerobic exercise, and inclusive instructional strategies in physical education.

Plan Implementation

The first step to initiating a workshop is to submit a proposal to my department chair, college dean, and to complete a contract with the University Research Foundation (UF). UF protocols will be followed while engaging in community outreach and partnerships with school districts (Administrative Office, n.d.). All community workshops, trainings, camps, performances, and institutes on campus have expenses to cover and procedures to follow. The proposal will need a purpose, justification, specific dates and location, and a budget to be approved. After gaining approval then recruiting participants will occur through personal invitation and open advertising. The physical education specialists and administrators who participated in my study would be specifically invited as well as other local teachers that I have contact with in the field. Invitation letters sent through U.S. mail and e-mail messages to physical education educators, past NCPE-HP teacher-leaders, and health/fitness instructors and providers would be used to contact potential participants. Advertising on the SHAPE (n.d.f) website and through their blog site are additional ways to recruit workshop participants. When advertising it will be noted that two of the three workshop sessions will be held during non-school days; and that school districts will need to pay for a substitute for one of the three days. All workshop participants will need to sign an agreement to participate on all three days and to gain permission from their school district to pay for a substitute teacher. The intent is to minimize the cost for conducting a workshop and provide an incentive to participate by holding two sessions during the summer break. Fees to attend the workshop could be paid by the school district or by the participants. In addition, an assistant will be hired to help with set-up/clean-up, check-in, morning snack and lunch, Rainbow Run preparation and administration, and other duties as needed.

Workshop budget. According to the Kinesiology Department administrator, the proposed budget (see Table 31) reflects current prices for the items listed (L. Hansen, personal communication, September 12, 2016). Budget items listed include fees for University facilities, food, supplies and materials, and personnel costs that reflect my salary and remuneration for an assistant. Facility fees reflect adjustments made for faculty and weekday use. Using the facilities during the weekend and with outside facilitators would increase costs. Likewise, an estimation of the workshop fee to be charged has been calculated. All financial transactions are managed and administered through the UF and follow University procedures. The average cost per person for 30 participants is $227.50 and $273 for 25 participants. For the workshop to “break even,” it would require 27 participants to pay $250 each for attending. With the possibility of lower costs, the charge to workshop participants to attend the Rainbow Workshop would be $250 per person. From my experience, attending a three-day workshop that includes snack and lunch, Rainbow Run cards, workshop materials, and t-shirt for $250 is a good deal and typical expense for PD activities.

Table 31

Rainbow Run Workshop Budget

Budget Item	Cost	Frequency	Total
Facility: meeting room/track	575/day	3 days	1725
Food: snack/lunch	25/day	3 days/30 people	2250
Supplies: gift RR cards, t-shirt, office supplies, postage	15/person	30 people	450
Facilitator	500/day	3 days	1500
Assistant	300/day	3 days	900
Total Expenses			$6825

Note: The Kinesiology Department, depending on the approval agreement, may cover some of the expenses such as facilities, office supplies, and postage.

Resources and Barriers

My greatest resources are the kinesiology and UF departments on campus. The Kinesiology Department would provide additional support under normal weekday operations; such as, answering phones, making copies, reserving rooms, providing easels/chart paper/pens, and general support as needed. Likewise, the kinesiology department has alumni home and e-mail addresses to use for recruiting participants. According to the UF website (n.d.),

> The purpose of the Foundation is to help develop and administer those activities that aid and supplement the educational mission of CSU, Chico. As an auxiliary organization of CSU, Chico, the Foundation provides service functions. … (The UF) solicits and manages externally funded projects orientated toward research, education, or public service, and which present opportunities for scholarship, creative activity and professional development. (Administrative Office: About the Foundation, para. 1)

All outside sponsored activities not directly related to academic courses taught on campus are required to use the UF administrative services. The UF manages insurance and liability waivers, work applications and related paperwork, payroll and payment of bills, and culminating reports of administrative activity. I have worked closely with the UF in the past with NCPE-HP business.

A specific barrier to success would be the lack of physical education educators interested in learning new content due to apathy. Professional alienation has been a major concern in education due to teachers working in isolation (Snoek, 2013). Often physical education has been marginalized and considered less valuable than other content areas with physical education educators feeling isolated and struggling to gain recognition as a professional (Sears, Edgington, & Hynes, 2013). Teachers in physical education typically do not attend conferences or workshops due to the time needed, expense, and/or lack of initiative and interest (Casey, 2013; Hastie et al., 2015). And finally, there is a lack in understanding about how to build physical activity self-efficacy beliefs and realization of the importance and connection to student aerobic fitness. A well-written and creative workshop invitation could overcome these barriers and professional apathy toward new content.

Workshop Equipment, Materials, and Supplies

- A workshop binder will be provided with daily agendas, PowerPoint® slide copies, Rainbow Run diagram and directions, Bukowsky et al. (2014) article, and reference list.
- PowerPoint ® (see Appendix A) presentation saved online with backup version saved on a data stick.
- Polyspots: 30 people in attendance, 5 groups of six placed around room.
- Chart paper and felt pens: 5 locations around room.
- Posters with icebreaker questions: 9 posters placed around room.
- Large orange cones: 8 for the Rainbow Run placed outside around track.
- Sets of Rainbow Run cards and CSU, Chico Kinesiology Department T-shirts (gifts) for 30 participants.
- Research articles (five copies of each, except 30 copies of Bukowkey article for the workshop binder):
    - "Self-efficacy, planning, and preparatory behaviours as joint predictors of physical activity: A conditional process analysis" by Barz et al. (2016);
    - "Fundamental Integrative Training (FIT) for physical education" by Bukowkey et al. (2014);

    - "Middle school student's heart rates during different curricular activities in physical education" by Gao et al. (2009);
    - "Development of Aerobic Fitness in Young Team Sport Athletes" by Harrison et al. (2015);
    - "Effect of aerobic exercise on cognition, academic achievement, and psychosocial function in children: A systematic review of randomized control trials" by Lees and Hopkins (2013); and
    - "WalkMore: a randomized controlled trial of pedometer-based interventions differing on intensity messages" by Tudor-Locke et al. (2014).
- Note: the Rainbow Run Workshop will be held in the PETE "pedagogy lab," which is a small gym that contains a media center (computer, internet access, projector, and screen), chairs, storage room with readily available equipment (poly spots), and ample room to sit in one area and engage in movement activities in an adjacent area.

Project Evaluation Plan

The Rainbow Run Workshop will have both formative and summative evaluations. A short and quick-write style of evaluation following each day of activities will give formative and ongoing feedback for improving future sessions. Specific and generalized questions will be asked on the exit evaluation with daily session outcomes assessed. For instance, on the first workshop day the evaluation would address physical activity self-efficacy; did your understanding about physical activity self-efficacy increase? Please explain. On the second workshop day the questions would address the ramifications from my study, as well as, improving their understanding about research design. For instance, was the information on research design useful? And finally on the third and final workshop day the formative questions would address calculating percent improvement, whether they were prepared to implement the Rainbow Run aerobic assessment with their students, and able to analyze and interpret the results. See the formative questions created to review and assess workshop participant' understanding of content presented in morning or afternoon session in Appendix A (Slides 15, 21, 38, 53, 64, and 68). In addition, there will be an ongoing "Parking Lot" location where workshop participants can write down a topic, issue, and/or concern that will be addressed during the same day with follow-up action if needed. These evaluations and input from participants are helpful and aid in ensuring that the workshop is engaging, pertinent, responsive, and effective.

A summative evaluation will be provided via SurveyMonkey® after the workshop is completed. This online style of evaluation will use a series of questions to review the organization and effectiveness of the workshop. A 5 point Likert scale will be used to measure specific components of the workshop and determine areas in need of improvement. Survey questions addressing items such as format, learning activities, content, facilities, cost, scheduling, and other issues that arise will be asked. For instance the question about cost would rank participants responses to, "The cost for the workshop was appropriate," with the range of answers: 1=too expensive through 5=very reasonable. The question about facilities would state, "The facilities were adequate for this workshop," with the range of answers; 1=not adequate through 5=highly adequate. The survey responses will be analyzed and interpreted to give a summative evaluation of the workshop strengths, weaknesses, and to determine future needs. Guskey and Yoon (2009) summed up the process of providing PD opportunities to others by stating, "Those responsible for planning and implementing PD, therefore, must learn how to critically assess and evaluate the effectiveness of what they do in terms of the goals they hope to achieve" (p. 498). My goal is to introduce and promote the Rainbow Run as a valid and inclusive method of assessing student aerobic fitness.

Project Implications

The outcomes from my research were strong and significant. The implications from the findings suggest that educators in physical education need to reflect on the aerobic assessment method used nationally, namely the FG 1-mile aerobic assessment, and consider the impact this assessment may have on physical activity self-efficacy. Social change implications derived from the findings from my study will drive the content while providing an effective, meaningful, productive workshop, and PD experience.

Research review and rationale. There is an obesity epidemic in the United States and locally with about 60% of Americans considered over weight, of which 36% adults and 17% youth are considered obese with 50% of adult Americans considered inactive (Ogden et al., 2015; Trust for America's Health, 2011). Obesity and inactivity are connected (Aryana et al., 2012; Burkhalter & Hillman, 2011; HHS, n.d.a). Between 30-50% of fifth, seventh, and ninth grade students fail to make the FG Healthy Zone®

standards for the 1-mile aerobic assessment and BMI standard locally and nationally (CDE, 2015). Furthermore, there are strong connections between aerobic capacity, body composition, health risk factors, and early mortality (Cureton et al., 2014; Going et al., 2014). There is strong evidence indicating that those who were inactive and obese during their youth will remain the same as an adult (JAMA, 2013; Trust for America's Health, 2011). Most likely, the same students that failed to meet the FG 1-mile and BMI standard in school are now obese and inactive as adults. Additionally, the FG 1-mile aerobic assessment has been the only test used to measure aerobic fitness since 1987 with the onset of submitting and maintaining fitness scores in a database (Plowman et al., 2006). And finally, there is a connection between aerobic fitness and physical activity self-efficacy beliefs, which predicts moderate-to-vigorous physical activity levels (Gao et al., 2011; Harmon et al., 2014), academic achievement (Blom et al., 2011; Booth et al., 2013; Lees & Hopkins, 2013; Rasberry et al., 2011),

and overall health (Cureton et al., 2014; HHS, n.d.a; WHO, n.d.). Understanding the sources of influence that impact physical activity self-efficacy is the key to understanding why the Rainbow Run builds self-efficacy beliefs, whereas, the FG 1-mile aerobic assessment may have done irreparable damage to generations of students.

The sources that influence physical activity self-efficacy beliefs include performance, vicarious experience, verbal and social persuasion, and psychological state (Feltz et al., 2008) with variations offered by Perry et al. (2012) and Voskuil and Robbins (2015). It is hard to build physical activity self-efficacy if your performance never meets the standard, even if you improve. Vicarious sources include comparing yourself against others, which is easy to do in physical education classes and especially during the mile assessment. It is easy to observe, compare, and know who the faster and slower students are in class. Verbal and social persuasion are not enough for students to try hard on the mile run as compared to the Rainbow Run with teacher-participant indicating similar directions and words of encouragement for both groups with significantly different performance results. Teacher-participants who reported examples related to physiological factors during aerobic assessments had similar comments about student fear, anxiety, and confusion with no psychological differences between groups. Likewise, preparation was similar between groups. Experiences in physical education, motor skills abilities, and self-efficacy beliefs predict physical activity levels (Parschau et al., 2013; Parschau et al., 2014). The significant outcomes from my research found students tried harder to improve on the Rainbow Run with 22.5 percent improvement, while students' effort on the FG 1-mile was 1.49 percent improvement. Contrary to the FG 1-mile, the Rainbow Run provides opportunity for success and individual performance improvement, thus the Rainbow Run builds confidence, motivation, and physical activity self-efficacy beliefs through at least two sources of influence. The sources of influence that impact physical activity self-efficacy are prevalent and subtle, which in turn affects and predicts student physical activity levels.

Social Change. Changing the style of aerobic assessment in schools can potentially alter the trend of inactivity and obesity. Theoretically, by changing the aerobic assessment to a style that focuses on improvement, such as the Rainbow Run, students' physical activity self-efficacy beliefs will increase with corresponding increase in physical activity and reduction in obesity. Self-esteem, physical activity, and perceived competence beliefs were found to be lower in children that are overweight (Suton et al., 2013). According to Walden University (n.d.), "social change is a deliberate process of creating and applying ideas, strategies, and actions to promote the worth, dignity, and development of individuals and communities alike" (Beyond the Classroom, para. 2). The Rainbow Run is based on Bandura's (1977) social cognitive theory and the role self-efficacy plays in human behavior. The real-world application would increase daily physical activity, thus improving wellness and health (WHO, n.d.). However, consistency is needed in physical education instruction. Quality physical education provides learning experiences for all ability levels in an inclusive learning environment. The "Support Real Teachers" (n.d.) website confirms these goals, "We believe that every child has the right to standards-based quality physical education focused on developing the skills, knowledge, virtues and dispositions needed to become a physically literate person…" (Introduction, para 1), and physically active for a lifetime.

If children were more physically active due to elevated self-efficacy beliefs, a myriad of possibilities could happen. The literature review in Section 2 revealed that children would be more active as adults. Health benefits gained from regular exercise would be evident. The threatening obesity epidemic would be under control and manageable. Medical conditions such as type 2 diabetes and heart disease would decline with corresponding decrease in medical expenses. Children who are fit have higher attendance rates and would perform better in school. Likewise, brain growth and development is connected with exercise and more exercise would produce smarter students. Emotional issues, such as anger control and mood swings, would be more manageable with increased exercise. Girls would become more engaged in physical activity that would not decrease with age. Students would feel good about their bodies and would make healthy life choices. Students would be empowered to engage in recreational and sport activities outside of school. As indicated in a review of research literature by Barz et al. (2016), the list of potential outcomes and impact from increased physical activity is significant and limitless in improving the quality of life of all children and ultimately as adults.

The FG 1-mile aerobic assessment has been around for a long time and is the only fitness test that is linked to academic achievement, health, and physical activity self-efficacy. The Rainbow Run is an alternative method to measure aerobic fitness that is inclusive of mobility differences and varying ability levels, and was linked to building positive physical activity self-efficacy beliefs through increased student effort and motivation to improve their performance during my study. Higher physical activity self-efficacy beliefs result in greater engagement in physical activity (Arslan, 2012; Blom et al., 2011; Foley et al., 2008; Parschau et al., 2014; Suton et al., 2013; van Stralen et al., 2011; Warner et al., 2014). Building physical activity self-efficacy beliefs in children while engaging an aerobic assessment is the instructional change and goal of the Rainbow Run aerobic assessment in physical education classes.

Conclusion

The Rainbow Run Workshop has the potential to make an impact on participants' practice and approach when assessing aerobic fitness while building student physical activity self-efficacy beliefs. This change directly benefits students. Furthermore, this workshop is designed to overcome the barriers of teacher apathy by offering new ideas, theory-based content while engaging participants as learners, collaborators, and problem solvers. Participants will engage in purposeful and effective PD activities while concurrently applying their new knowledge and skill sets in the classroom. Formative and summative evaluations will aide in keeping presentations effective and content pertinent. Social change implications related to changing youth inactivity behaviors begins in the schools with teachers and stakeholders that attend this workshop.

Section 4: Reflections and Conclusions

Introduction

This section contains discussion about the implications of my research, reveals personal growth that incurred in the development process, and reflects on the strengths and limitations of my project. In addition, implications for social change, leadership opportunities, and future research are discussed.

Project Strengths and Limitations

Strengths

The greatest strength of The Rainbow Run Workshop is that the content is theoretically based in Bandura's (1977) social cognitive theory. Activities during the workshop consistently thread physical activity self-efficacy concepts throughout the sessions. Active engagement by the workshop participants is another strength. Through charting experiences, engaging in purposeful conversations, and assessing their own aerobic fitness levels by participating in the Rainbow Run, workshop participants are actively learning. Workshops that have a theoretical foundation, collaboration, relevancy, and active participation have been found to be most effective in physical education PD (Aelterman et al., 2013; Casey, 2013). Scheduling the three sessions over a year-long span with ongoing "homework" to complete that connects theory to practice will also improve the effectiveness of achieving the workshop outcomes. Workshop participants need to experiment with facilitating the Rainbow Run with students, which requires time to reflect on the implications of using a different and inclusive approach to assessing aerobic fitness. The effectiveness of the PD experience increases if the content is perceived to be valid and valuable (Awais Bhatti et al., 2014). The Rainbow Run method of assessing aerobic fitness questions current practice and advocates for inclusive instruction that is theoretically based on building physical activity self-efficacy, which increases teaching effectiveness.

The need to improve teaching effectiveness in physical education has been noted by many researchers and scholars. Often the content knowledge is insufficient and/or pedagogy skills need to be developed. Dyson's (2014) review of literature surrounding teaching effectiveness noted that, "Physical educators who teach the whole child advocate for a plethora of physical activity, skills, knowledge, and positive attitudes that foster healthy and active playful lifestyles" (abstract). Dyson further explained that physical education is beyond learning motor skills and strategies, and that the affective domain, which includes social interactions, interpersonal skills, and emotions, is important. Similarly, Ennis (2011) added, "Physical educators, who teach the whole child, advocate not only daily participation in moderate to vigorous physical activity but also the skills, knowledge, and perceptions of positive physical self-worth that foster healthy, active lifestyles" (p. 7). The concept of building self-worth is related to self-image and building positive physical activity self-efficacy beliefs. Dyson's literature review found evidence that building positive attitudes toward physical education is connected to teachers providing an inclusive learning environment that considers gender, culture, and race. Inclusive learning environments also include students with disabilities. Phillips and Silverman (2012) summed up the importance of an inclusive environment by stating, "Our physical activity behavior, whether or not we choose to go to the gym or go for a run, is impacted by attitude, and these behaviors and attitudes are strongly influenced by our experiences in physical education" (p. 316). The only measurement connected to building positive attitudes and physical activity self-efficacy has been the FG 1-mile aerobic assessment, which has around a 30% failure rate. My professional development project will give physical education educators an option by incorporating the Rainbow Run style of measuring aerobic fitness into their curriculum. Understanding that students learn behaviors and determine self-efficacy beliefs from watching and comparing themselves to others is a new concept and different from the traditional approach to measuring aerobic fitness used today.

Limitations

This project meets the needs of the teacher-participants that contributed their perceptions about student motivation and effort and collected student data for my research: however, their influence over students in elementary schools is limited. Often physical education specialists at schools have contact with students only one or two days a week, whereas, physical education should be taught daily. Elementary school teachers are also responsible for teaching physical education and they are in desperate need for PD opportunities in physical education, as I found out during my experience with NCPE-HP. According to Tsangaridou (2012), "More emphasis on content and pedagogical content knowledge of PE should be given during [elementary] teacher education and professional development programs" (p. 282). These elementary school teachers would not be targeted or expected to attend the proposed Rainbow Run Workshop to gain new knowledge about physical education reform and they would benefit from this PD experience. However, the format, content, and deliverability of the Rainbow Run Workshop assumes that the participants have strong and fundamental knowledge in physical education and exercise science, which could be overwhelming to a nonPE specialist and a potential limitation.

Recommendations for Alternative Approaches

Alternative Approaches and Improvements

The most practical alternative approach is to use only quantitative data, especially student performance data. It can be assumed that teachers would provide similar learning and assessment environments, and that student physical activity self-efficacy would be elevated with increased effort and motivation. Simply and theoretically, if students try hard to improve their performance then their physical activity self-efficacy beliefs are positive, or at least, improving. Collecting only quantitative data would limit the reliability but increase practicality. Collecting only student performance data and calculating percent improvement would give any teacher information about student progress and motivation.

I asked teacher-participants for recommendations for the future and received a couple of practical ideas. One suggestion was to have eight colors on the rainbow marker instead of seven. Four laps around the track is a mile and eight colors would provide an easier conversion method to compare aerobic assessment styles. This is a good idea, and I understand the curiosity to convert the scores; however, if used to compare students' performance prowess, this change would be detrimental to the intent of the Rainbow Run style of reporting scores. The Rainbow Run was purposely designed so that it would be difficult for children to compare results.

All surveys should be administered online through SurveyMonkey®. I allowed the option of using a paper/pencil style on the student survey and found entering the scores to be time consuming and costly. Most schools incorporate the use of technology in the classroom with personal tablets and/or computer access for all students. The problem was that the physical education specialists did not have a classroom in which to administer the survey and needed to seek cooperation from the classroom teacher to complete the survey. It was easier to administer the survey during PE time using paper and pencil. In the future, all surveys need to be completed online.

Teachers were asked to submit student performance scores online, which was a bad idea. The worksheet (see Appendix E and Appendix F) provided an area for field notes and student scores that were to be recorded online and never happened. I ended up gathering the worksheets and used the data off these sheets for my results; consequently, there were fewer errors. I had to convert times to minutes and color/numbers to cones before analyzing data, and hard copies of results made that process easier. Student performance scores need to be recorded on the provided worksheet and not submitted online. I have filed the original hard copies of the aerobic assessments scores and field notes for future reference.

Asking teacher-participants to give their perspectives about student effort and motivation during the aerobic assessments was unrealistic and limited. Simply, they were too busy during the aerobic assessments to notice any student behavior details or tendencies. Teacher-participant perceptions need to be developed over time as a result of a particular approach that is ongoing and experimental. Section 3 discussed research surrounding PD activities in physical education and the need for teachers to share new ideas; as well as benefitting from the opportunity to share personal challenges, solutions, and professional growth (Casey, 2013). The data gathered from the teacher-participants lead to a rich description of the preparation, outside influences, and student behaviors during the aerobic assessment performances. Few comments were recorded about student motivation and effort during my research due to the research design error. There were only two times teacher-participants were asked to record their comments, immediately following the pretest and again after the posttest. This two-time format limited teacher-participants' capacity to share their perspectives about student motivation and effort. An online "blog" in future research is recommended that will allow ongoing conversations about student' behaviors while engaged in the Rainbow Run style of preparation and aerobic assessment.

Alternative Definition of the Problem

An alternative method to discuss the problem of youth and adult inactivity is to establish a longitudinal study that focuses on the long term and ongoing impact of the FG 1-mile aerobic assessment on attitude and motivation to be physically active. There is a gap in the literature regarding the connection between these two groups; that is, those who failed to meet the FG 1-mile aerobic assessment standard in school and those who are not physically active as adults. The connection is likely. Although seemingly unrelated at first, I believe the mile aerobic assessment based on standards has had a great and negative impact on physical activity self-efficacy over the years; indeed, the impact has been subtle and undetected.

Scholarship

Returning to school as a graduate student gave me a different perspective about higher education compared to my previous educational experiences. I liked it, and confirmed that I am a life-long learner. Furthermore, I found that I really do "know things" about education, pedagogy, and learning, and it was refreshing to revisit theoretical concepts and to learn more. For instance, I knew that adult learning was different than teaching children but could not explain how. From course work, I now know how adults learn, why they attend institutes and conferences, and understand what they want and need during professional development. I found out that I could research concepts and find references, write clearly and create scholarly essays, and organize my thoughts and present ideas logically for others to gain information from my work. I learned more about research methods, analyzing and reporting results, and gained a deeper understanding about my discipline. I found passion for my research and project topics that kept the momentum going through the process and were the driving forces toward completion. My confidence and excitement grew with each semester and as the program progressed.

Project Development

I heard about "self-efficacy" about ten years ago while assisting a colleague collect data from children with disabilities. She was probing about the impact of attending a wheelchair sports camp had on the participants' confidence and desire to participate in sports outside of camp. That involvement started the process of examining motivation and confidence; and frankly, self-efficacy was a new term and concept for me at that time. I was curious.

Discovering the work of Gao et al. (2008-2012), Huang et al. (2012), Block et al. (2010) and others regarding physical activity self-efficacy and the connection to Bandura's (1977) social cognitive theory (Plotnikoff et al., 2013; Ramirez et al., 2012) started the process of examining physical education learning and skill development. After all, physical education is mostly taught through demonstrations and watching others perform skills. It made sense to further investigate this learning theory to better understand how students acquire skills in physical education. More importantly, Gao et al. and others connected physical activity self-efficacy beliefs to moderate to vigorous physical activity levels and aerobic fitness. The benefits gained from engaging in aerobic fitness are well known and part of the physical education curriculum. Aerobic fitness and physical activity self-efficacy beliefs are connected, which was a huge discovery and turning point in my research and study. Feltz' et al. (2008) work summarized how self-efficacy beliefs are formed in physical education and sport and identified four sources of influence: performance, vicarious sources, verbal and social persuasion, and physiological factors. His book about self-efficacy and sport reminded me how important it is to consider all sources of persuasion that influence physical activity self-efficacy. Finding Campbell's (2012) research and creation of a student survey to measure youth self-efficacy beliefs was exciting and critical in deciding what to do for my research and project. Her research led to the modified SEPAQ student survey used in my study. The discussion by Plowman et al. (2006) about the history of FitnessGram® testing and changes over the years provided insight to the long-term and potential cultural impact that the FG 1-mile aerobic assessment has had on youth physical activity self-efficacy. All early fitness assessments have been changed to reflect health-related goals except for the mile aerobic assessment, which is criterion-based. In my conversations with superintendents, principals, and teachers, I found that it was common knowledge that about 30% of all students tested will fail the FG 1-mile aerobic assessment with corresponding body composition rates. It seemed obvious that an alternative style of aerobic assessment was warranted and at first I planned to compare student' physical activity self-efficacy beliefs from the FG 1-mile and FG Pacer® assessments; however, the FG Pacer® student failure rates are about the same as the FG 1-mile results. My literature research found plentiful amount of programs and methods to improve motivation to be more physically active that have had limited success. Re-visiting Feltz et al. and the sources that influence and impact physical activity self-efficacy led me to creating the Rainbow Run aerobic assessment.

The Rainbow Run assessment is similar to another aerobic assessment that I use in the pool. My students engage in a ten-minute swim every semester to measure progress and to determine improvement. This practical approach is an authentic method to assess motor skill development and aerobic fitness. This ten-minute assessment to measure improvement includes all sources of persuasion as described by Feltz et al. that impact swimming self-efficacy. The Rainbow Run does the same.

I was nervous and excited to test my hypothesis that measuring personal improvement would motivate children to try harder and build positive physical activity self-efficacy beliefs. The result of my study supports this concept and duplicates previous research in this area, and challenges the impact and authenticity of the FG 1-mile aerobic assessment. This message needs to be shared.

My project study purpose is to use the resources available to me in order to present the results of my research and to summarize the findings from my literature review. The importance of understanding the sources of physical activity self-efficacy cannot be stressed enough. This theoretical framework of learning through watching others is the foundation of effective instruction in physical education. Similarly, increasing youth and adult physical activity is the ultimate goal of physical education in schools.

And finally, my research topic and project design matches my personality and life goals perfectly. I am an advocate of inclusive physical education that considers all ability levels. I am a Special Olympic coach and training clinician. My masters' degree is in exercise science, which indicates a deep understanding about exercise physiology, training, and how to attain fitness goals. It fits my life's work and experience that my doctorate is about inclusive aerobic assessment strategies and protocols that encourages and motivates participation.

Leadership and Change

I have had ample opportunity to impact others with my educational philosophy and demonstrated the ability to be a leader in my field. My job as an instructor in the

PETE program and supervisor of student teachers provides daily opportunity to mentor pre-service teachers and model inclusive practices used in physical education. For seven years I was a co-director of a subject matter grant and was part of the leadership team that determined the activities and content of the two-week summer institutes and follow-ups. Developing teacher leadership skills and becoming change agents was our overall theme while engaging in goal setting and action research. This PD experience has provided insight to teacher professional development needs and interests.

My ongoing experience as a volunteer with Special Olympics has provided plentiful opportunities to be an advocate for individuals with disabilities. As the area director for 15 years and aquatics coach for 30 years, I have been privileged to be a speaker at events, conferences, and special occasions. The theme of my speeches are similar, "sport is for everyone." I have a short list of specific accomplishments that demonstrate leadership and change. I would consider initiating the Special Olympic School-site Track Meet in Butte County 25 years ago my legacy to the future. This competition started with 50 athletes and today over 600 children with disabilities compete in this event every year with local adapted physical education specialists responsible for organization and funding; I continue to be the announcer. I received much attention when selected as the head aquatics coach for Team USA that traveled to the Special Olympic International World Games held in China in 2007. Through this recognition I gained a larger and more diverse audience and continued to advocate for all individuals through sporting opportunities. Likewise, I have trained 100s of coaches in several sports locally as well as nationally and at international events about inclusive practices and developmental approaches to teaching. These experiences and others have prepared me to continue as a leader and advocate for individuals with disabilities and to share information regarding physical activity self-efficacy and the Rainbow Run results.

Reflection on Importance of the Work

Research in physical education has relevance due to the potential impact on youth and adult well-being and quality of life. Being physically active is connected to improved health (WHO, n.d.). The purpose of physical education is to give students the skills and knowledge to be physically active for a lifetime, which has failed. Why are adults not active? How can the discipline physical education change to improve youth and adult inactivity? Research and addressing these issues is important for society to progress and focus on healthy habits that includes increasing physical activity levels.

Implications, Applications, and Directions for Future Research

There was so much learned and organized in my literature review that was useful and relevant to physical education and health educators. For instance, the four sources of physical activity self-efficacy as described by Feltz et al. (2008) have not been adequately explored, nor directly connected to learning in physical education. Research related to the differences between genders has not been organized in one article with a review of research comparing genders, motivation factors, and self-efficacy beliefs. Incentive programs designed to motivate youth to be more physically active have not been compared to each other with positive and negative features of these interventions to increase physical activity. I found few articles that questioned the impact of the FG fitness assessments on student motivation with the exception of Lopez-Pastor et al.

(2013) who reported that students purposely avoid fitness days with traditional assessment techniques in physical education under critique (Leirhaug & MacPhail, 2015). We know that a third of our children are not physically active and overweight (Trust for America's Health, 2011). I believe that there is a connection between our assessment practices and motivation to become physically active. I am challenging the traditional practice of measuring aerobic fitness that has been used since the beginning of recording fitness scores.

I have a bombshell to deliver, and need to be careful. My research needs to be duplicated and verified. However, I believe my instincts are right and the Rainbow Run, or any style of aerobic assessment based on personal goals and improvement, will be the future approach to measuring aerobic fitness. Along with providing professionals an opportunity to attend a workshop to further their understanding about physical activity self-efficacy, I plan to "set the table" with articles related to topics about physical activity self-efficacy, gender differences, and approaches to inclusive instructional practices. I hope to get people thinking, talking, and experimenting with new ideas and approaches. Likewise at conferences I will share my information and invite teachers to join the Rainbow Run workshop in the future. I am excited for this opportunity to share my knowledge about physical activity self-efficacy, change how we look at aerobic assessments, and to make a positive impact on the problem of youth and adult inactivity.

Conclusion

This project study represents many years of effort and work to complete a relevant and unique product that could impact physical education and aerobic assessment in the years to come. Nothing in education can be more convincing, substantial, rigorous, and thorough as published doctoral dissertation; and in this case, an action driven project study. It has always been important in my professional endeavors to teach how to make learning environments inclusive, positive, and meaningful for everyone. Completing this doctoral program has given me the platform and credentials to continue advocating for all students to have the opportunity to be successful and important; after all, everyone benefits from participation in quality physical education and by improving aerobic fitness. Bandura's (1977) social cognitive theoretical framework was the key to understanding how students learn in physical education and form physical activity self-efficacy beliefs. With this knowledge comes responsibility and commitment to making a difference and to initiate change. My only wish is that others duplicate my research and verify the results; the findings are too important to ignore.

References

Abadie, B. R., & Brown, S. P. (2010). Physical activity promotes academic achievement and a healthy lifestyle when incorporated into early childhood education. *Forum on Public Policy, 2010*(5). Retrieved from http://files.eric.ed.gov/fulltext/EJ912979.pdf

Abioye, A., Hajifathalian, K., & Danaei, G. (2013). Do mass media campaigns improve physical activity? a systematic review and meta-analysis. *Archives of Public Health*, *71*(1), 20.

Aelterman, N., Vansteenkiste, M., Van Keer, H., De Meyer, J., Van den Berghe, L., & Haerens, L. (2013). Development and evaluation of a training on need-supportive teaching in physical education: Qualitative and quantitative findings. *Teaching and Teacher Education*, *29*, 64–75. https://doi.org/10.1016/j.tate.2012.09.001

American Alliance for Health, Physical Education, Recreation and Dance. (2013). National PE Standards. Retrieved from http://www.shapeamerica.org/standards/pe/

Annesi, J. J., Faigenbaum, A. D., & Westcott, W. L. (2010). Relations of transtheoretical model stage, self-efficacy, and voluntary physical activity in African American preadolescents. *Research Quarterly for Exercise and Sport*, *81*(2), 239–244. https://doi.org/10.1080/02701367.2010.10599671

Arslan, A. (2012). Predictive power of the sources of primary school students' self-efficacy beliefs on their self-efficacy beliefs for learning and performance. *Educational Sciences: Theory and Practice*, *12*(3), 1915–1920.

Aryana, M., Li, Z., & Bommer, W. J. (2012). Obesity and physical fitness in California school children. *American Heart Journal*, *163*(2), 302–312. https://doi.org/10.1016/j.ahj.2011.10.020

Atkin, A., Gorely, T., Biddle, S. H., Cavill, N., & Foster, C. (2011). Interventions to promote physical activity in young people conducted in the hours immediately after school: A systematic review. *International Journal of Behavioral Medicine*, *18*(3), 176–187. https://doi.org/10.1007/s12529-010-9111-z

Awais Bhatti, M., Ali, S., Mohd Isa, M. F., & Mohamed Battour, M. (2014). Training transfer and transfer motivation: The influence of individual, environmental, situational, training design, and affective reaction factors. *Performance Improvement Quarterly*, *27*(1), 51–82.

Baghurst, T. (2014). Assessment of effort and participation in physical education. *Physical Educator*, *71*(3), 505.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review*, *84*, 191–215.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307–337). Greenwich, Connecticut: Information Age Publishing. Retrieved from http://books.google.com.ezp.waldenulibrary.org/books?hl=en&lr=&id=Cj97DKKRE7AC&oi=fnd&pg=PA307&dq=Guide+for+constructing+self-efficacy+scales.&ots=cF4UqUrGr6&sig=bMdFV0595PHXJ5f_ND6-

y_khd9s#v=onepage&q=Guide%20for%20constructing%20self-efficacy%20scales.&f=false

Barz, M., Lange, D., Parschau, L., Lonsdale, C., Knoll, N., & Schwarzer, R. (2016). Self-efficacy, planning, and preparatory behaviours as joint predictors of physical activity: A conditional process analysis. *Psychology & Health*, *31*(1), 65–78. https://doi.org/10.1080/08870446.2015.1070157

Basterfield, L., Pearce, M. S., Adamson, A. J., Frary, J. K., Parkinson, K. N., Wright, C. M., & Reilly, J. J. (2012). Physical activity, sedentary behavior, and adiposity in English children. *American Journal of Preventive Medicine*, *42*(5), 445–451. https://doi.org/10.1016/j.amepre.2012.01.007

Bean, M. K., Miller, S., Mazzeo, S. E., & Fries, E. A. (2012). Social cognitive factors associated with physical activity in elementary school girls. *American Journal of Health Behavior*, *36*(2), 265–274.

Belcastro, L., & Boon, H. (2012). Student motivation for NAPLAN tests. *Australian & International Journal of Rural Education*, *22*(2). Retrieved from http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=18397387&AN=80037526&h=36TTrMHeIZK0txIO7YkZeJjOiqicyktL03I%2F62inOvtJIu9NOlsVskM%2BOtSjTN8bcMiqbRdleDYIUJGGqiyCNQ%3D%3D&crl=c

Best, J. R. (2012). Exergaming immediately enhances children’s executive function. *Developing Psychology*, *48*(5), 1501–1510.

Biddiss, E., & Irwin, J. (2010). Active video games to promote physical activity in children and youth: A systematic review. *Archives of Pediatrics & Adolescent Medicine*, *164*(7), 664–672.

Biddle, S., Braithwaite, R., & Pearson, N. (2014). The effectiveness of interventions to increase physical activity among young girls: A meta-analysis. *Preventive Medicine*, *62*, 119–131. https://doi.org/10.1016/j.ypmed.2014.02.009

Biddle, S. J., O'Connell, S., & Braithwaite, R. E. (2011). Sedentary behaviour interventions in young people: a meta-analysis. *British Journal of Sports Medicine*, *45*(11), 937–942. https://doi.org/10.1136/bjsports-2011-090205

Block, M., Taliaferro, A., Harris, N., & Krause, J. (2010). Using self-efficacy theory to facilitate inclusion in general physical education. *Journal of Physical Education*, *81*(3), 43–46.

Blom, L., Alvarez, J., Zhang, L., & Kolbo, J. (2011). Associations between health-related physical fitness, academic achievement and selected academic behaviors of elementary and middle school students in the State of Mississippi. *Journal of Research*, *6*(1), 13–19.

Booth, J. N., Leary, S. D., Joinson, C., Ness, A. R., Tomporowski, P. D., Boyle, J. M., & Reilly, J. J. (2013). Associations between objectively measured physical activity and academic attainment in adolescents from a UK cohort. *British Journal of Sports Medicine*, *48*(3), 265–270. https://doi.org/10.1136/bjsports-2013-092334

Brown, H., Pearson, N., Braithwaite, R., Brown, W., & Biddle, S. (2012). Physical activity interventions and depression in children and adolescents: A systematic review and meta-analysis. *Journal of Science and Medicine in Sport*, *15*, S343. https://doi.org/10.1016/j.jsams.2012.11.834

Bukowsky, M., Faigenbaum, A. D., & Myer, G. D. (2014). Fundamental Integrative Training (FIT) for physical education. *Journal of Physical Education, Recreation & Dance*, *85*(6), 23–30.

Burkhalter, T. M., & Hillman, C. H. (2011). A Narrative Review of Physical Activity, Nutrition, and Obesity to Cognition and Scholastic Performance across the Human Lifespan. *Advances in Nutrition: An International Review Journal*, *2*(2), 201S–206S. https://doi.org/10.3945/an.111.000331

California Department of Education. (n.d.). FASTSTATS - Overweight Prevalence. Retrieved from http://www.cdc.gov/nchs/fastats/overwt.htm

California Department of Education. (2013). Physical fitness test: 2013-14 California fitness report: Overall summary of results. Retrieved from http://data1.cde.ca.gov/dataquest/PhysFitness/PFTDN/Summary2011.aspx?r=0&t=4&y=2013-14&c=00000000000000&n=0000

California Department of Education. (2015). Physical fitness test: 2015-16 California fitness report: Overall summary of results. Retrieved from http://dq.cde.ca.gov/dataquest/PhysFitness/PFTDN/Summary2011.aspx?r=0&t=4&y=2015-16&c=00000000000000&n=0000

California State University, Chico Research Foundation. (n.d.). Administrative Office. Retrieved from http://www.csuchico.edu/rfdn/about/

Campbell, N. (2012). *The measurement of physical activity and self-efficacy in adolescents: Prospects, problems, and future directions*. The University of Western Ontario. Retrieved from http://ir.lib.uwo.ca/etd/599/

Cardinal, B. J., Yan, Z., & Cardinal, M. K. (2013). Negative experiences in physical education and sport. *Journal of Physical Education, Recreation & Dance*, *84*(3), 49–53.

Casey, A. (2013). Practitioner research: A means of coping with the systemic demands for continual professional development? *European Physical Education Review*, *19*(1), 76–90. https://doi.org/10.1177/1356336X12465510

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (n.d.). *Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research.* Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1424733/

Castelli, D. M., Hillman, C. H., Buck, S. M., & Erwin, H. E. (2007). Physical fitness and academic achievement in third-and fifth-grade students. *Journal of Sport and Exercise Psychology*, *29*(2), 239.

Cataldo, R., John, J., Chandran, L., Pati, S., & Shroyer, A. L. W. (2013). Impact of Physical Activity Intervention Programs on Self-Efficacy in Youths: A Systematic Review. *ISRN Obesity*, *2013*, 1–11. https://doi.org/10.1155/2013/586497

Cawley, J., Frisvold, D., & Meyerhoefer, C. (2013). The impact of physical education on obesity among elementary school children. *Journal of Health Economics*, *32*(4), 743–755.

Centeio, E. E., & Castelli, D. M. (April 8-12, 2011). Curricular and behavior change in physical education. In *Conference Proceedings:* American Educational Research Association. New Orleans, LA (pp. 1-4).

Center for Nutrition and Activity Promotion. (n.d.). Preschool physical activity programs. Retrieved from http://www.csuchico.edu/chc/programs/preschool-physical-activity.shtml

Centers for Disease Control and Prevention (n.d.a). Coordinated school health - adolescent and school health. Retrieved from http://www.cdc.gov/healthyyouth/cshp/

Centers for Disease Control and Prevention. (n.d.b). Data and statistics, physical activity. Retrieved from https://www.cdc.gov/physicalactivity/data/

Centers for Disease Control and Prevention. (n.d.c) Division of nutrition, physical activity, and obesity. Retrieved from https://www.cdc.gov/nccdphp/dnpao/index.html

Centers for Disease Control and Prevention. (n.d.d) Physical activity glossary of terms. Retrieved from http://www.cdc.gov/physicalactivity/everyone/glossary/

Centers for Disease Control and Prevention. (n.d.e) VERB: CDC’s youth campaign. Retrieved from http://www.cdc.gov/youthcampaign/

Centers for Disease Control and Prevention. (2013). Vital signs: Progress on childhood obesity. Retrieved from http://www.cdc.gov/vitalsigns/ChildhoodObesity/index.html

Centers for Disease Control and Prevention. (n.d.e). Walking as a way for Americans to get recommended amount of physical activity for health. Retrieved from frnwalking@cdc.gov

Chaddock, L., Erickson, K. I., Prakash, R. S., Kim, J. S., Voss, M. W., VanPatter, M., … Kramer, A. F. (2010). A neuroimaging investigation of the association between aerobic fitness, hippocampal volume, and memory performance in preadolescent children. *Brain Research*, *1358*(0), 172–183. https://doi.org/10.1016/j.brainres.2010.08.049

Chaddock, L., Hillman, C. H., Buck, S. M., & Cohen, N. J. (2011). Aerobic fitness and executive control of relational memory in preadolescent children. *Medicine & Science in Sports & Exercise*, *43*(2), 344–349.

Chen, S., Welk, G. J., & Joens-Matre, R. R. (2014). Testing the Youth Physical Activity Promotion Model: Fatness and Fitness as Enabling Factors. *Measurement in Physical Education and Exercise Science*, *18*(4), 227–241.

Child care applauds Chico State for increasing opportunities in preschool physical activity. (n.d.). Retrieved from http://www.letsmove.gov/blog/2014/03/21/let%E2%80%99s-move-child-care-applauds-chico-state-increasing-opportunities-preschool-physic

Cochran, D. & Conklin, J. (2007). A new bloom: Transforming learning. *Learning & Leading with Technology, 34*(5), 22-25. Retrieved from http://files.eric.ed.gov/fulltext/EJ779824.pdf

Colantonio, E., & Peduti Dal Molin Kiss, M. A. (2013). Is the HRmax= 220-age Equation valid to prescribe exercise training in children? *Journal of Exercise Physiology Online*, *16*(1). Retrieved from http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=10979751&AN=91532639&h=n%2BtJFTRXJgKycEJYWjUpILdXV7%2FQW2ZCwmEx2tVPhde4yAphwbtU1mILSNZTdslaVa0F7fY68nF0NaHlF9bHFg%3D%3D&crl=c

Cooper Institute. (n.d.a). FitnessGram. Retrieved from http://www.cooperinstitute.org/youth/fitnessgram/

Cooper Institute. (n.d.b). FitnessGram: Activity and fitness assessment, reporting, and tracking. Retrieved from http://www.fitnessgram.net/

Corder, K., Ekelund, U., Steele, R. M., Wareham, N. J., & Brage, S. (2008). Assessment of physical activity in youth. *Journal of Applied Physiology*, *105*(3), 977–987. https://doi.org/10.1152/japplphysiol.00094.2008

Craggs, C., Corder, K., van Sluijs, E. M. F., & Griffin, S. J. (2011). Determinants of change in physical activity in children and adolescents: A Systematic Review. *American Journal of Preventive Medicine*, *40*(6), 645–658. https://doi.org/10.1016/j.amepre.2011.02.025

Creative Research Systems. (n.d.) Sample size calculator. Retrieved from http://www.surveysystem.com/sscalc.htm

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Laureate Education, Inc.

Cureton, K. J., Plowman, S. A., & Mahar, M. T. (2014). Aerobic capacity assessments. In S. A. Plowman & M. D. Meredith (Eds.), *FITNESSGRAM with ACTIVITYGRAM reference guide* (pp. 6–1--6–226). Dallas, TX: Cooper Institute.

Derri, V., Vasiliadou, O., & Kioumourtzoglou, E. (2015). The effects of a short-term professional development program on physical education teachers' behaviour and students' engagement in learning. *European Journal of Teacher Education*, *38*(2), 234–262. https://doi.org/10.1080/02619768.2014.947024

Dills, A. K., Morgan, H. N., & Rotthoff, K. W. (2011). Recess, physical education, and elementary school student outcomes. *Special Issue on Education and Health*, *30*(5), 889–900. https://doi.org/10.1016/j.econedurev.2011.04.011

Dishman, R. K., Hales, D. P., Sallis, J. F., Saunders, R., Dunn, A. L., Bedimo-Rung, A. L., & Ring, K. B. (2010). Validity of social-cognitive measures for physical activity in middle-school girls. *Journal of Pediatric Psychology*, *35*(1), 72–88. https://doi.org/10.1093/jpepsy/jsp031

Dumith, S. C., Gigante, D. P., Domingues, M. R., & Kohl, H. W. (2011). Physical activity change during adolescence: a systematic review and a pooled analysis. *International Journal of Epidemiology*, *40*(3), 685–698. https://doi.org/10.1093/ije/dyq272

Duncan, M., Birch, S., & Woodfield, L. (2012). Efficacy of an integrated school curriculum pedometer intervention to enhance physical activity and to reduce weight status in children. *European Physical Education Review*, *18*(3), 396–407. https://doi.org/10.1177/1356336X12450799

Dunn, P., & Palermo-Kielb, K. (n.d.). *Skill builder: Descriptive statistics and graphical representations*. Retrieved from https://www.youtube.com/watch?v=i_y0SSTnyiQ

Dyson, B. (2014). Quality physical education: A commentary on effective physical education teaching. *Research Quarterly for Exercise and Sport*, *85*, 144–152. https://doi.org/10.1080/02701367.2014.904155

Dzewaltowski, D. A., Geller, K. S., Rosenkranz, R. R., & Karteroliotis, K. (2010). Children's self-efficacy and proxy efficacy for after-school physical activity. *Psychology of Sport and Exercise*, *11*(2), 100–106. https://doi.org/10.1016/j.psychsport.2009.08.001

Elliot, D. L., & Campbell, T. (2015). "Really on the ball": exploring the implications of teachers' PE-CPD experience. *Sport, Education and Society*, *20*(3), 381–397. https://doi.org/10.1080/13573322.2013.765400

Ennis, C. D. (2011). Physical education curriculum priorities: Evidence for education and skillfulness. *Quest*, *63*(1), 5–18. https://doi.org/10.1080/00336297.2011.10483659

Feltz, D. L., Short, S. E., & Sullivan, P. J. (2008). *Self-efficacy in sport*. Champaign, IL: Human Kinetics.

Fink, A. (2009). *How to conduct surveys: A step-by-step guide* (4th ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Fit. (n.d.). In Merriam-Webster's online dictionary (11th ed.). Retrieved from http://www.merriam-webster.com/dictionary/fit

FitnessGram: Activity and fitness assessment, reporting, and tracking. (n.d.). Retrieved from http://www.fitnessgram.net/

Florin, T. A., Shults, J., & Stettler, N. (2011). Perception of overweight is associated with poor academic performance in US adolescents. *Journal of School Health*, *81*(11), 663–670.

Foley, L., Prapavessis, H., Maddison, R., Burke, S., McGowan, E., & Gillanders, L. (2008). Predicting physical activity intention and behavior in school-age children. *Pediatric Exercise Science*, *20*, 342–356.

Gao, Z. (2012). Urban Latino school children's physical activity correlates and daily physical activity participation: A social cognitive approach. *Psychology, Health & Medicine*, *17*(5), 542–550. https://doi.org/10.1080/13548506.2011.647699

Gao, Z., Hannon, J. C., & Carson, R. L. (2009). Middle school student's heart rates during different curricular activities in physical education. *ICHPER-SD Journal of Research*, *4*(1), 21–24.

Gao, Z., Lee, A. M., & Harrison, L. (2008). Understanding students' motivation in sport and physical education: From the expectancy-value model and self-efficacy theory perspectives. *Quest*, *60*(2), 236–254. https://doi.org/10.1080/00336297.2008.10483579

Gao, Z., Lee, A. M., Xiang, P., & Kosma, M. (2011). Effect of learning activity on students' motivation, physical activity levels and effort/persistence. *ICHPER-SD Journal of Research*, *6*(1), 27–33.

Gao, Z., Lodewyk, K. R., & Zhang, T. (2009). The role of ability beliefs and incentives in middle school students' intention, cardiovascular fitness, and effort. *Journal of Teaching in Physical Education*, *28*(1). Retrieved from http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=02735024&AN=70219785&h=017ZeSdySpXYtPrq1YVB9fUZ4UuwJnJm4dvwgu9w1p6cTlBtJ4RsA9fqBYyxtikF2XFT1q9g8YS%2B6DLLgxzoGQ%3D%3D&crl=c

Gao, Z., Newton, M., & Carson, R. L. (2008). Students' motivation, physical activity levels, & health-related physical fitness in middle school physical education. *Middle Grades Research Journal*, *3*(4), 21–39.

Going, S. B., Lohman, T. G., & Eisenmann, J. C. (2014). In S. A. Plowman & M. D. Meredith (Eds.), *FITNESSGRAM/ACTIVITYGRAM reference guide* (4th ed., pp. 7-1–7-12). Dallas, TX: Cooper Institute.

Graham, G., Holt/Hale, S., & Parker, M. (2013). *Children moving: a reflective approach to teaching physical education* (9th ed.). New York, NY: McGraw-Hill.

Gregoski, M. J., Mueller, M., Vertegel, A., Shaporev, A., Jackson, B. B., Frenzel, R. M., … Treiber, F. A. (2012). Development and validation of a smartphone heart rate acquisition application for health promotion and wellness telehealth applications. *International Journal of Telemedicine and Applications*, *2012*, 1–7. https://doi.org/10.1155/2012/696324

Guskey, T. R. (2002). Does it make a difference? Evaluating professional development. *Educational Leadership*, *59*(6), 45–51.

Guskey, T. R., & Yoon, K. S. (2009). What works in professional development. *Phi Delta Kappan*, *90*(7), 495–500.

Haapala, E. A., Poikkeus, A.-M., Tompuri, T., Kukkonen-Harjula, K., Leppänen, P. H. T., Lindi, V., & Lakka, T. A. (2013). Associations of motor and cardiovascular performance with academic skills in children. *Medicine & Science in Sports & Exercise*. https://doi.org/10.1249/MSS.0000000000000186

Haga, M. (2009). Physical fitness in children with high motor competence is different from that in children with low motor competence. *Physical Therapy*, *89*(10), 1089–1097. https://doi.org/10.2522/ptj.20090052

Harmon, B. E., Nigg, C. R., Long, C., Amato, K., Anwar, Kutchman, E., … Hill, J. O. (2014). What matters when children play: Influence of Social Cognitive Theory and perceived environment on levels of physical activity among elementary-aged youth. *Psychology of Sport and Exercise*, *15*(3), 272–279. https://doi.org/10.1016/j.psychsport.2014.02.001

Hastie, P. A., MacPhail, A., Calderón, A., & Sinelnikov, O. A. (2015). Promoting professional learning through ongoing and interactive support: three cases within physical education. *Professional Development in Education*, *41*(3), 452–466. https://doi.org/10.1080/19415257.2014.924425

Heath, G. W., Parra, D. C., Sarmiento, O. L., Andersen, L. B., Owen, N., Goenka, S., …

Brownson, R. C. (2012). Evidence-based intervention in physical activity: lessons from around the world. *The Lancet*, *380*(9838), 272–281. https://doi.org/10.1016/S0140-6736(12)60816-2

Hemphill, M. A., Templin, T. J., & Wright, P. M. (2015). Implementation and outcomes of a responsibility-based continuing professional development protocol in physical education. *Sport, Education and Society*, *20*(3), 398–419. https://doi.org/10.1080/13573322.2012.761966

Hill, L. J. B., Williams, J. H. G., Aucott, L., Thomson, J., & Mon-Williams, M. (2011). How does exercise benefit performance on cognitive tests in primary-school pupils?: Benefits of Exercise on Cognition in Schoolchildren. *Developmental Medicine & Child Neurology*, *53*(7), 630–635. https://doi.org/10.1111/j.1469-8749.2011.03954.x

Holcomb, E. L. (2004). *Getting excited about data: Combining people, passion, and proof to maximize student achievement* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Institute of Medicine (2012). Fitness measures and health outcomes in youth. *IOC: Report Brief*. Retrieved from http://ezp.waldenulibrary.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsgea&AN=edsgcl.303514521&site=eds-live&scope=site

International Walk to School (n.d.). About the Walk. Retrieved from http://www.iwalktoschool.org/about.htm

Jones, R. A., Hinkley, T., Okely, A. D., & Salmon, J. (2013). Tracking Physical Activity and Sedentary Behavior in Childhood: A systematic review. *American Journal of Preventive Medicine*, *44*(6), 651–658. https://doi.org/10.1016/j.amepre.2013.03.001

Journal of the American Medical Association. (2013, October). Obesity declines in U.S. preschoolers. Retrieved from http://jama.jamanetwork.com/article.aspx?articleid=1745690

Kane, I., Robertson, R. J., Fertman, C. I., Nagle, E. F., McConnaha, W. R., & Rabin, B. S. (2013). Self-efficacy and enjoyment of middle school children performing the progressive aerobic cardiovascular endurance run (PACER) 1, 2. *Perceptual and Motor Skills*, *117*(2), 470–483. https://doi.org/10.2466/29.25.PMS.117x23z3

Kantomaa, M. T., Stamatakis, E., Kankaanpää, A., Kaakinen, M., Rodriguez, A., Taanila, A., … Tammelin, T. (2013). Physical activity and obesity mediate the association between childhood motor function and adolescents' academic achievement. *Proceedings of the National Academy of Sciences*, *110*(5), 1917–1922. https://doi.org/10.1073/pnas.1214574110

Kazbour, R. R. ., McGee, H. M. ., Mooney, T., Masica, L., & Brinkerhoff, R. O. . (2013). Evaluating the Impact of a Performance-Based Methodology on Transfer of Training. *Performance Improvement Quarterly*, *26*(1), 5–33.

Kearns, L.-L. (2011). High-stakes standardized testing & marginalized youth: An examination of the impact on those who fail. *Canadian Journal of Education*, *34*(2), 112–130.

Kelly, M. S., Bluestone-Miller, R., Mervis, B., & Fuerst, R. (2012). The family and school partnership program: A framework for professional development. *Children & Schools*, *34*(4), 249–252 4p.

Kelly, N. R., Mazzeo, S. E., Evans, R. K., Stern, M., Thacker, L. F., Thornton, L. M., & Laver, J. H. (2011). Physical activity, fitness and psychosocial functioning of obese adolescents. *Mental Health and Physical Activity*, *4*(1), 31–37. https://doi.org/10.1016/j.mhpa.2010.11.001

Kitzman-Ulrich, H., Wilson, D. K., Van Horn, M. L., & Lawman, H. G. (2010). Relationship of body mass index and psychosocial factors on physical activity in underserved adolescent boys and girls. *Health Psychology*, *29*(5), 506–513. https://doi.org/10.1037/a0020853

Krafft, C. E., Schwarz, N. F., Chi, L., Weinberger, A. L., Schaeffer, D. J., Pierce, J. E., … McDowell, J. E. (2014). An 8-month randomized controlled exercise trial alters brain activation during cognitive tasks in overweight children: Exercise alters brain activation. *Obesity*, *22*(1), 232–242.

Kriemler, S., Meyer, U., Martin, E., van Sluijs, E. M. F., Andersen, L. B., & Martin, B. W. (2011). Effect of school-based interventions on physical activity and fitness in children and adolescents: a review of reviews and systematic update. *British Journal of Sports Medicine*, *45*(11), 923–930. https://doi.org/10.1136/bjsports-2011-090186

Krivolapchuk, I. A. (2011). Effectiveness of physical exercises for regulation of the f functional state of six- to eight-year-old anxious children. *Human Physiology*, *37*(5), 568–578. https://doi.org/10.1134/S0362119711050094

Kulinna, P. H. (2012). Increasing pupil physical activity: A comprehensive professional development effort. *Biomedical Human Kinetics*, *4*, 6–11.

Laerd Statistics. (n.d.a). Cronbach's alpha in SPSS statistics. Retrieved from https://statistics.laerd.com/spss-tutorials/cronbachs-alpha-using-spss-statistics.php

Laerd Statistics. (n.d.b). Standard deviation. Retrieved from https://statistics.laerd.com/statistical-guides/measures-of-spread-standard-deviation.php

Lawman, H. G., Wilson, D. K., Van Horn, M. L., Resnicow, K., & Kitzman-Ulrich, H. (2011). The relationship between psychosocial correlates and physical activity in underserved adolescent boys and girls in the ACT trial. *Journal of Physical Activity & Health*, *8*(2), 253.

Lee, H. (2014). The role of parenting in linking family socioeconomic disadvantage to physical activity in adolescence and young adulthood. *Youth & Society*, *46*(2), 255–285. https://doi.org/10.1177/0044118X12470431

Lee, V. R., & Thomas, J. M. (2011). Integrating physical activity data technologies into elementary school classrooms. *Educational Technology Research and Development*, *59*(6), 865–884.

Lees, C., & Hopkins, J. (2013). Effect of aerobic exercise on cognition, academic achievement, and psychosocial function in children: A systematic review of randomized control trials. *Preventing Chronic Disease*, *10*(1), 1–8.

Leirhaug, P. E., & MacPhail, A. (2015). “It's the other assessment that is the key": Three Norwegian physical education teachers’ engagement (or not) with assessment for learning. *Sport, Education and Society*, *20*(5), 624–640.

Let’s Move! (n.d.). Get active. Retrieved from http://www.letsmove.gov/get-active

Lewis, B. A., Williams, D. M., Frayeh, A., & Marcus, B. H. (2016). Self-efficacy versus perceived enjoyment as predictors of physical activity behaviour. *Psychology & Health*, *31*(4), 456–469. https://doi.org/10.1080/08870446.2015.1111372

Liao, Y., Liao, J., Durand, C. P., & Dunton, G. F. (2014). Which type of sedentary behaviour intervention is more effective at reducing body mass index in children? A meta-analytic review. *Obesity Reviews*, *15*(3), 159–168. https://doi.org/10.1111/obr.12112

López-Pastor, V. M., Kirk, D., Lorente-Catalán, E., MacPhail, A., & Macdonald, D. (2013). Alternative assessment in physical education: a review of international literature. *Sport, Education and Society*, *18*(1), 57–76. https://doi.org/10.1080/13573322.2012.713860

Macdonald, D. (2011). Like a fish in water: physical education policy and practice in the era of neoliberal globalization. *Quest*, *63*, 36–45.

Maher, C. A., Lewis, L. K., Ferrar, K., Marshall, S., De Bourdeaudhuij, L., & Vandelanotte, C. (n.d.). Are health behavior change interventions that use online social networks effective? A systematic review. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3936265/

Makopoulou, K., & Armour, K. M. (2011). Physical education teachers’ career-long professional learning: getting personal. *Sport, Education and Society*, *16*(5), 571–591. https://doi.org/10.1080/13573322.2011.601138

Minsoo, K., Marshall, S. J., Barreira, T. V., & Lee, J.-O. (2009). Effect of pedometer-based physical activity interventions: A meta-analysis. *Research Quarterly for Exercise and Sport*, *80*(3), 648–655.

Morales, P., Sánchez-López, M., Moya-Martínez, P., García-Prieto, J., Martínez-Andrés, M., García, N., & Martínez-Vizcaíno, V. (2013). Health-related quality of life, obesity, and fitness in schoolchildren: the Cuenca study. *Quality of Life Research*, *22*(7), 1515–1523. https://doi.org/10.1007/s11136-012-0282-8

Morrow, J., Martin, S., & Jackson, A. (2010). Reliability and validity of the FITNESSGRAM: Quality of teacher-collected health-related fitness surveillance data. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21049835

Muehleck, J. K., Smith, C. L., & Allen, J. M. (2014). Understanding the advising learning process using learning taxonomies. *NACADA Journal*, *34*(2), 63–74. http://dx.doi.org/10.12930/NACADA-13-013

Murray, M., & Tenenbaum, G. (2010). Computerized pedagogical agents as an educational means for developing physical self-efficacy and encouraging activity in youth. *Journal of Educational Computing Research*, *42*(3), 267–283.

National Association for Sport and Physical Education. (2011). *Physical education is critical to educating the whole child*. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance.

National Association for Sport and Physical Education. (2012). *2012 Shape of the nation* *report: Status of physical education in the USA*. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance.

Network for a Healthy California. (n.d.). Children's Power Play! Campaign. Retrieved from http://www.cdph.ca.gov/programs/cpns/Pages/ChildrensPowerPlayCampaign.aspx

Ning, W., Gao, Z., & Lodewyk, K. (2012). Associations between socio-motivational factors, physical education activity levels and physical activity behavior among youth. *ICHPER-SD Journal of Research*, *7*(2), 3–10.

NIST/SEMATECH e-Handbook of Statistical Methods. (n.d.). What are outliers in the data? Retrieved from http://www.itl.nist.gov/div898/handbook/prc/section1/prc16.htm

Norman, G. J., Sallis, J. F., & Gaskins, R. (2005). Comparability and reliability of paper- and computer-based measures of psychosocial constructs for adolescent physical activity and sedentary behaviors. *Research Quarterly for Exercise and Sport*, *76*(3), 315–23.

Palmer, S., & Bycura, D. (2014). BEYOND THE GYM: Increasing outside of school physical activity through physical education. *Journal of Physical Education, Recreation & Dance*, *85*(1), 28–35.

Park, S.-H., Han, K. S., Kang, C.-B., & Park, E.-S. (2013). Effects of an exercise program on depression symptom, self-esteem and stress in adolescents: A systematic review. *Journal of Korean Academy of Psychiatric and Mental Health Nursing*, *22*(1), 22. https://doi.org/10.12934/jkpmhn.2013.22.1.22

Parker, M., Templin, T., & Setiawan, C. (2012). What has been learned from school-University Partnerships. *Journal of Physical Education, Recreation & Dance*, *83*(9), 32–35. https://doi.org/10.1080/07303084.2012.10598845

Parschau, L., Fleig, L., Koring, M., Lange, D., Knoll, N., Schwarzer, R., & Lippke, S. (2013). Positive experience, self-efficacy, and action control predict physical activity changes: A moderated mediation analysis. *British Journal of Health Psychology*, *18*(2), 395–406. https://doi.org/10.1111/j.2044-8287.2012.02099.x

Parschau, L., Fleig, L., Warner, L. M., Pomp, S., Barz, M., Knoll, N., . . . Lippke, S. (2014). Positive exercise experience facilitates behavior change via self-efficacy. *Health Education & Behavior, 41*(4). https://doi.org/10.1177/1090198114529132

Patton, K., Parker, M., & Neutzling, M. M. (2012). Tennis shoes required: The role of the facilitator in professional fevelopment. *Research Quarterly for Exercise and Sport*, *83*(4), 522–32.

Pearson, N., Braithwaite, R., & Biddle, S. J. (2015). The effectiveness of interventions to increase physical activity among adolescent girls: a meta-analysis. *Academic Pediatrics*, *15*(1), 9–18.

Pella, S. (2012). What should count as data for data-driven instruction?; Toward contextualized data-inquiry models for teacher education and professional development. *Middle Grades Research Journal*, *7*(1), 57.

Percentage Change - Percentage Increase and Decrease | SkillsYouNeed. (n.d.). Retrieved from http://www.skillsyouneed.com/num/percent-change.html

Perry, C. K., Garside, H., Morones, S., & Hayman, L. L. (2012). Physical activity interventions for adolescents: An ecological perspective. *The Journal of Primary Prevention*, *33*(2–3), 111–135. https://doi.org/10.1007/s10935-012-0270-3

Peterson, M. S., Lawman, H. G., Wilson, D. K., Fairchild, A., & Van Horn, M. L. (2013). The association of self-efficacy and parent social support on physical activity in male and female adolescents. *Health Psychology*, *32*(6), 666–674. https://doi.org/10.1037/a0029129

Plotnikoff, R. C., Costigan, S. A., Karunamuni, N., & Lubans, D. R. (2013). Social cognitive theories used to explain physical activity behavior in adolescents: A systematic review and meta-analysis. *Preventive Medicine*, *56*(5), 245–253. https://doi.org/10.1016/j.ypmed.2013.01.013

Plowman, S. A. (2014). Top 10 research questions related to musculoskeletal physical fitness testing in children and adolescents. *Research Quarterly for Exercise and Sport*, *85*(2), 174–187. https://doi.org/10.1080/02701367.2014.899857

Plowman, S. A., Sterling, C. L., Corbin, C. B., Meredith, M. D., Welk, G. J., & Morrow Jr, J. R. (2006). The history of FitnessGram®. *Journal of Physical Activity & Health*, *3*(2), S5–S20.

Poekert, P. (2011). The pedagogy of facilitation: teacher inquiry as professional development in a Florida elementary school. *Professional Development in Education*, *37*(1), 19–38. https://doi.org/10.1080/19415251003737309

Ramirez, E., Kulinna, P. H., & Cothran, D. (2012). Constructs of physical activity behaviour in children: The usefulness of Social Cognitive Theory. *Psychology of Sport and Exercise*, *13*(3), 303–310. https://doi.org/10.1016/j.psychsport.2011.11.007

Reed, J. A., Einstein, G., Hahn, E., Hooker, S. P., Gross, V. P., & Kravitz, J. (2010). Examining the impact of integrating physical activity on fluid intelligence and academic performance in an elementary school setting: a preliminary investigation. *Journal of Physical Activity & Health*, *7*(3), 343–351.

Resaland, G. K., Andersen, L. B., Mamen, A., & Anderssen, S. A. (2011). Effects of a 2-year school-based daily physical activity intervention on cardiorespiratory fitness: the Sogndal school-intervention study. *Scandinavian Journal of Medicine & Science in Sports*, *21*(2), 302–309. https://doi.org/10.1111/j.1600-0838.2009.01028.x

Rasberry, C. N., Lee, S. M., Robin, L., Laris, B. A., Russell, L. A., Coyle, K. K., & Nihiser, A. J. (2011). The association between school-based physical activity, including physical education, and academic performance: A systematic review of the literature. *Preventive Medicine*, *52*, S10–S20. https://doi.org/10.1016/j.ypmed.2011.01.027

Ribeiro, L. G. dos S. C., Portal, M. de N. D., da Silva, J. B., Saraiva, A., da Cruz Monte, G., & Dantas, E. H. M. (2010). Effects of two modes of exercise training on physical fitness of 10 year-old children. *Biomedical Human Kinetics*, *2*, 38–41.

Robergs, R. A., & Landwehr, R. (2002). The surprising history of the “HRmax= 220-

age" equation. *Journal of Exercise Physiology*, *5*(2), 1–10.

Roberts, C. K., Freed, B., & McCarthy, W. J. (2010). Low aerobic fitness and obesity are associated with lower standardized test scores in children. *The Journal of Pediatrics*, *156*(5), 711–718.e1. https://doi.org/10.1016/j.jpeds.2009.11.039

Sanchez-Vaznaugh, E. V., Sánchez, B. N., Rosas, L. G., Baek, J., & Egerter, S. (2012). Physical education policy compliance and children's physical fitness. *American Journal of Preventive Medicine*, *42*(5), 452–459. https://doi.org/10.1016/j.amepre.2012.01.008

Sarzynski, M. A., Rankinen, T., Earnest, C. P., Leon, A. S., Rao, D. C., Skinner, J. S., & Bouchard, C. (2013). Measured maximal heart rates compared to commonly used age-based prediction equations in the heritage family study. Retrieved from http://onlinelibrary.wiley.com.ezp.waldenulibrary.org/enhanced/doi/10.1002/ajhb.22431/

Sears, J. V., Edgington, W. D., & Hynes, J. W. (2013). The effect of professional development on physical education instruction in middle schools. *Middle School Journal (J3)*, *45*(5), 25–31.

Shape America: Society of health and physical educators. (n.d.a). 2016 US report card on physical activity. Retrieved from http://www.shapeamerica.org/pressroom/2016/2016-us-report-card-on-physical-activity.cfm

Shape America: Society of health and physical educators. (n.d.b). About SHAPE: Mission and vision. Retrieved from http://www.shapeamerica.org/about/

Shape America: Society of health and physical educators. (n.d.c). Events and conferences. Retrieved from http://www.shapeamerica.org/events/

Shape America: Society of health and physical educators. (n.d.d). Guidelines. Retrieved from http://www.shapeamerica.org/standards/guidelines/peguidelines.cfm

Shape America: Society of health and physical educators. (n.d.e). Physical education standards. Retrieved from http://www.shapeamerica.org/standards/pe/

Shape America: Society of health and physical educators. (n.d.f). Resources, exchanges, blogs. Retrieved from http://www.shapeamerica.org/publications/resources/exchange.cfm

Shen, C. Y., & Liu, H. C. (2011). Metacognitive skills development: a web-based approach in higher education. *TOJET: The Turkish Online Journal of Educational Technology*, *10*(2), 140–150.

Shriver, L. H., Harrist, A. W., Hubbs-Tait, L., Topham, G., Page, M., & Barrett, A. (2011). Weight status, physical activity, and fitness among third-grade rural children. *Journal of School Health*, *81*(9), 536–544.

Smith, J., Nichols, D., Biggerstaff, K., & DiMarco, N. (2009a). Assessment of physical activity levels of 3rd and 4th grade children using pedometers during physical education class. *ICHPER-SD Journal of Research*, *4*(1), 73–79.

Smith, J., Nichols, D., Biggerstaff, K., & DiMarco, N. (2009b). Assessment of physical activity levels of 3rd and 4th grade children using pedometers during physical education class. *ICHPER-SD Journal of Research*, *4*(1), 73–79.

Snoek, M. (2013). From splendid isolation to crossed boundaries? The futures of teacher education in the light of activity theory. *Teacher Development*, *17*(3), 307–321.

Spencer, R. A., Bower, J., Kirk, S. F., & Hancock Friesen, C. (n.d.). Peer mentoring is associated with positive change in physical activity and aerobic fitness of grades 4, 5, and 6 students in the heart healthy kids program. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/?term=Peer+Mentoring+Is+Associated+With+Positive+Change+in+Physical+Activity+and+Aerobic+Fitness+of+Grades+4%2C+5%2C+and+6+Students+in+the+Heart+Healthy+Kids+Program.

Spencer, R. A., Bower, J., Kirk, S. F. L., & Friesen, C. H. (2014). Peer mentoring is associated with positive change in physical activity and aerobic fitness of grades 4, 5, and 6 Students in the Heart Healthy Kids Program. *Health Promotion Practice*, *15*(6), 803–811. https://doi.org/10.1177/1524839914530402

St. George, S. M., Wilson, D. K., Lawman, H. G., & Van Horn, M. L. (2013). Weight status as a moderator of the relationship between motivation, emotional social support, and physical activity in underserved adolescents. *Journal of Pediatric Psychology*, *38*(4), 387–397. https://doi.org/10.1093/jpepsy/jss178

Standage, M., Gillison, F. B., Ntoumanis, N., & Treasure, D. C. (2012). Predicting students' physical activity and health-related well-being: A prospective cross-domain investigation of motivation across school physical education and exercise settings. *Journal of Sport & Exercise Psychology*, *34*(1), 37–60.

Statistics Help for Students. (n.d.). How do I interpret data in SPSS for an independent samples t-test? Retrieved from http://statistics-help-for-students.com/How_do_I_interpret_data_in_SPSS_for_an_independent_samples_T_test.htm#.VxzG-nCG68s

Stroth, S., Kubesch, S., Dieterle, K., Ruchsow, M., Heim, R., & Kiefer, M. (2009). Physical fitness, but not acute exercise modulates event-related potential indices for executive control in healthy adolescents. *Brain Research*, *1269*(0), 114–124. https://doi.org/10.1016/j.brainres.2009.02.073

Sun, C., Pezic, A., Tikellis, G., Ponsonby, A.-L., Wake, M., Carlin, J. B., … Dwyer, T. (2013). Effects of school-based interventions for direct delivery of physical activity on fitness and cardiometabolic markers in children and adolescents: a systematic review of randomized controlled trials. *Obesity Reviews*, *14*(10), 818–838. https://doi.org/10.1111/obr.12047 supportREALteachers. (n.d.). Retrieved from http://www.supportrealteachers.org/

supportREALteachers. (n.d.). The importance of quality physical education. Retrieved from http://www.supportrealteachers.org/the-importance-of-quality-physical-education1.html

Suresh, K., & Chandrashekara, S. (2012). Sample size estimation and power analysis for clinical research studies. *Journal of Human Reproductive Sciences*, *5*(1), 7. https://doi.org/10.4103/0974-1208.97779

Suton, D., Pfeiffer, K. A., Feltz, D. L., Yee, K. E., Eisenmann, J. C., & Carlson, J. J.

(2013). Physical Activity and Self-efficacy in Normal and Over-fat Children. *American Journal of Health Behavior*, *37*(5), 635–640. https://doi.org/10.5993/AJHB.37.5.7

Telford, R. D., Cunningham, R. B., Fitzgerald, R., Olive, L. S., Prosser, L., Jiang, X., & Telford, R. M. (2011). Physical education, obesity, and academic achievement: A 2-year longitudinal investigation of Australian elementary school children. *American Journal of Public Health*, *102*(2), 368–374. https://doi.org/10.2105/AJPH.2011.300220

Terrell, S. R. (2012). Mixed-Methods Research Methodologies. *Qualitative Report*, *17*(1), 254–280.

Thomas, A. G., Dennis, A., Bandettini, P. A., & Johansen-Berg, H. (2012). The effects of aerobic activity on brain structure. *Frontiers in Psychology*, *3*(86). https://doi.org/10.3389/fpsyg.2012.00086

Trust for America's Health. (2011). *F as in fat: How obesity threatens America's future.* Washington DC: Robert Wood Johnson Foundation.

Tsangaridou, N. (2012). Educating primary teachers to teach physical education. *European Physical Education Review*, *18*(3), 275–286. https://doi.org/10.1177/1356336X12450788

UCLA Institute for Digital Research and Education. (n.d.). SPSS FAQ: What does Cronbach's alpha mean? Retrieved from http://www.ats.ucla.edu/stat/spss/faq/alpha.html

U.S. Department of Health and Human Services. (n.d.a). The surgeon general's vision for a healthy and fit nation. Retrieved from https://www.surgeongeneral.gov/priorities/healthy-fit-nation/obesityvision2010.pdf

U.S. Department of Health and Human Services (n.d.b). Step It Up! The Surgeon General's call to action to promote walking and walkable communities. Retrieved from https://www.surgeongeneral.gov/library/calls/walking-and-walkable-communities/exec-summary.html

Vaara, J. P., Kyröläinen, H., Niemi, J., Ohrankämmen, O., Häkkinen, A., Kocay, S., & Häkkinen, K. (2012). Associations of maximal strength and muscular endurance test scores with cardiorespiratory fitness and body composition. *The Journal of Strength & Conditioning Research*, *26*(8), 2078–2086. Retrieved from http://journals.lww.com/nsca-jscr/Fulltext/2012/08000/Associations_of_Maximal_Strength_and_Muscular.10.aspx

Van Der Horst, K., Paw, M. J. C. A., Twisk, J. W. R., & Van Mechelen, W. (2007). A brief review on correlates of physical activity and sedentariness in youth. *Medicine & Science in Sports & Exercise*, *39*(8), 1241–1250. https://doi.org/10.1249/mss.0b013e318059bf35

Voorhees, C. C., Yan, A. F., Clifton, K. J., & Wang, M. Q. (2011). Neighborhood environment, self-efficacy, and physical activity in urban adolescents. *American Journal of Health Behavior*, *35*(6), 674–688.

Voskuil, V. R., & Robbins, L. B. (2015). Youth physical activity self-efficacy: A concept analysis. *Journal of Advanced Nursing*, *71*(9), 2002–2019. https://doi.org/10.1111/jan.12658

Warner, L. M., Schüz, B., Wolff, J. K., Parschau, L., Wurm, S., & Schwarzer, R. (2014). Sources of self-efficacy for physical activity. *Health Psychology*, *33*(11), 1298–1308. https://doi.org/10.1037/hea0000085

Welk, G. J., & Meredith, M. D. (2007). FitnessGram®/ActivityGram®. *Test Administration Manual. The Cooper Institute, 4º Ed. Champaign, IL: Human Kinetics*. Retrieved from http://classroom.kleinisd.net/users/0274/docs/fitnessgram_referenceguide.pdf

West, S., T., & Shores, K., A. (2014). Does HOPSports promote youth physical activity in physical education classes? *The Physical Educator*, *71*, 16–40.

Wiles, J., & Bondi, J. C. (2011). *Curriculum development: A guide to practice* (8th ed.). Boston, MA: Pearson.

Wiles, N. J., Haase, A. M., Lawlor, D. A., Ness, A., & Lewis, G. (2011). Physical activity and depression in adolescents: cross-sectional findings from the ALSPAC cohort. *Social Psychiatry and Psychiatric Epidemiology*, *47*(7), 1023–1033. https://doi.org/10.1007/s00127-011-0422-4

Wilkinson, C., Brown, L., Graser, S. V., & Pennington, T. R. (2012). Adolescent girls' preferences pertaining to cardiovascular fitness testing: A comparison between the one-mile run and PACER tests. *The Physical Educator*, *69*, 52–70.

Wittberg, R. A., Northrup, K. L., & Cottrel, L. A. (2009). Children's physical fitness and academic performance. *American Journal of Health Education*, *40*(1), 30–36. Retrieved from http://files.eric.ed.gov/fulltext/EJ833253.pdf

Wittberg, R. A., Northrup, K. L., & Cottrell, L. A. (2012). Children's aerobic fitness and academic achievement: A longitudinal examination of students during their fifth and seventh grade years. *American Journal of Public Health*, *102*(12), 2303–2307. https://doi.org/10.2105/AJPH.2011.300515

Wittberg, R. A., Cottrell, L. A., Davis, C. L., & Northrup, K. L. (2010). Aerobic fitness thresholds associated with fifth grade academic achievement. *American Journal of Health Education*, *41*(5), 284–291. Retrieved from http://files.eric.ed.gov/fulltext/EJ897369.pdf

Wood, C., Angus, C., Pretty, J., Sandercock, G., & Barton, J. (2013). A randomized control trial of physical activity in a perceived environment on self-esteem and mood in UK adolescents. *International Journal of Environmental Health Research*, *23*(4), 311–320. https://doi.org/10.1080/09603123.2012.733935

World Health Organization. (n.d.). Physical activity. Retrieved from http://www.who.int/dietphysicalactivity/pa/en/

Yetter, G. (2009). Exercise-based school obesity prevention programs: An overview. *Psychology in the Schools*, *46*(8), 739–747.

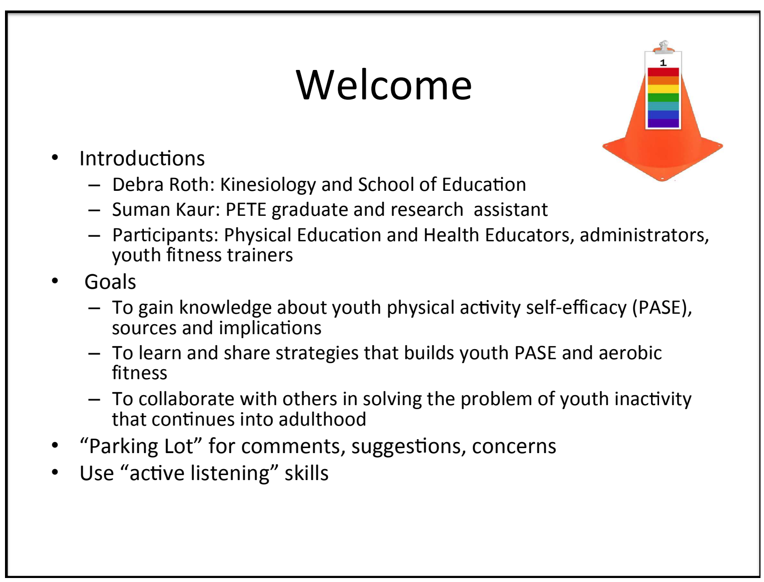
Yildirim, M., Van Stralen, M. M., Chinapaw, M. J. M., Brug, J., Van Mechelen, W., Twisk, J. W. R., & Te Velde, S. (2011). For whom and under what circumstances do school-based energy balance behavior interventions work? Systematic review on moderators. *International Journal of Pediatric Obesity*, *6*(2Part2), e46–e57. https://doi.org/10.3109/17477166.2011.566440

Yoshikawa, H., Weisner, T. S., Kalil, A., & Way, N. (2013). Mixing qualitative and quantitative research in developmental science: Uses and methodological choices. *Qualitative Psychology*, *1*(S), 3–18.

Appendix A: The Project

Professional Development Workshop
Slide 1/73

Note: Slide will be displayed during registration



Note: In addition to the list provided, there may be an opportunity to ask workshop participants to be part of another study that will be closely related to my research. This study would need to be approved by my University Research Foundation and pass an ethical review while following all campus policies before proceeding.

Slide 3/73

Workshop Topics

Day 1

- Rainbow Run Introduction
- Bandura's (1977) "Social Cognitive Theory" (SCT)
- Sources that influence PASE

Day 2

- Research design and data analysis
- Rainbow Run research findings

Day 3

- Physical activity (PA) research, significance of PA
- FIT introduction, youth fitness training strategies
- Rainbow Run data analysis and interpretation

1

Note: Topics simply listed for participants to understand the workshop content

Slide 4/73

Day 1: Agenda and Schedule

8:30-9:00: Registration, coffee, fruit, rolls

- Introduction, goals, topics, agenda
- Instant activity: Railroad Cars
- Chart activity: record FitnessGram® experiences, share

10:30-11:00: Morning Break/light snack

- "Becky's Story"
- Introduce Rainbow Run rationale, protocols

12:30-1:00: Lunch break/buffet lunch

- Bandura's SCT, self-efficacy, sources of PASE
- Discuss student motivation, PA self-efficacy beliefs
- Participate in the Rainbow Run and record scores

2:30-3:00: Close session

- Set/share personal aerobic fitness goals, discuss goal setting
- Be aware of PASE sources to share next time
- Prepare to conduct Rainbow Run aerobic assessments with students, receive rainbow assessment cards, gift t-shirt

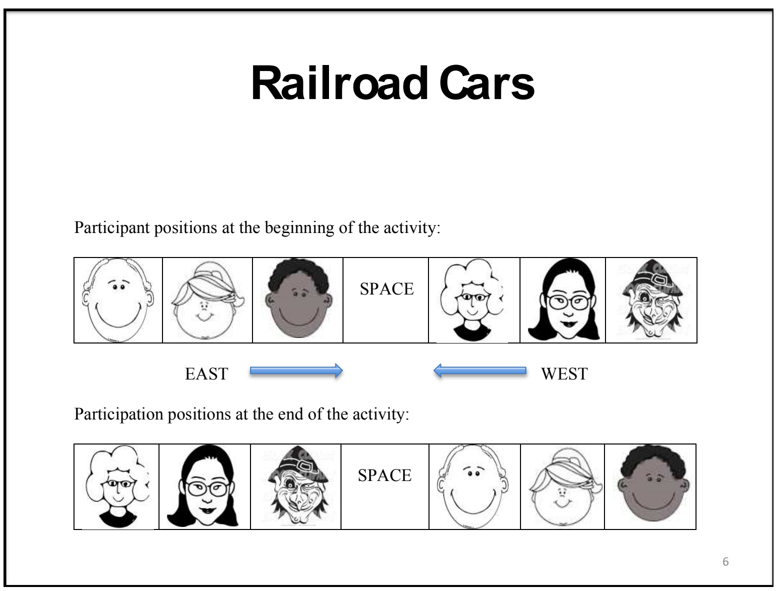
4

Note: Workshop participants will receive a binder with agendas, presentation materials duplicated, handouts with additional information, and evaluation forms (see Appendix B). Teachers will be reminded to follow school policies and protocols when using student data. WU IRB determined that schools can share student assessment data if identities are kept confidential.

Slide 5/73

Note: Explain ice breaker; help participants get into groups with supplies.

Slide 6/73



Note: Participants problem solve how to exchange sides; demonstrate to other groups; share experiences; what worked best?

Slide 7/73

Teacher Perspectives

Charting Activity

Organization:

- Same groups at Railroad Car activity
- Choose: Discussion leader, writer (chart), presenter

Topic: FitnessGram® 1 Mile Run/Walk

- Possible themes:
  - Preparation
  - Student behaviors
  - External influences
  - Student performance

7

Note: Share ideas after activity, sum up consensus and differences

Slide 8/73

FitnessGram® 1 Mile Run Facts

- Developed in 1980's to provide a "report card" to parents, teachers, administrators
- Officially adopted in 1987; software program; collects and maintains longitudinal data
- Pacer® adopted in 1997; 1 Mile Walk in 1999
- Healthy Fitness Zone® standards were adopted in 1992; minimum levels of fitness
- Historically, FG® only fitness assessment not adjusted or changed; original assessment

Plowman (2006)

8

Note: FYI…. I have observed years and years of 1 Mile days; not my favorite lesson. Teachers are great! Kids seem to always have the same reaction….dread…what is your experience? Share current research regarding avoidance.

Slide 9/73

FitnessGram® 1 Mile Run Facts

- 30-35% of students in fifth, seventh, and ninth grades were not meeting the HFZ criteria for aerobic fitness.
- 6-12% in high risk category
- Student numbers: 10 out of 30 students, about one-third, fail to make the FG® standard EVERY time is is administered, EVERY TIME.
- About 30% of Americans are sedentary; most likely the same people that failed the FG®.

9

Note: Connect participant comments to the FG facts

Slide 10/73

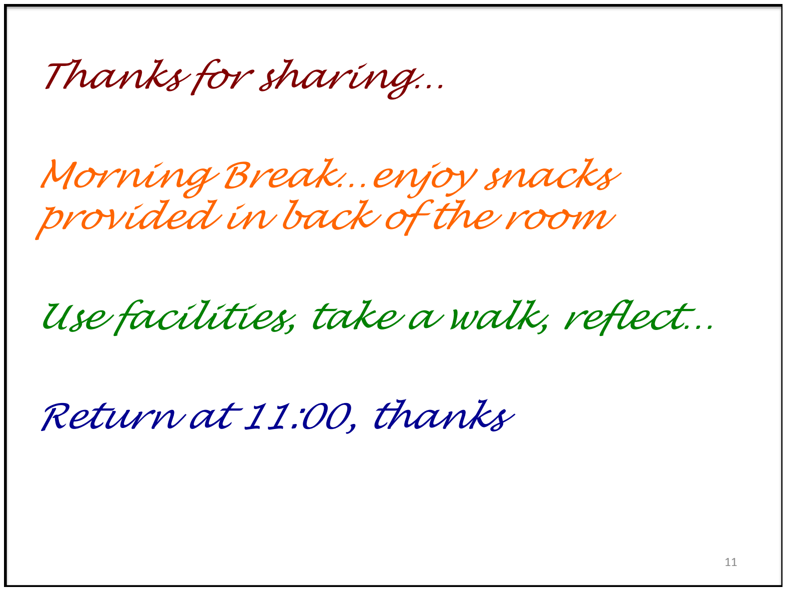
FitnessGram® 1 Mile Facts

	FG 1 Mile	FG 1 Mile	FG 1 Mile
	Met HFZ Standard	HFZ: Needs Improvement	HFZ: High Risk Zone
5th Grade	63.5	29.9	6.6
7th Grade	65.4	24.6	10.0
9th Grade	63.8	23.5	12.7

Source: CDC (2015)

Note: Summarize charts: Needs Improvement group get better (start junior has PE)….High risk group gets bigger….those that meet the standard stays about the same…

Slide 11/73



Note: Workshop management slide

Slide 12/73

Note: Give quick background my experience to give Becky's story context and why the Rainbow Run was created; "Becky's story". Briefly, Becky was a Special Olympic athlete that I often saw in her junior high PE class while observing student teachers. She was one of my athletes that swam, ran, bowled, and at the time of this story, played basketball on my level 3 team. She was the point guard. I knew her family well and they raised golden retriever dogs as a living. Becky was responsible for walking the dogs daily, which took a couple hours each afternoon. She was clearly one of the most aerobically fit persons possible. I noticed that Becky was not "dressed down" for the mile run planned that day. To be honest, I was curious to see what she might do. When asked, she didn't dress down because she didn't have to do the mile (not required) and that she felt that she couldn't finish it anyway. What? In her mind she felt that she wouldn't be able to finish it. Well, she was right, sort of, she would not be able to finish under the standard as expected, and somehow she equated meeting the standard to being able to complete a mile at any standard….

Slide 13/73

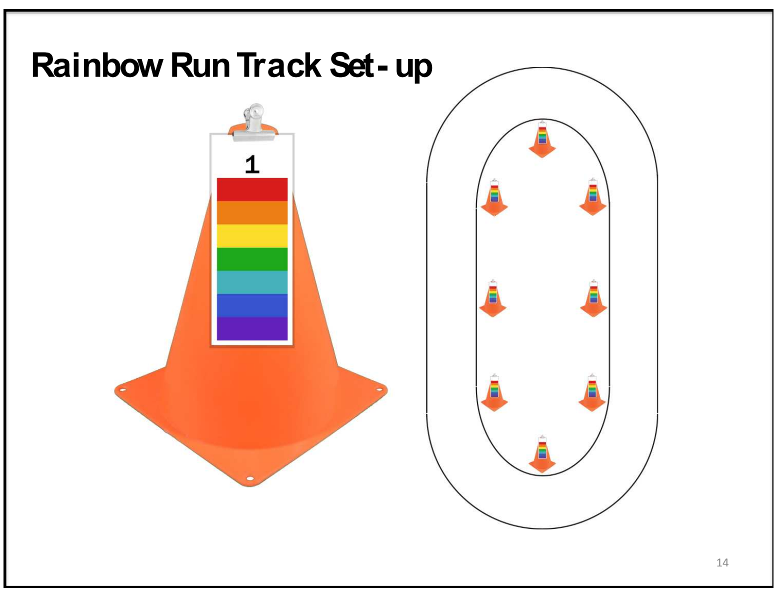
Rainbow Run

- **Set up**: Cones are set up evenly around a track
- **Procedure:** All students start together and try to go as far (distance) as possible around the track for **15 minutes**
- Report performance using **color:number** format
- Ask students to **try their hardest** and to try to **improve** on subsequent attempts

13

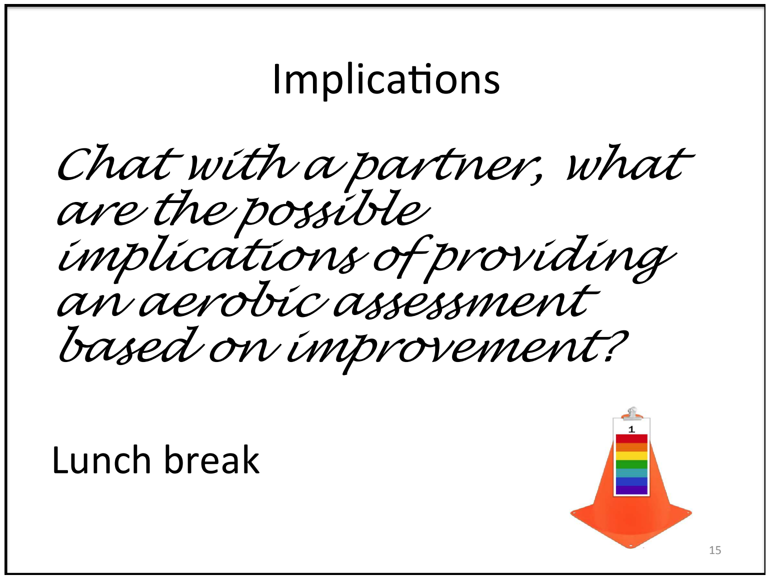
Note: Workshop participants will learn about the RR protocols. They will be engaging in this assessment later today, and will facilitate in their PE classes

Slide 14/73



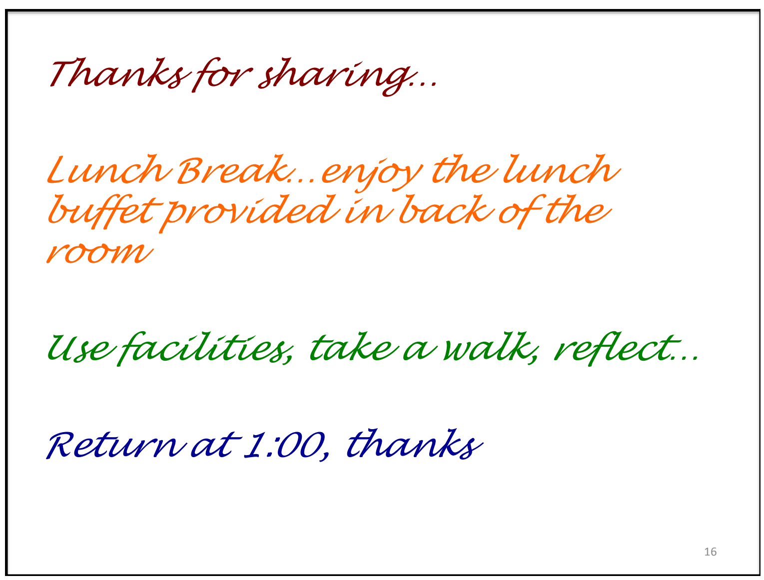
Note: typical track (400m); RR illustration

Slide 15/24



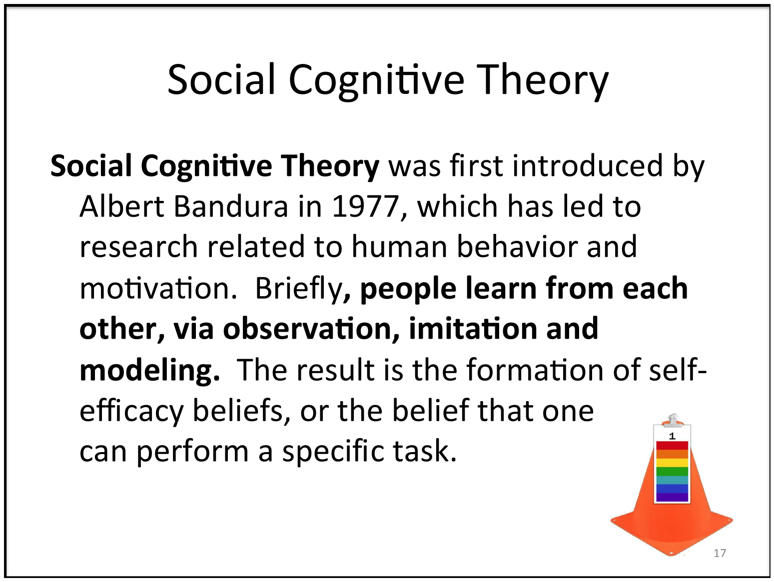
Note: Formative assessment and participant opportunity to synthesis information learned so far; provides management transition to lunch, flexible scheduling into lunch

Slide 16/73



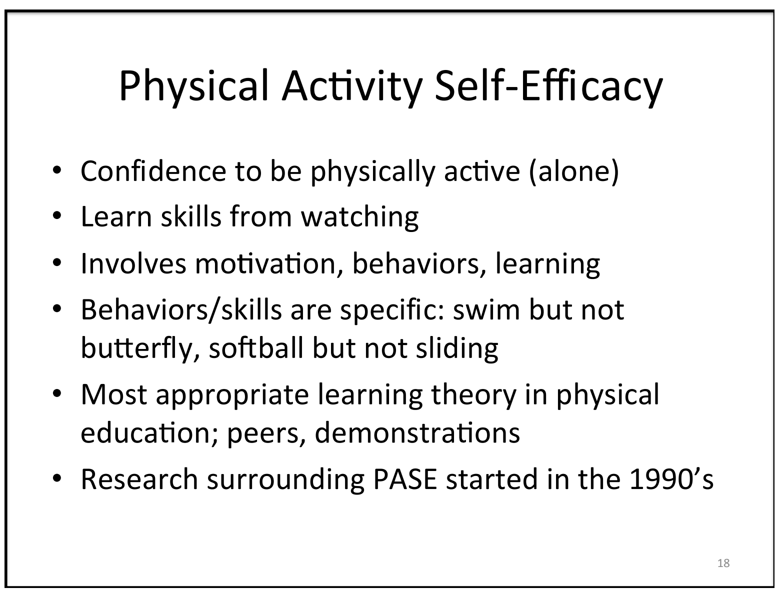
Note: Lunch will be provided and served in the same room/gym (registration area); my assistant will set up.

Slide 17/73



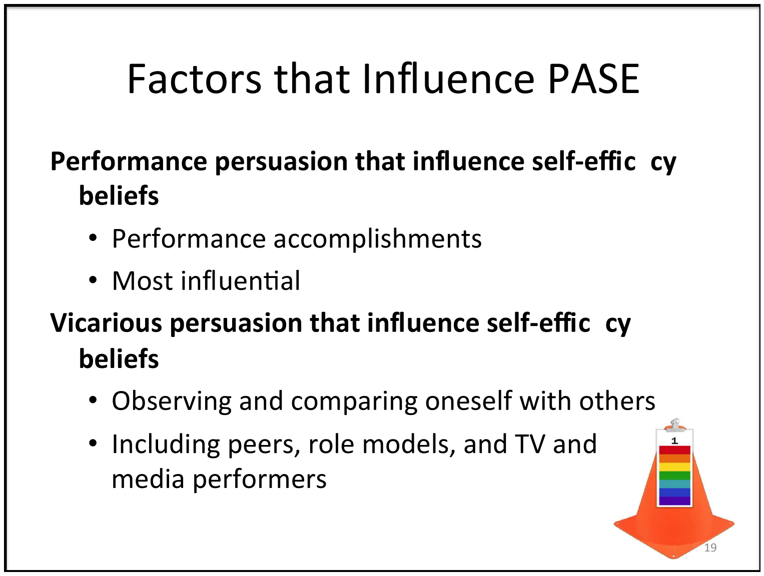
Note: Bandura…learning from watching…that is PE.

Slide 18/73



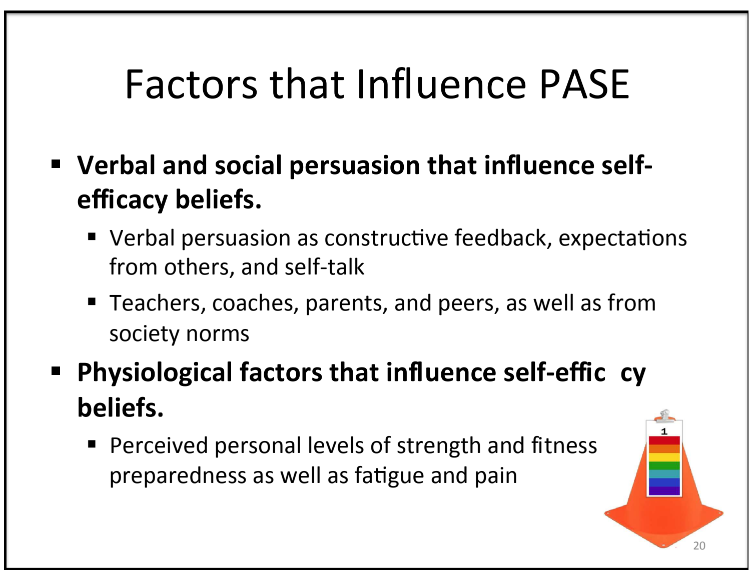
Note: PASE characteristic summary

Slide 19/73



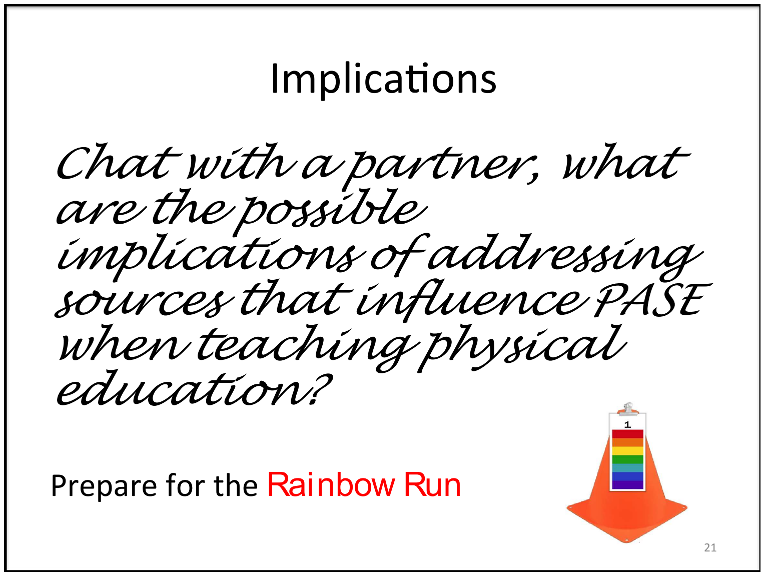
Note: Ask participants to chat with partners to come up with examples of these sources of SE. "Turn to your partner, what are some examples of performance accomplishments and comparing self to others occurs in your classroom?"

Slide 20/73



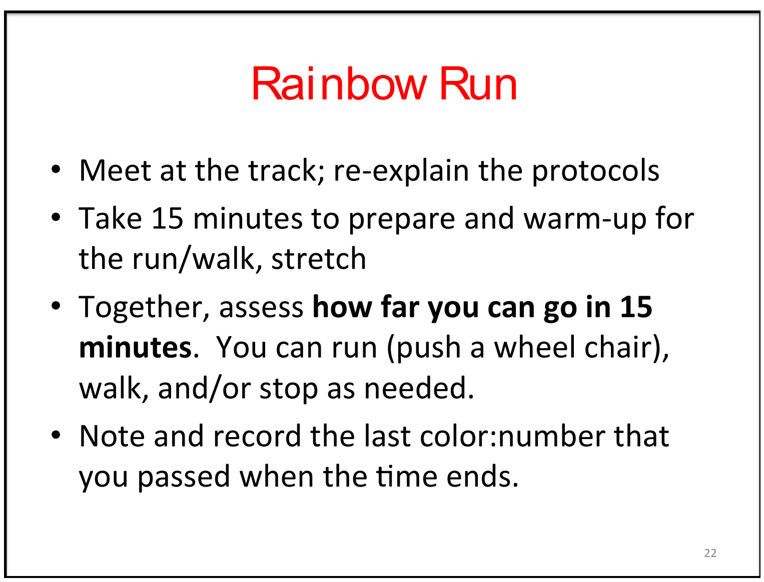
Note: Repeat same chat as previous slide…examples of these sources in your classroom?

Slide 21/73



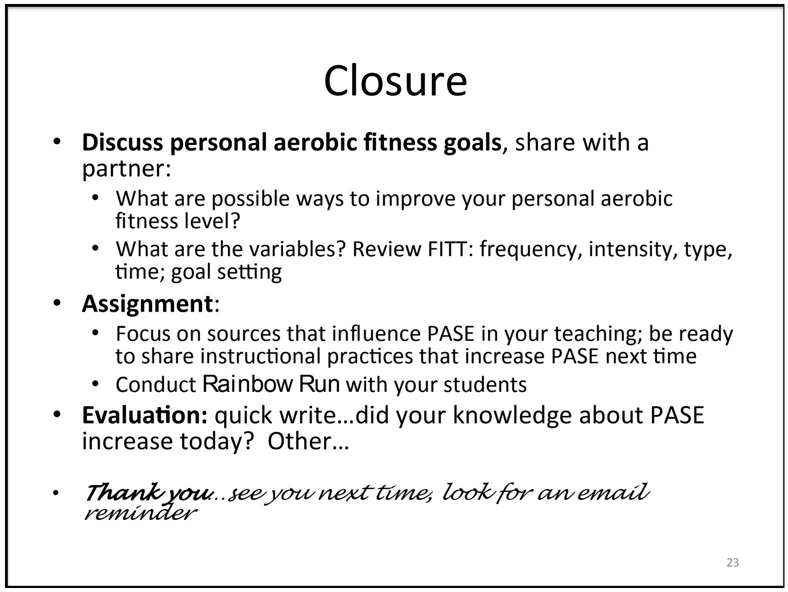
Note: Formative assessment, implications requiring higher thinking

Slide 22/73



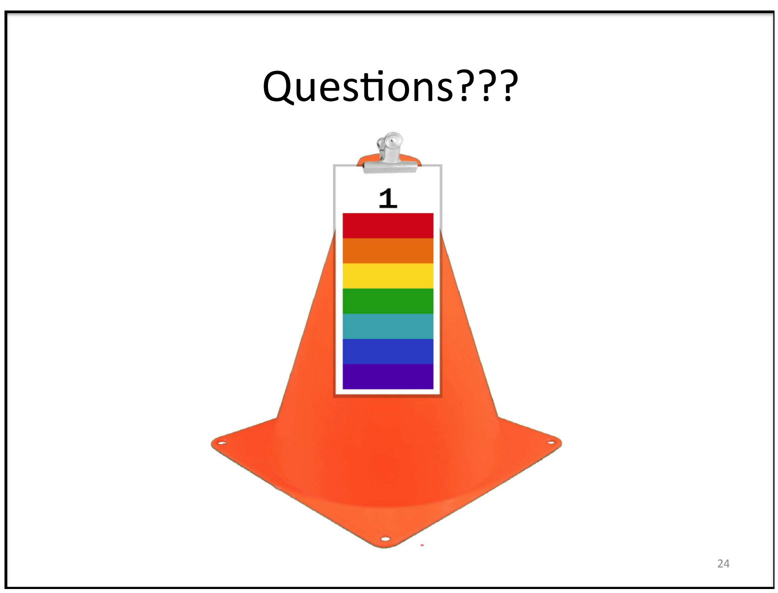
Note: Workshop participants will engage in the RR and record scores.

Slide 23/73



Note: Evaluation sheets will be provided with questions that inquire if the workshop outcomes are met, if content was pertinent, and participant feedback about the workshop content. Participants will be directed to write down their examples of lessons and daily practice that purposefully address PASE.

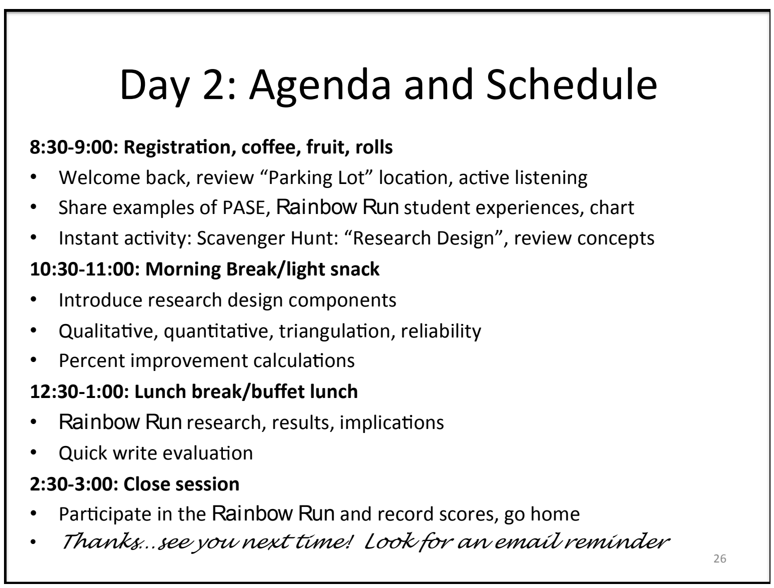
Slide 24/73



Note: Take questions as needed

Slide 25/73

Slide 26/73



Note: The sharing of examples will begin in small groups at first, that is, turn to your partner and share your Rainbow Run experience that you had with your students. Afterward, a whole group discussion will follow with charting (assistant) similarities between participants. Later, this chart will be compared to the results of my study.

Slide 27/73

Scavenger Hunt

- Find a partner…someone different
- "Hunt" for posters placed around the gym; follow the directions
- Spend about 2-3 minutes at each poster solving the problem and/or answer the question(s)
- Get another cup of coffee/tea in the process?

27

Note: There are nine posters/stations that reviews research design concepts. See Chapter three, Appendix J for an illustration. Three minutes at nine stations is 18 minutes, plus a quick review and closure of activity…this instant activity is planned for about 30 minutes.

Slide 28/73

Scavenger Hunt Review

#1: Average, mean; add and divide by number of integers

#2: Convert minute:seconds into seconds; change minutes to 60 seconds, add

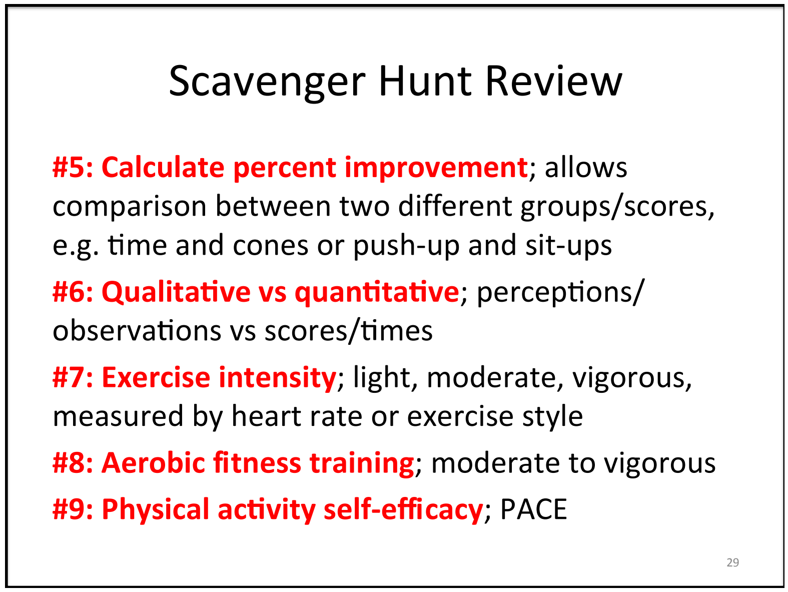
#3: Convert color:cones to all cones; each color is worth 8 cones, add

#4: Aerobic vs anaerobic; exercise intensity and duration are the key factors

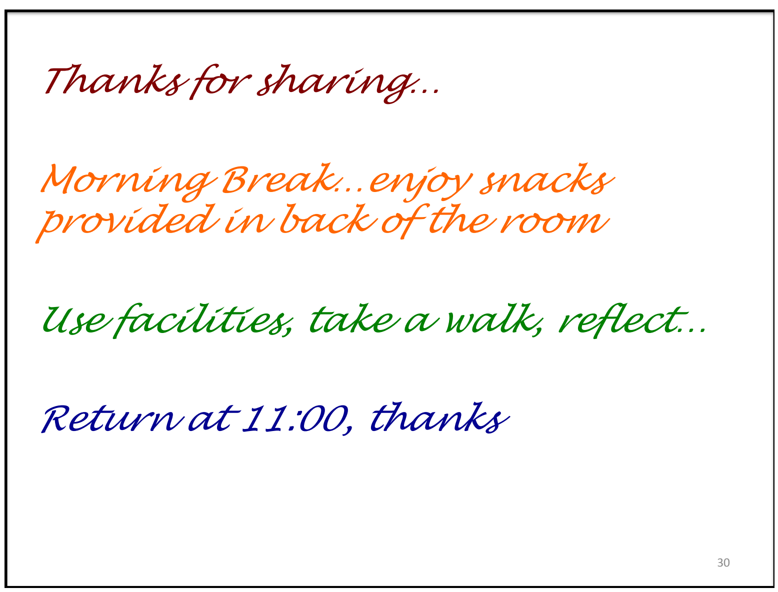
28

Note: Poster answers will be shared with this activity intended to introduce the session held after the morning break.

Slide 29/73



Slide 30/73



Note: Allows for flexible management of workshop participant discussion/chat

Slide 31/73

Research Design Overview

Quantitative

- Use of numbers, (scores, time)
- RQs are specific, narrow, measureable, verifiable, predict outcomes
- Data gathered from large population; able to generalize from results, compares groups and variables
- Objective and unbiased

31

Note: Quick summary of research design components; purpose, to understand my study better.

Slide 32/73

Research Design Overview

Qualitative

- Data based on words, observations to describe the phenomenon
- Explores a problem, develops a detailed understanding, descriptive themes
- RQs are general and broad
- Small population, individuals
- Text is analyzed, findings interpreted

32

Slide 33/73

Research Design

Quantitative method of research

- Experimental: control group, pre/post testing; quasi-experimental (known groups)
- Correlational: predict and explain relationships
- Survey: attitudes, behaviors, opinions, characteristics

33

Slide 34/73

Research Design

Qualitative method of research

- Grounded Theory: generates and explains broad concepts, process, action, interaction
- Ethnographic: describes, analyzes, interprets culture, groups, patterns of behavior, beliefs, and language
- Narrative: story telling, individuals

Mixed Methods

- Uses both quantitative and qualitative styles

(Creswell, 2012)

34

Slide 35/73

Research Design

Steps…

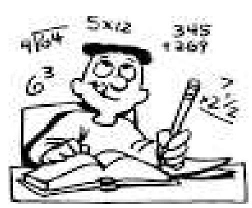
- Determine problem, write RQ question
- Complete a review of literature about the topic
- Write a proposal, get approvals (IRB), consider ethical practices
- Collect data, analyze, interpret
  - Quantitative: descriptive statistics
  - Qualitative: coded themes, tendencies
- Triangulate results, verify findings and reliability, and determine implications
- Report

35

Note: A short discussion about ethical behavior surrounding research practices will be included during this slide

Slide 36/73

Percent Improvement

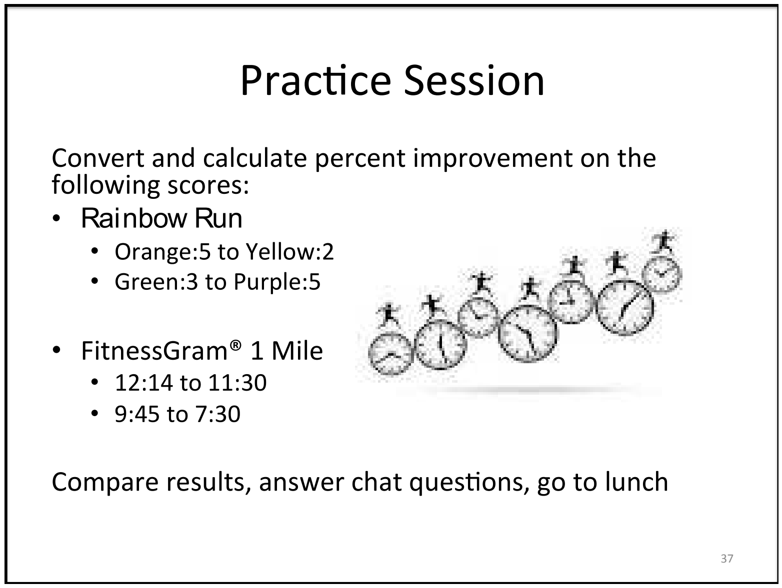


- Compares two sets of data measured in different ways
- Calculate the difference between the two scores, divide the difference by the original score, then multiply by 100
- Example: 57-49=8
  8/57=.14
  .14 x 100= 14% improvement
- Can be programmed into a spreadsheet

36

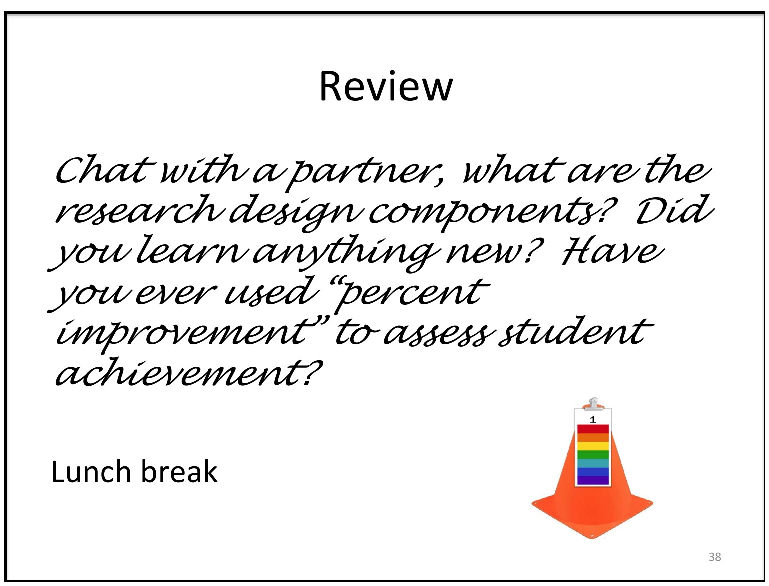
Note: This topic is most important in understanding my study and to gain a practical tool to use data to direct instruction

Slide 37/73



Note: This activity uses information presented on Day 1 as well as the morning session about how to calculated Rainbow Run scores. Percent improvement can be used with any quantitative/scored fitness activity.

Slide 38/73

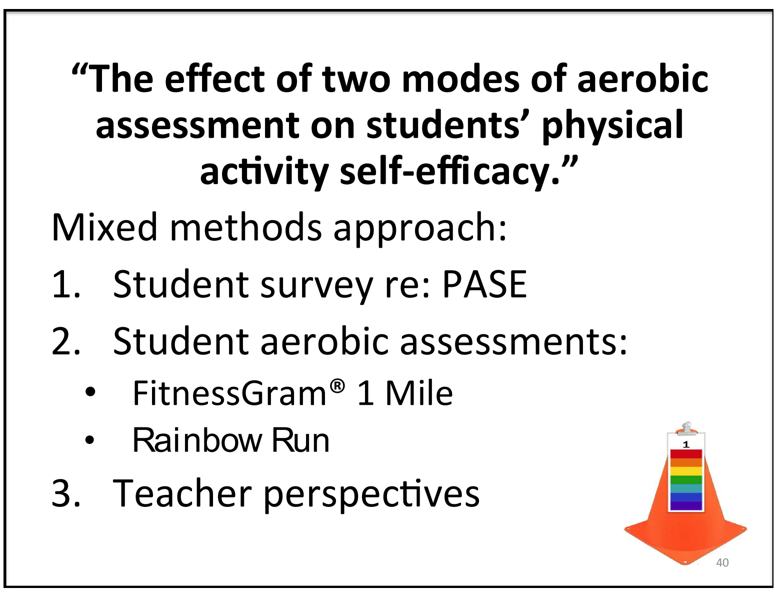


Note: Formative assessment of the morning session; flexible management

Slide 39/73

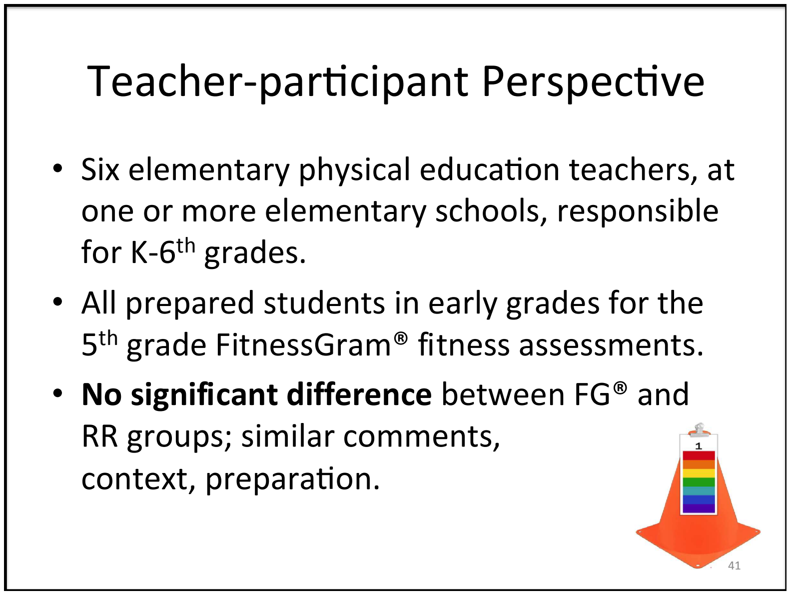
Note: Flexible transition.

Slide 40/73



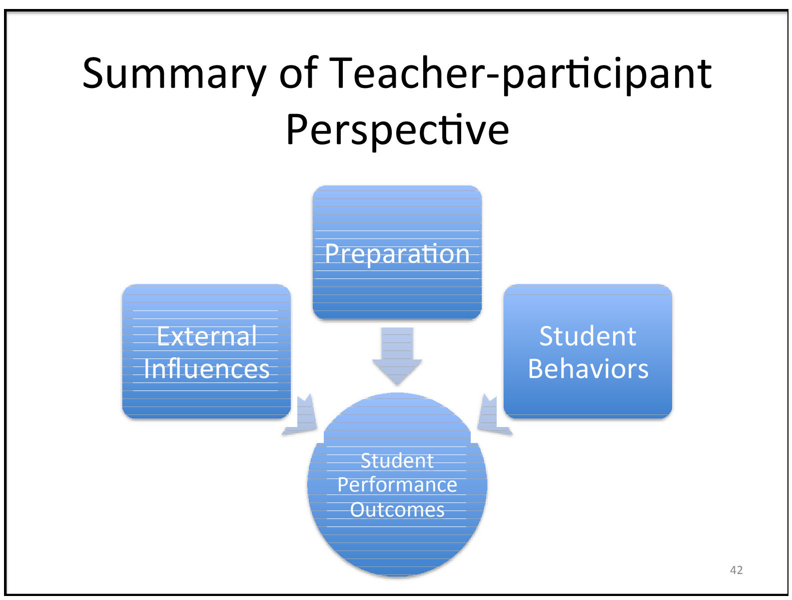
Note: remember to share that the RR is an original assessment; ask participants if there are any other alternative assessments that you have used?

Slide 41/73



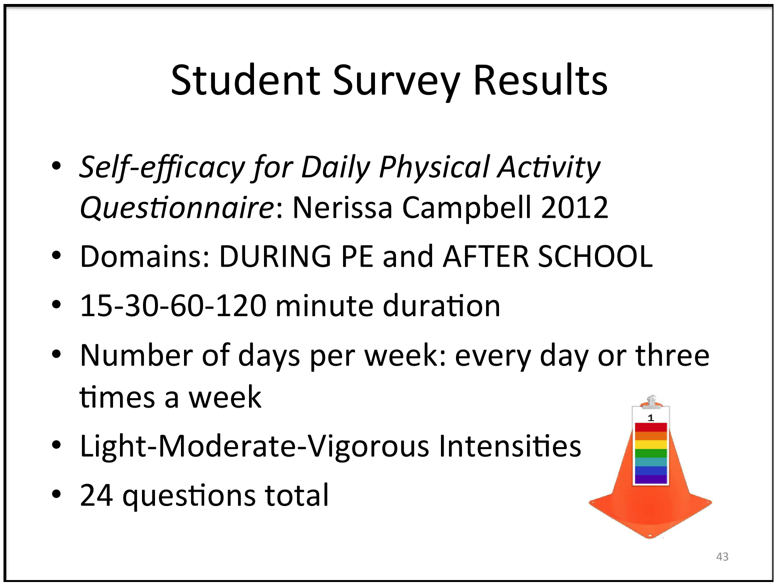
Note: Explain that I was expecting/hoping to see different behaviors from the different groups, which did not happen. Rather, teacher comments indicated that both settings and outcomes were similar with ample teacher encouragement and student preparation.

Slide 42/73



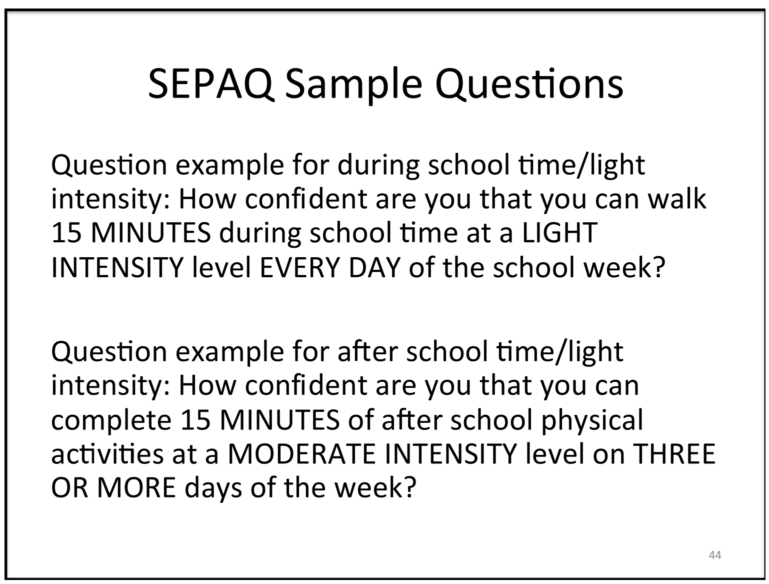
Note: External influences: new track, weather, people cheering, informing parent, ALL TEACHERS TOLD STUDENTS TO TRY HARD TO IMPROVE; preparation: started in early grades, small increments; student behaviors: excited, confused.

Slide 43-73



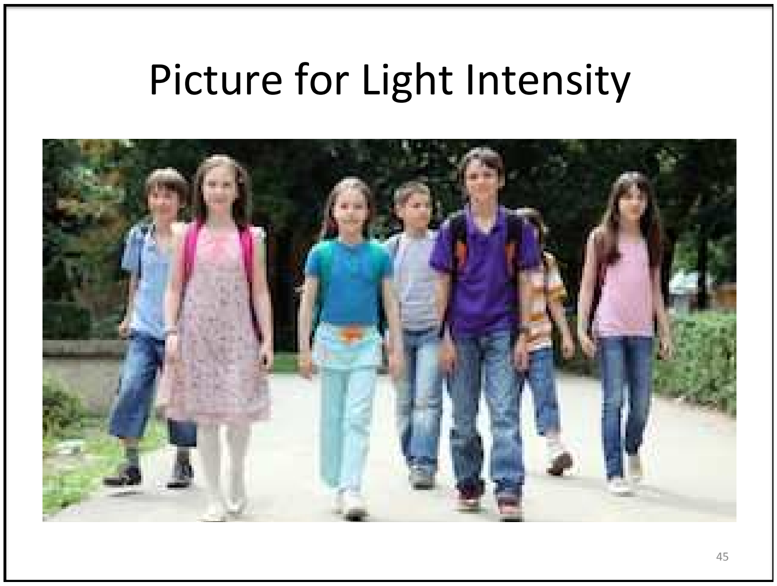
Note: Explain the survey; online and paper/pencil styles

Slide 44/73



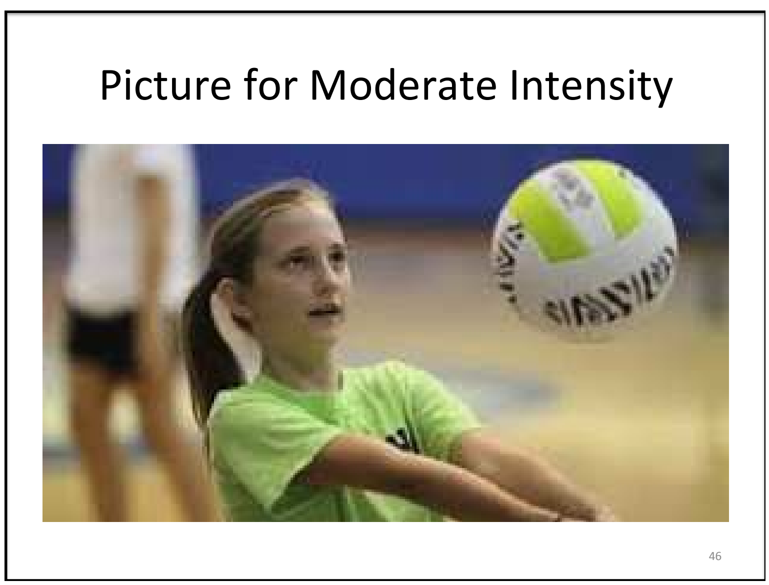
Note: Explain exercise intensities….used pictures (use next slides).

Slide 45/73



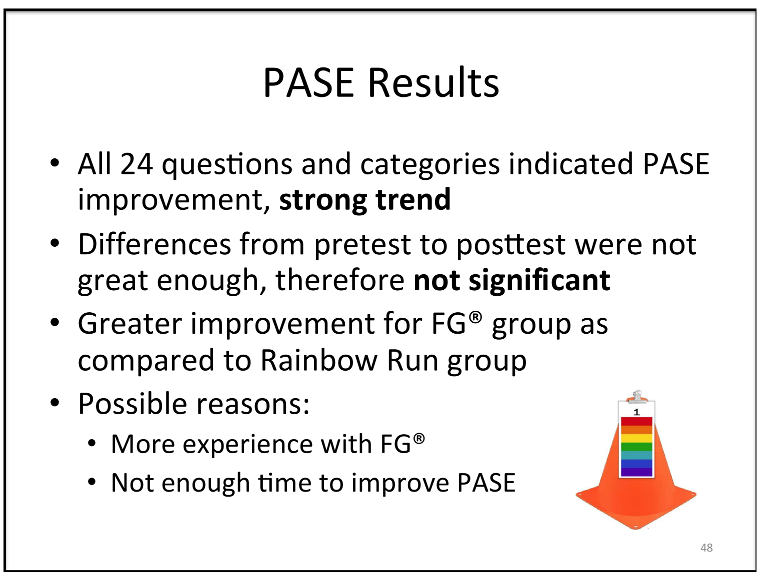
Note: Use pictures to explain intensity

Slide 46/73



Slide 47/73

Slide 48/73



Note: Results: STRONG TREND…all questions had improvement from both groups….

Slide 49/73

FG® and Rainbow Run Results

	Number of Students	Percent that Improved	Percent Improve-ment
FitnessGram®	136	70	1.49%
Rainbow Run	211	73	22.5%

49

Note: Explain percent improvement; how to compare the different styles of assessing fitness; explain the chart: those that tried to improve tried harder during the RR.

Slide 50/73

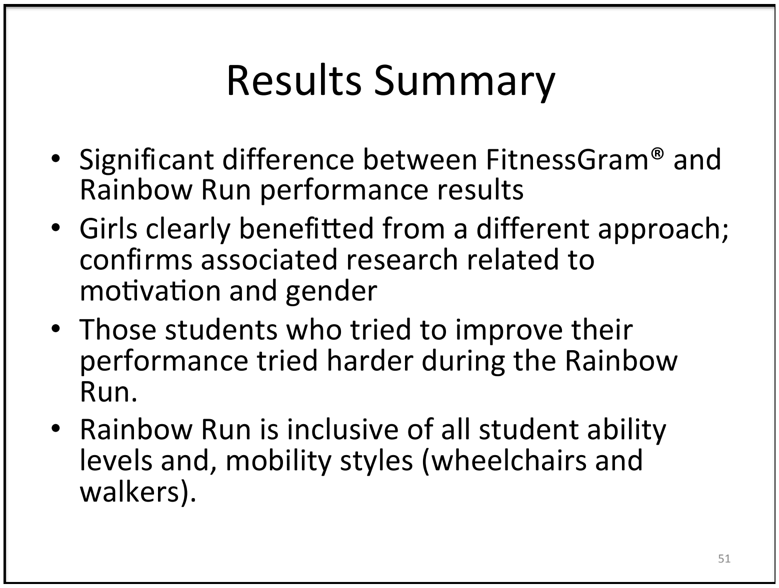
Gender Differences

	Number of Students	Percent that Improved	Percent Improve-ment
FitnessGram®			
Girls	69	68	**-7.5%**
Boys	67	72	10.8%
Rainbow Run			
Girls	103	74	**24.2%**
Boys	108	71	22.8%

50

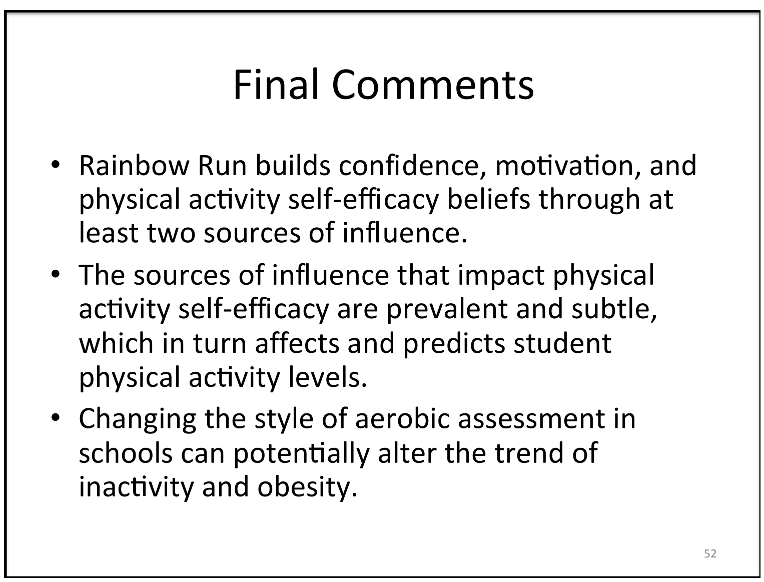
Note: Gender results were most significant; Explain the chart, girls were most affected.

Slide 51/73



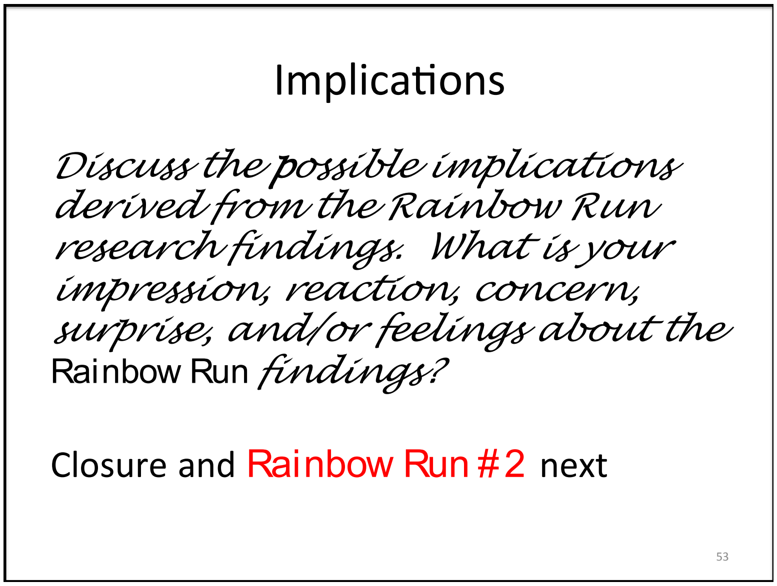
Note: To my delight, my intuition was right. I have witnessed students quit trying and accepted this behavior often as part of the process. Now I think the 1 Mile assessment is part of the problem in motivating students to be physically active. Don't forget Bandura and the sources of SE. We are most susceptible to social modeling, literally depend on modeling to teach skills, and wonder why kids not motivated.

Slide 52/73



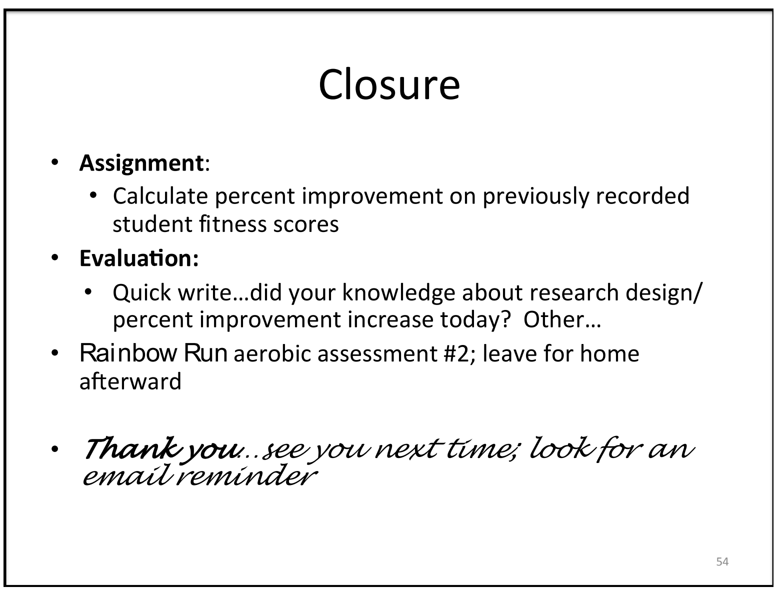
Note: This seems to make sense… Remember, SE sources are important… Share personal experiences that were charted.

Slide 53/73



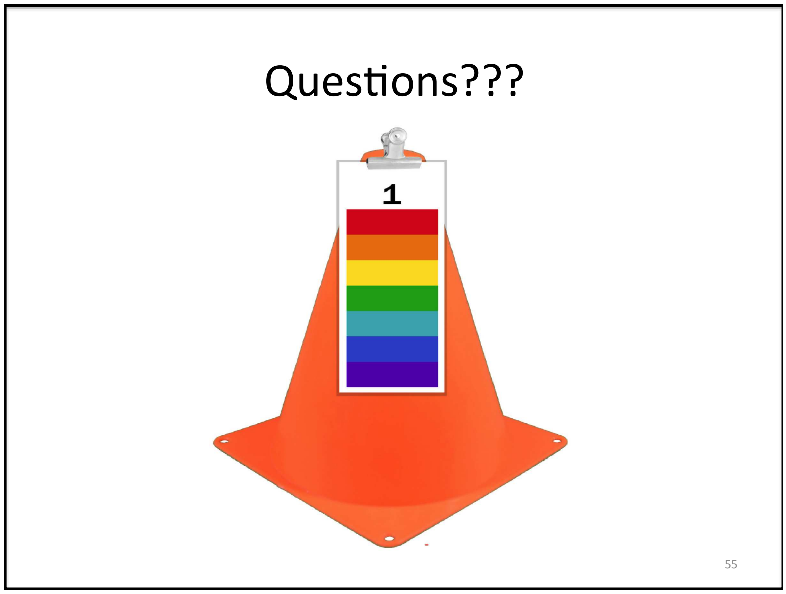
Note: Formative assessment of the content and implications from my study.

Slide 54/73



Note: notice that workshop participants have homework and an assignment to complete for the next workshop.

Slide 55/73



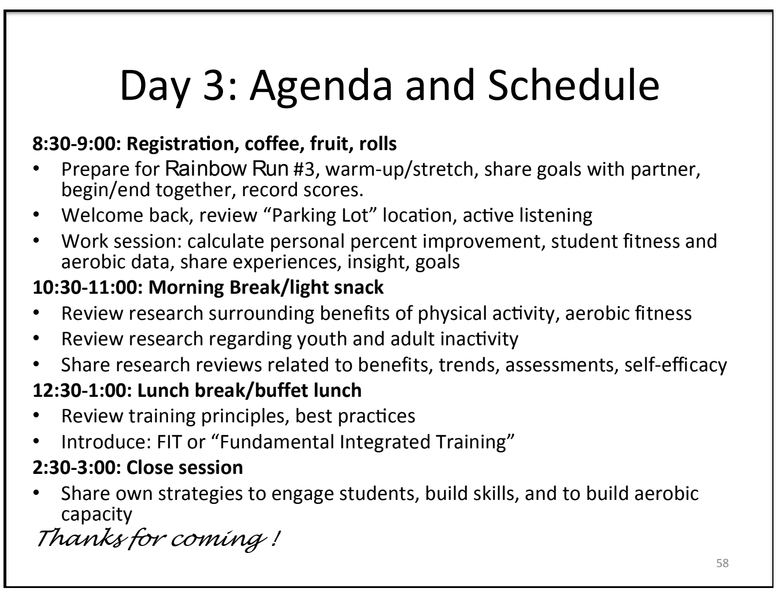
Note: Take questions as needed.

Slide 56/73

Slide 57/73

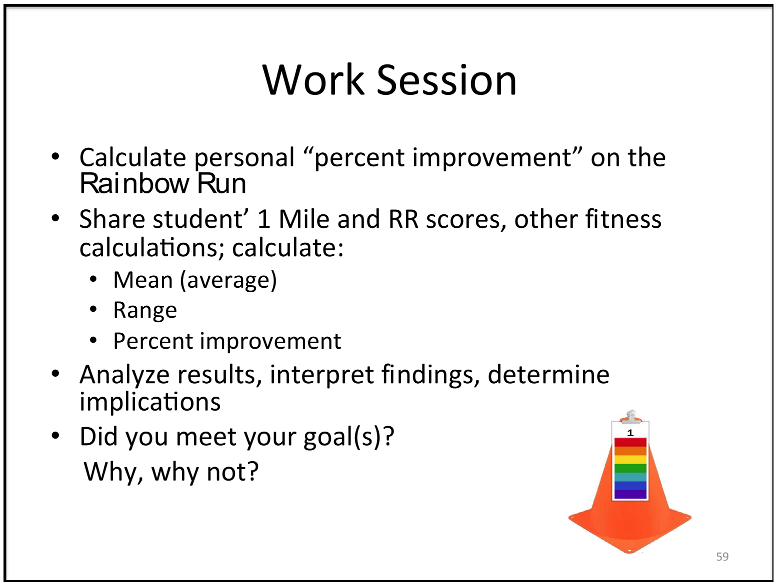
Note: Registration will be held between 8:30-9:00 with this message on the screen. Workshop participants will be directed to meet on the track at 9:00.

Slide 58/73



Note: I expect the final Rainbow Run to take about 30 minutes to complete. Another 15 minutes is needed to warm-down/stretch, and return to the gym. The Rainbow Run assessment will begin around 9:00, take 15 minutes with 5 minutes to record results.

Slide 59/73

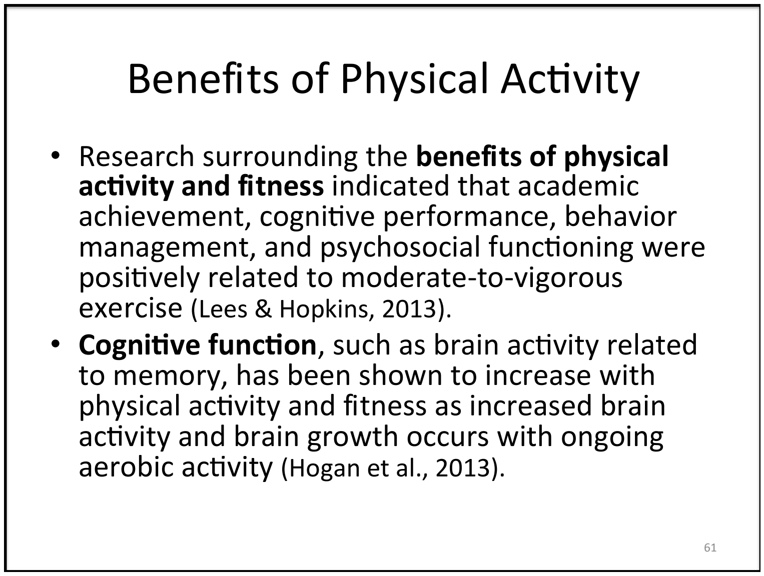


Note: Whole group sharing will occur **without charting** in an attempt to minimize revealing identities and avoid possible violation of privacy. An example of a whole group question, what was the consensus of your group? Give me a thumb up or down…did you meet your goal?

Slide 60/73

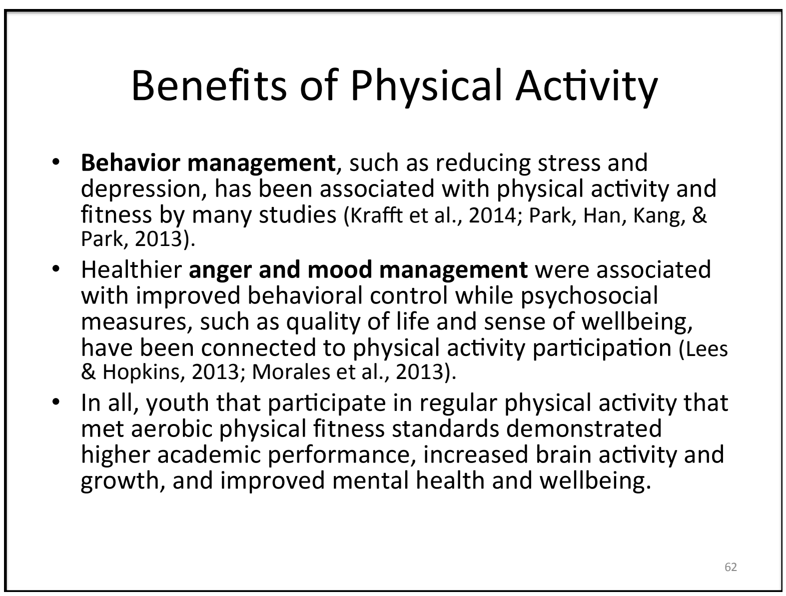
Note: Transition and flexible management.

Slide 61/73



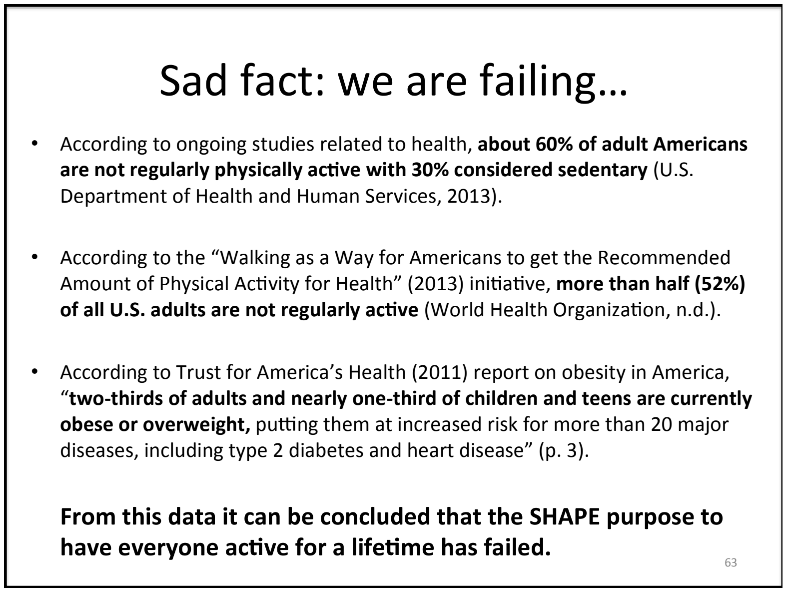
Note: Research related to physical activity.

Slide 62/73



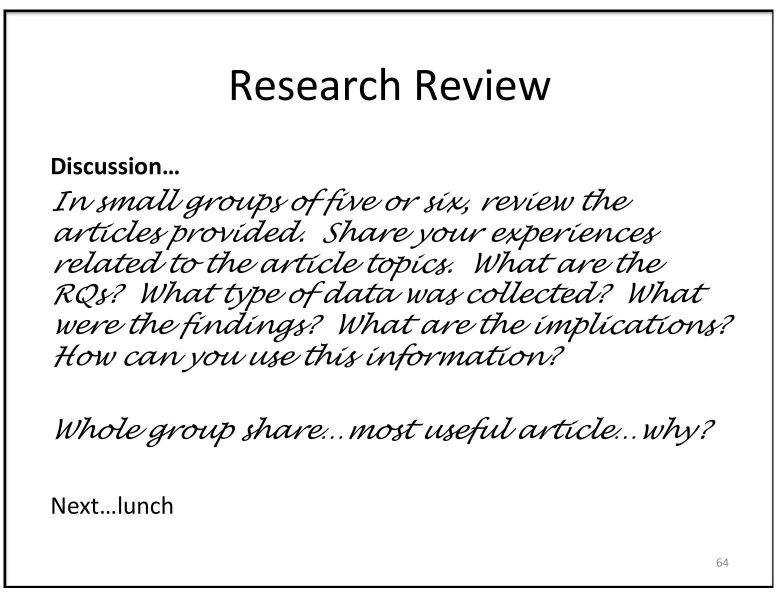
Note: This information should be already be known by the workshop participants.

Slide 63/73



Note: Statistic for failing students was similar to statistic for inactive adults. Generally discuss these two facts…and "wonder" if there is a connection? No matter how talented and experienced the teacher…

Slide 64/73



Note: Potential articles are listed in Section 3, material list. Reading and discussing these articles will connect previous content to today's activities and discussions.

Slide 65/73

Note: Transition, flexible management.

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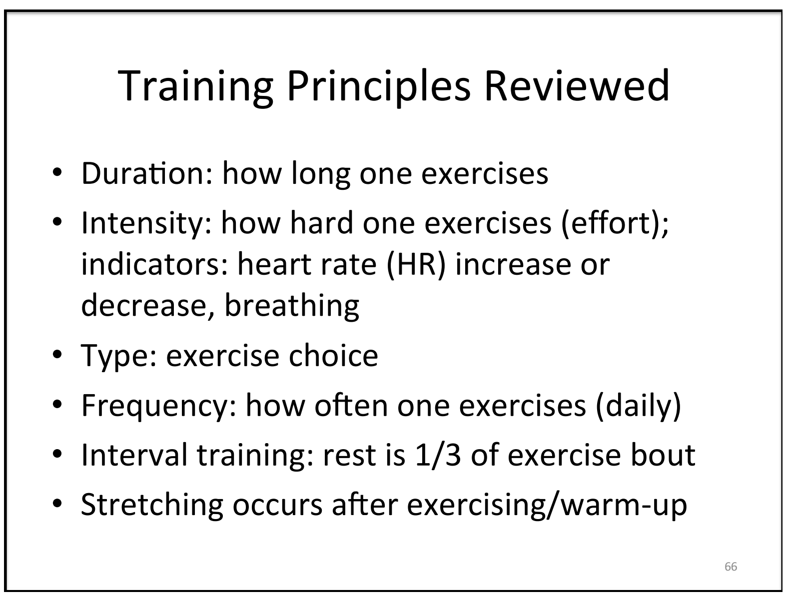

Note: Examples will be given of each of these training components; workshop participants should be familiar with these concepts and can offer examples as well.

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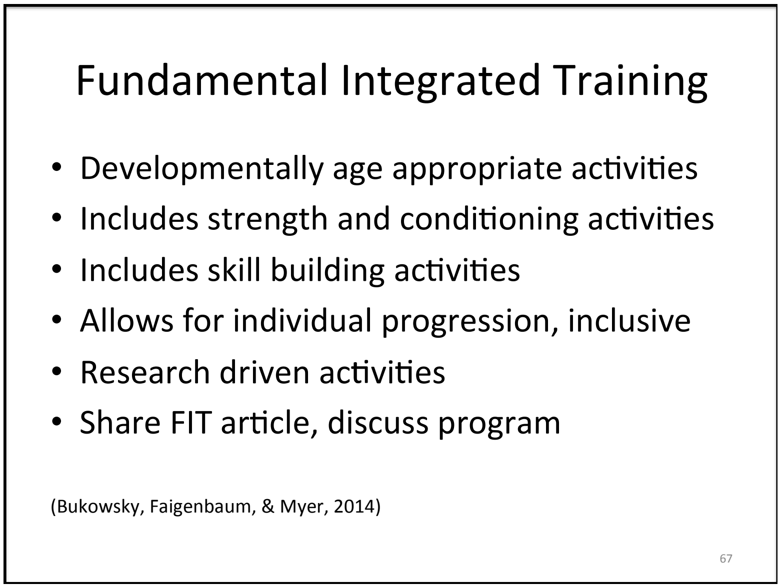

Note: We will examine article in the workshop notebook; discuss ramifications, participant experiences

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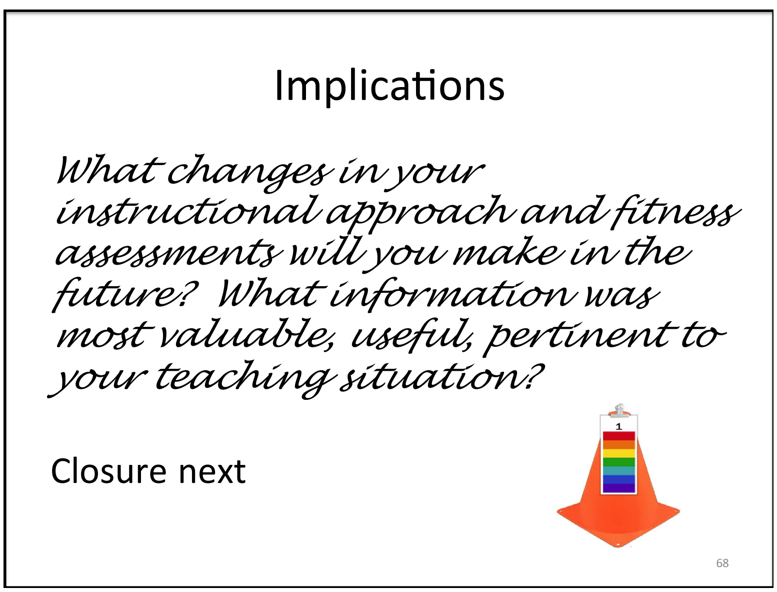

Note: Formative assessment.

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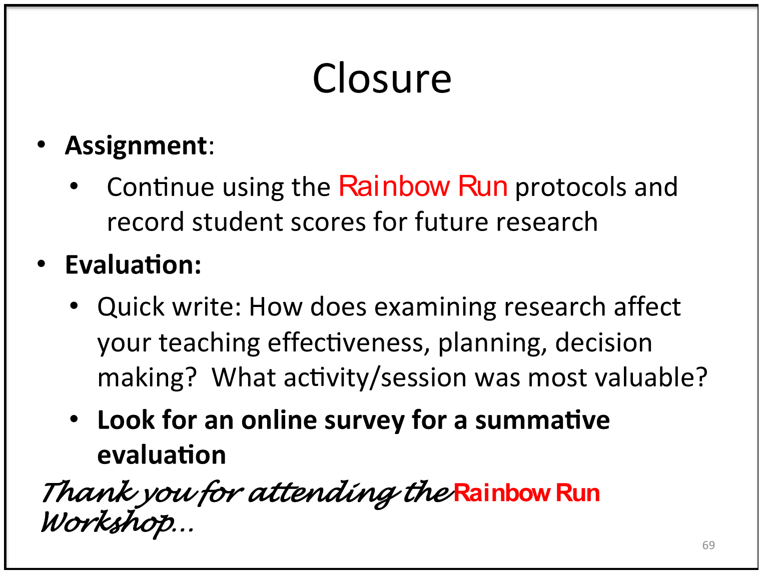

Note: It would be beneficial to be prepared to initiate additional research from this workshop. Proper University and school site procedures would need to be followed with appropriate review and approvals.

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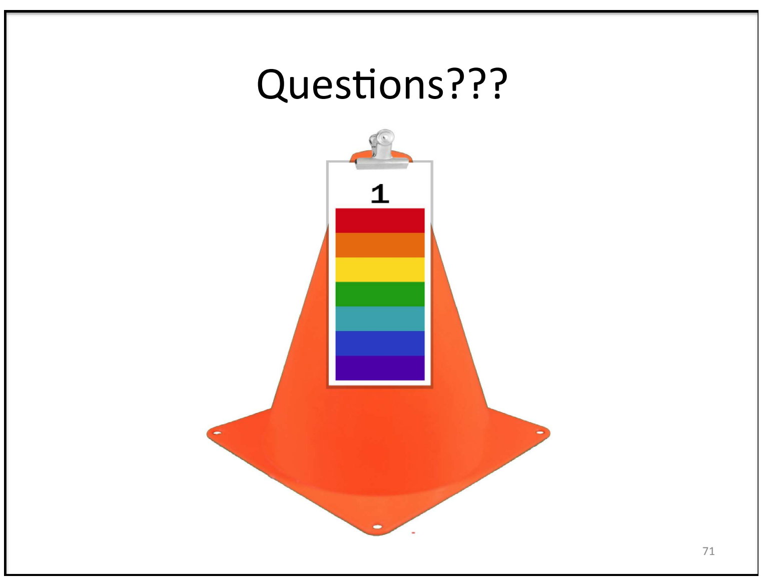

Note: Take questions as needed,

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References

Barz, M., Lange, D., Parschau, L., Lonsdale, C., Knoll, N., & Schwarzer, R. (2016). Self-efficacy, planning, and preparatory behaviours as joint predictors of physical activity: A conditional process analysis. *Psychology & Health*, *31*(1), 65–78. http://doi.org/10.1080/08870446.2015.1070157

Bukowsky, M., Faigenbaum, A. D., & Myer, G. D. (2014). Fundamental Integrative Training (FIT) for physical education. *Journal of Physical Education, Recreation & Dance*, *85*(6), 23–30.

California Department of Education. (2012, 2013). Physical fitness test results. Retrieved March 26, 2014, from http://data1.cde.ca.gov/dataquest/PhysFitness/PFTDN/Summary2011.aspx?r=0&t=4&y=2012-13&c=00000000000000&n=0000

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Laureate Education, Inc.

Gao, Z., Hannon, J. C., & Carson, R. L. (2009). Middle school student's heart rates during different curricular activities in physical education. *ICHPER-SD Journal of Research*, *4*(1), 21–24.

Harrison, C. B., Gill, N. D., Kinugasa, T., & Kilding, A. E. (2015). Development of Aerobic Fitness in Young Team Sport Athletes. *Sports Medicine*, *45*(7), 969–983. http://doi.org/10.1007/s40279-015-0330-y

Hogan, M., Kiefer, M., Kubesch, S., Collins, P., Kilmartin, L., & Brosnan, M. (2013). The interactive effects of physical fitness and acute aerobic exercise on electrophysiological coherence and cognitive performance in adolescents. *Experimental Brain Research*, *229*(1), 85–96. http://doi.org/10.1007/s00221-013-3595-0

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References continued

Krafft, C. E., Schwarz, N. F., Chi, L., Weinberger, A. L., Schaeffer, D. J., Pierce, J. E., … McDowell, J. E. (2014). An 8-month randomized controlled exercise trial alters brain activation during cognitive tasks in overweight children: Exercise alters brain activation. *Obesity*, *22*(1), 232–242.

Lees, C., & Hopkins, J. (2013). Effect of aerobic exercise on cognition, academic achievement, and psychosocial function in children: A systematic review of randomized control trials. *Preventing Chronic Disease*, *10*(1), 1–8.

Morales, P., Sánchez-López, M., Moya-Martínez, P., García-Prieto, J., Martínez-Andrés, M., García, N., & Martínez-Vizcaíno, V. (2013). Health-related quality of life, obesity, and fitness in schoolchildren: the Cuenca study. *Quality of Life Research*, *22*(7), 1515–1523. http://doi.org/10.1007/s11136-012-0282-8

Palmer, S., & Bycura, D. (2014). BEYOND THE GYM: Increasing Outside of School Physical Activity through Physical Education. *Journal of Physical Education, Recreation & Dance*, *85*(1), 28–35.

Park, S.-H., Han, K. S., Kang, C.-B., & Park, E.-S. (2013). Effects of an Exercise Program on Depression Symptom, Self-esteem and Stress in Adolescents: A Systematic Review. *Journal of Korean Academy of Psychiatric and Mental Health Nursing*, *22*(1), 22. http://doi.org/10.12934/jkpmhn.2013.22.1.22

Parschau, L., Fleig, L., Warner, L. M., Pomp, S., Barz, M., Knoll, N., … Lippke, S. (2014). Positive exercise experience facilitates behavior change via self-efficacy. *Health Education & Behavior*. http://doi.org/10.1177/1090198114529132

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References continued

Plowman, S. A., Sterling, C. L., Corbin, C. B., Meredith, M. D., Welk, G. J., & Morrow Jr, J. R. (2006). The history of Fitnessgram®. *Journal of Physical Activity & Health*, *3*(2), S5–S20.

Tudor-Locke, C., Swift, D., Schuna, J., Dragg, A., Davis, A., Martin, C., … Church, T. (2014). WalkMore: a randomized controlled trial of pedometer-based interventions differing on intensity messages. *BMC Public Health*, *14*(1), 168.

UCLA Health Policy (Ed.). (2011). Mission statement. UCLA Center for Health Policy. Retrieved from http://www.cdc.gov/nccdphp/sgr/adults.htm

U.S. Department of Health and Human Services. (2013, January). The surgeon general's vision for a healthy and fit nation.

World Health Organization. (n.d.). Physical Activity. Retrieved March 12, 2014, from http://www.who.int/dietphysicalactivity/pa/en/

Appendix B: Self-Efficacy for Daily Physical Activity Questionnaire

1. Self-efficacy for Daily Physical Activity Questionnaire

Welcome to a study about fifth grade students' motivation and beliefs about physical activity during and after school: STUDENT SURVEY

2. Student Survey of Physical Activity Participation

Hello fifth grade students. The purpose of this survey is to discover how much confidence you have about engaging in physical activity during school and during leisure time after school. There are no wrong answers, this survey is asking about YOUR beliefs and feelings related to confidence and physical activity. Thank you for participating.

3. Participant Information

Please provide the following information:

*** 1. Make sure to ask your teacher to check your information before beginning the survey.**

Student initials	
Student # (ask teacher)	
School	

2. What is your gender?

	Gender
Gender	

3. What is your age?

	Age
Age	

4. The Self-Efficacy for Daily Physical Activity Questionnaire

In answering the following questions you will be asked to think about HOW CONFIDENT you are that you can participate in a variety of physical activities at increasing intensity levels (light, moderate, and/or vigorous) and increasing periods of time (in minutes). The word "confident" refers to your belief that you can do something well. Please see the definitions below to help familiarize you with what is considered a light, moderate, and vigorous physical activity. See the examples of light, moderate, and vigorous activities below.

LIGHT activity: You are moving around, but your heart rate and breathing do not increase very much. You probably will not be sweating doing these activities unless the weather is really hot. You would be able to talk easily through the activity.

MODERATE activity: Your breathing and heart rate increase. You may start to sweat, your legs might feel a little bit tired and you may feel out of breath. You may also find it hard to talk during the activity.

VIGOROUS activity: your heart beats very fast, your breathing is fast and you start sweating. You may feel exhausted and out of breath. Your legs would probably feel heavy. It would be very hard to talk during the activity.

Many questions sound similar, please read them carefully. There are 24 questions. Thank you!

5. Physical Activity at School

In answering the following questions think about HOW CONFIDENT you are in performing the following physical activities AT SCHOOL.

At school you may walk to and from class and/or through the halls during lunch break which can often involve a few stairs. These walking activities are typically LIGHT in intensity level.

Using the scale below, please check the appropriate response (0-100%) for each question.

0% not at all confident
10%
20% little confidence
30%
40%
50% somewhat confident
60%
70%
80% mostly confident
90%
100% completely confident about my ability to engage in
physical activity at this intensity level and time of activity (duration).

LIGHT Activity

4. How confident are you that you can walk 15 MINUTES during school time at a LIGHT INTENSITY level EVERY DAY of the school week?

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

5. How confident are you that you can walk 30 MINUTES during school time at a LIGHT INTENSITY level EVERY DAY of the school week?

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

6. How confident are you that you can walk 60 MINUTES during school time at a LIGHT INTENSITY level EVERY DAY of the school week?

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

7. How confident are you that you can complete 120 MINUTES (2 hours) of physical education and/or school activities at a LIGHT INTENSITY level EVERY DAY of the school week?

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

6.

At school you may be enrolled in physical education classes and/or engage in before/after school activities (band, soccer, volleyball, bicycling etc.). These activities can vary in intensity but are usually MODERATE in intensity level.

Using the scale below, please check the appropriate response (0-100%) for each question.

0% not at all confident
10%
20% little confidence
30%
40%
50% somewhat confident
60%
70%
80% mostly confident
90%
100% completely confident about my ability to engage in

physical activity at this intensity level and time of activity (duration).

MODERATE Activity

8. How confident are you that you can complete 15 MINUTES of physical education and/or school activities at a MODERATE INTENSITY level EVERY DAY of the school week?

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

9. How confident are you that you can complete 30 MINUTES of physical education and/or school activities at a MODERATE INTENSITY level EVERY DAY of the school week?

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

10. How confident are you that you can complete 60 MINUTES of physical education and/or school activities at a MODERATE INTENSITY level EVERY DAY of the school week?

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

11. How confident are you that you can complete 120 MINUTES (2 hours) of physical education and/or school activities at a MODERATE INTENSITY level EVERY DAY of the school week?

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

7.

At school you may be enrolled in physical education classes and/or engage in before/after school activities (running club, swim team, basketball practice). These activities can vary in intensity but are usually VIGOROUS in intensity level.

Using the scale below, please check the appropriate response (0-100%) for each question.

0% not at all confident
10%
20% little confidence
30%
40%
50% somewhat confident
60%
70%
80% mostly confident
90%
100% completely confident about my ability to engage in physical activity at this intensity level and time of activity (duration).

VIGOROUS Activity

12. How confident are you that you can complete 15 MINUTES of physical education and/or school activities at a VIGOROUS INTENSITY level EVERY DAY of the school week?

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

13. How confident are you that you can complete 30 MINUTES of physical education and/or school activities at a VIGOROUS INTENSITY level EVERY DAY of the school week?

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

14. How confident are you that you can complete 60 MINUTES of physical education and/or school activities at a VIGOROUS INTENSITY level EVERY DAY of the school week?

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

15. How confident are you that you can complete 120 MINUTES (2 hours) of physical education and/or school activities at a VIGOROUS INTENSITY level EVERY DAY of the school week?

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

8. Leisure and Recreation Physical Activity

In answering the following questions think about how confident you are in performing the following physical activities during your free time after school. The word confident and the physical activity intensities (light, moderate, vigorous) are described on the first page of the questionnaire.

You may participate in sports or go to the gym during your FREE TIME. For example, you may play rugby, hockey, and/or soccer, swim on a team, dance, martial arts, cheer leading, ride your bike, horseback ride, go for a run, and/or lift weights after school. Think about which activities you do specifically. These types of activities are typically performed at a moderate to vigorous intensity level.

Using the scale below, please check the appropriate response (0-100%) for each question.

0% not at all confident
10%
20% little confidence
30%
40%
50% somewhat confident
60%
70%
80% mostly confident
90%
100% completely confident about my ability to engage in
physical activity at this intensity level and time of activity (duration).

16. How confident are you that you can complete 15 MINUTES of after school physical activities at a MODERATE INTENSITY level on THREE OR MORE days of the week?

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

17. How confident are you that you can complete 30 MINUTES of after school physical activities at a MODERATE INTENSITY level on THREE OR MORE days of the week?

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

18. How confident are you that you can complete 60 MINUTES of after school physical activities at a MODERATE INTENSITY level on THREE OR MORE days of the week?

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

19. How confident are you that you can complete 120 MINUTES of after school physical activities at a MODERATE INTENSITY level on THREE OR MORE days of the week?

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

20. How confident are you that you can complete 15 MINUTES of after school physical activities at a VIGOROUS INTENSITY level on THREE OR MORE days of the week?

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

21. How confident are you that you can complete 30 MINUTES of after school physical activities at a VIGOROUS INTENSITY level on THREE OR MORE days of the week?

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

22. How confident are you that you can complete 60 MINUTES of after school physical activities at a VIGOROUS INTENSITY level on THREE OR MORE days of the week?

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

23. How confident are you that you can complete 120 MINUTES of after school physical activities at a VIGOROUS INTENSITY level on THREE OR MORE days of the week?

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

Appendix C: Campbell Consent Letter

Nerissa Campbell, PhD
Research Assistant
Aging, Rehabilitation and Geriatric Care
St. Joseph's Healthcare - Parkwood Hospital
801 Commissioners Road East
London, ON N6G 1H1
519-685-4292 x. 42630
Nerissa.Campbell@sjhc.london.on.ca

Nerissa Campbell 06/18/14 3:58 PM >>>
Hi Debbie,

Thank you for contacting me.

As per our phone conversation earlier today, I am very excited to hear your interest in using the Self-efficacy for Daily Physical Activity Questionnaire, created as part of my PhD dissertation work. Please regard this email as confirmation that I give you permission to use this scale as a measure in your own research.

I wish all the best with your project and look forward to keeping in touch and sharing our research findings!
Cheers,
Nerissa

Nerissa Campbell, PhD
Research Assistant
Aging, Rehabilitation and Geriatric Care
St. Joseph's Healthcare - Parkwood Hospital
801 Commissioners Road East
London, ON N6G 1H1
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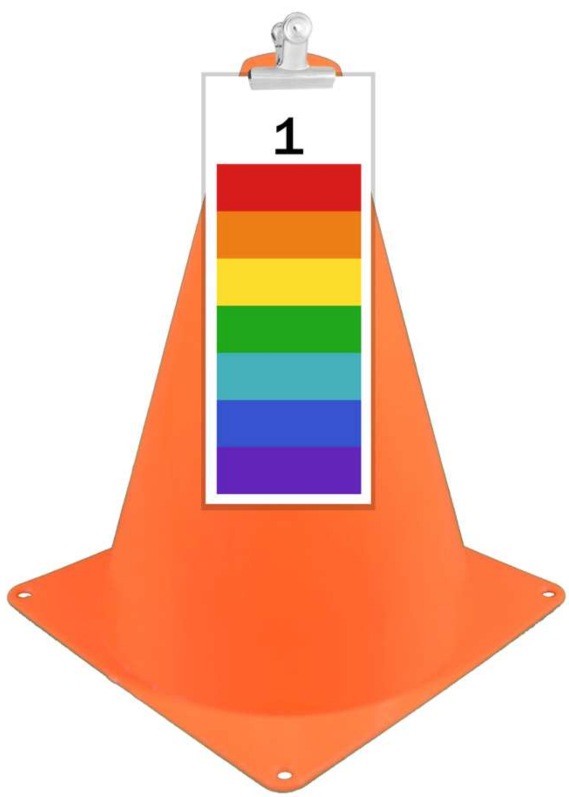
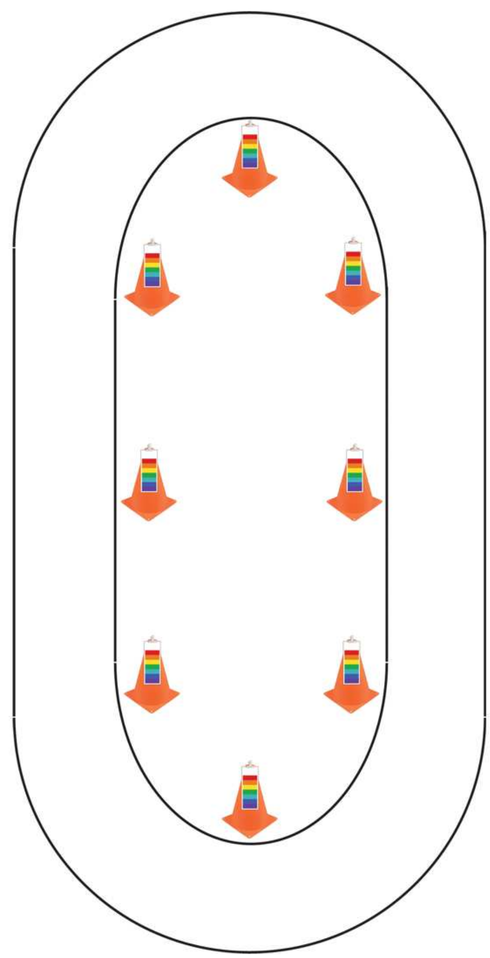
Appendix D: AABI Diagram and Directions

15-Minute Aerobic Assessment Based on Improvement "Rainbow Run"

Students are encouraged to run, walk, run/walk, or to push their wheelchairs as far as possible for 15-minutes. They can change from run to walk, or stop to rest if needed. Scores are reported using a combination of colors and cone numbers. Students are encouraged to try their hardest and, after the initial attempt, to try to improve from previous attempts.





Appendix E: Teacher-Participant Worksheet for AABI

Rainbow Run Research
Student Aerobic Assessment
<u>15-Minute Aerobic Assessment</u>
<u>Based on Improvement</u>

Red=8 cones
Orange=16
Yellow=24
Green=32
Lt. Blue=40
Blue=48
Purple=56…plus….

Student Performance Record Sheet

Please record student performance scores using the form below. Record total cones passed in 15 minutes. At your convenience, please submit results at: https://www.surveymonkey.com

TEACHER NOTES

Student Name (To be blacked out later)	Student ID Coded	Aerobic Assessment #1 **Date:**	Aerobic Assessment #2 **Date:**
Example: Allen Brown	AB12	10 (orange 2)	12 (orange 4)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			

Submit this form via US Mail after the study is completed.

Appendix F: Teacher-Participant Worksheet for FG 1-Mile

Rainbow Run Research
Student Aerobic Assessment
FitnessGram® 1 Mile

Student Performance Record Sheet

Record student performance scores using the form below. Use min:sec format. At your convenience, please submit results at: https://www.surveymonkey.com

TEACHER NOTES

Student Name (To be blacked out later)	Student ID Coded	Aerobic Assessment #1 **Date:**	Aerobic Assessment #2 **Date:**
Example: Allen Brown	Ab12	9:45	9:30
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			

Submit this form via US Mail after the study is completed.

Appendix G: Percent Improvement Calculations with Outliers for FG

Student Code	Run #1	Run #2	Run Type	Gender	Percent Improvement (decimal)	Percent Improvement (%)	Outlier Test
1012	705	832	2	1	0.180	18.01	TRUE
1024	1017	866	2	1	-0.148	-14.85	TRUE
1035	581	571	2	2	-0.017	-1.72	TRUE
1047	459	449	2	2	-0.022	-2.18	TRUE
1058	498	485	2	2	-0.026	-2.61	TRUE
1069	454	841	2	1	0.852	85.24	FALSE
1233	897	800	2	1	-0.108	-10.81	TRUE
1419	427	412	2	2	-0.035	-3.51	TRUE
1894	719	628	2	1	-0.127	-12.66	TRUE
2011	866	806	2	2	-0.069	-6.93	TRUE
2023	503	450	2	2	-0.105	-10.54	TRUE
3011	813	779	2	1	-0.042	-4.18	TRUE
3024	497	505	2	2	0.016	1.61	TRUE
3035	768	792	2	1	0.031	3.13	TRUE
3046	504	509	2	2	0.010	0.99	TRUE
3057	844	774	2	1	-0.083	-8.29	TRUE
3068	481	467	2	2	-0.029	-2.91	TRUE
3079	745	825	2	1	0.107	10.74	TRUE
3337	1020	1015	2	1	-0.005	-0.49	TRUE
4011	613	605	2	1	-0.013	-1.31	TRUE
4022	675	676	2	1	0.001	0.15	TRUE
4033	630	615	2	2	-0.024	-2.38	TRUE
4044	650	630	2	2	-0.031	-3.08	TRUE
4055	720	705	2	1	-0.021	-2.08	TRUE
4066	780	750	2	2	-0.038	-3.85	TRUE
4077	592	570	2	2	-0.037	-3.72	TRUE
4088	705	720	2	1	0.021	2.13	TRUE
4099	527	510	2	2	-0.032	-3.23	TRUE
4116	642	675	2	1	0.051	5.14	TRUE
5011	432	427	2	2	-0.012	-1.16	TRUE
5022	530	480	2	2	-0.094	-9.43	TRUE
5033	900	854	2	2	-0.051	-5.11	TRUE
5055	725	696	2	1	-0.040	-4.00	TRUE
5066	595	568	2	1	-0.045	-4.54	TRUE
5077	659	665	2	1	0.009	0.91	TRUE
5088	653	607	2	2	-0.070	-7.04	TRUE
5099	720	646	2	1	-0.103	-10.28	TRUE
5551	839	622	2	1	-0.259	-25.86	TRUE
5678	520	519	2	1	-0.002	-0.19	TRUE
6852	528	628	2	1	0.189	18.94	TRUE
7775	430	440	2	2	0.023	2.33	TRUE
10113	593	782	2	1	0.319	31.87	TRUE
10114	614	633	2	2	0.031	3.09	TRUE
10122	1020	635	2	1	-0.377	-37.75	TRUE
10710	525	574	2	2	0.093	9.33	TRUE
10812	604	578	2	1	-0.043	-4.30	TRUE
10913	630	592	2	1	-0.060	-6.03	TRUE
11014	584	574	2	2	-0.017	-1.71	TRUE
11129	735	596	2	1	-0.189	-18.91	TRUE
11130	433	1000	2	2	1.309	130.95	FALSE
12327	528	519	2	1	-0.017	-1.70	TRUE
13128	828	824	2	1	-0.005	-0.48	TRUE
13517	579	943	2	2	0.629	62.87	FALSE
15023	679	830	2	1	0.222	22.24	TRUE
20318	780	730	2	2	-0.064	-6.41	TRUE
20419	622	574	2	2	-0.077	-7.72	TRUE
20520	780	809	2	1	0.037	3.72	TRUE
20612	555	523	2	2	-0.058	-5.77	TRUE
20713	501	506	2	1	0.010	1.00	TRUE
20814	554	740	2	2	0.336	33.57	TRUE
20921	512	472	2	1	-0.078	-7.81	TRUE
21016	622	573	2	2	-0.079	-7.88	TRUE
21117	603	622	2	1	0.032	3.15	TRUE
21218	608	573	2	2	-0.058	-5.76	TRUE
21319	515	482	2	2	-0.064	-6.41	TRUE
21421	769	744	2	2	-0.033	-3.25	TRUE
21522	930	955	2	1	0.027	2.69	TRUE
21627	714	632	2	1	-0.115	-11.48	TRUE
21723	542	500	2	1	-0.077	-7.75	TRUE
22225	829	630	2	2	-0.240	-24.00	TRUE
30020	908	1020	2	2	0.123	12.33	TRUE
30811	611	585	2	2	-0.043	-4.26	TRUE

Standard Deviation (*SD*) =
19.22

Average Improvement (%) =
1.49

Avg. Improvement +/- 3x*SD* =
59.16
-56.17

See note below for "Outlier Test" formula.

(table continues)

Student Code	Run #1	Run #2	Run Type	Gender	Percent Improvement (decimal)	Percent Improvement (%)	Outlier Test
30913	594	694	2	2	0.168	16.84	TRUE
31014	765	714	2	1	-0.067	-6.67	TRUE
31115	888	836	2	2	-0.059	-5.86	TRUE
31216	759	797	2	1	0.050	5.01	TRUE
31317	622	532	2	2	-0.145	-14.47	TRUE
31418	710	684	2	1	-0.037	-3.66	TRUE
31519	525	521	2	2	-0.008	-0.76	TRUE
31620	770	836	2	2	0.086	8.57	TRUE
31721	527	532	2	2	0.009	0.95	TRUE
31822	455	423	2	2	-0.070	-7.03	TRUE
31923	527	484	2	2	-0.082	-8.16	TRUE
33319	578	628	2	1	0.087	8.65	TRUE
33332	609	1005	2	1	0.650	65.02	FALSE
41010	550	545	2	1	-0.009	-0.91	TRUE
41112	505	498	2	1	-0.014	-1.39	TRUE
41213	704	665	2	1	-0.055	-5.54	TRUE
41314	780	770	2	1	-0.013	-1.28	TRUE
41415	757	690	2	1	-0.089	-8.85	TRUE
41516	715	718	2	2	0.004	0.42	TRUE
41617	552	527	2	2	-0.045	-4.53	TRUE
41718	630	585	2	2	-0.071	-7.14	TRUE
41819	695	776	2	2	0.117	11.65	TRUE
41920	630	607	2	1	-0.037	-3.65	TRUE
42021	490	479	2	1	-0.022	-2.24	TRUE
42122	530	512	2	1	-0.034	-3.40	TRUE
42223	770	763	2	2	-0.009	-0.91	TRUE
42324	480	775	2	2	0.615	61.46	FALSE
42425	650	623	2	1	-0.042	-4.15	TRUE
42526	600	612	2	1	0.020	2.00	TRUE
42627	605	576	2	2	-0.048	-4.79	TRUE
42728	500	496	2	2	-0.008	-0.80	TRUE
42829	480	480	2	2	0.000	0.00	TRUE
42833	587	619	2	2	0.055	5.45	TRUE
42930	610	580	2	1	-0.049	-4.92	TRUE
45616	951	1326	2	2	0.394	39.43	TRUE
51010	501	481	2	1	-0.040	-3.99	TRUE
51111	590	536	2	1	-0.092	-9.15	TRUE
51212	462	466	2	1	0.009	0.87	TRUE
51313	572	541	2	2	-0.054	-5.42	TRUE
51414	684	680	2	1	-0.006	-0.58	TRUE
51515	742	702	2	2	-0.054	-5.39	TRUE
51617	762	750	2	1	-0.016	-1.57	TRUE
51718	605	600	2	2	-0.008	-0.83	TRUE
51819	544	526	2	1	-0.033	-3.31	TRUE
51920	780	747	2	2	-0.042	-4.23	TRUE
52021	530	482	2	2	-0.091	-9.06	TRUE
52122	640	600	2	2	-0.063	-6.25	TRUE
52223	486	485	2	2	-0.002	-0.21	TRUE
52324	669	640	2	1	-0.043	-4.33	TRUE
52425	585	540	2	1	-0.077	-7.69	TRUE
52526	492	490	2	2	-0.004	-0.41	TRUE
52627	792	772	2	2	-0.025	-2.53	TRUE
52728	615	608	2	1	-0.011	-1.14	TRUE
52829	525	517	2	1	-0.015	-1.52	TRUE
52930	501	500	2	2	-0.002	-0.20	TRUE
55524	593	782	2	1	0.319	31.87	TRUE
70018	578	628	2	1	0.087	8.65	TRUE
73931	885	1059	2	2	0.197	19.66	TRUE
75711	655	635	2	1	-0.031	-3.05	TRUE
77712	639	551	2	1	-0.138	-13.77	TRUE
77721	990	968	2	1	-0.022	-2.22	TRUE
79510	1010	1000	2	1	-0.010	-0.99	TRUE
91126	734	619	2	2	-0.157	-15.67	TRUE
98915	515	481	2	2	-0.066	-6.60	TRUE

Note:

Values of percentage improvement found to be outside the range of the average improvement +/- 3 times the *SD* are considered outliers.
Example of "Outlier Test" formula for first "Percent Improvement" student entry above: =IF(G3<=$J$11,IF(G3>=$J$12,TRUE))
"Outlier Test" formula translation: If "Percent Improvement" is less than or equal to the "Average Improvement" plus 3 times the *SD*, or if the "Percent Improvement" is greater than or equal to the "Average Improvement" minus 3 times the *SD*, then the outlier test is "TRUE"; otherwise, the result is "FALSE" and the student "Percent Improvement" is statistically considered to be an outlier.

Appendix H: Percent Improvement Calculations with Outliers for AABI

Student Code	Run #1	Run #2	Run Type	Gender	Percent Improvement (decimal)	Percent Improvement (%)	Outlier Test
601	27	43	1	1	0.593	59.26	TRUE
602	38	43	1	2	0.132	13.16	TRUE
603	36	52	1	2	0.444	44.44	TRUE
604	33	50	1	1	0.515	51.52	TRUE
605	33	50	1	2	0.515	51.52	TRUE
606	26	43	1	2	0.654	65.38	TRUE
607	33	44	1	2	0.333	33.33	TRUE
608	23	37	1	1	0.609	60.87	TRUE
609	31	45	1	1	0.452	45.16	TRUE
610	27	37	1	2	0.370	37.04	TRUE
611	32	50	1	2	0.563	56.25	TRUE
612	18	31	1	1	0.722	72.22	TRUE
613	21	45	1	1	1.143	114.29	TRUE
614	29	44	1	1	0.517	51.72	TRUE
615	28	43	1	2	0.536	53.57	TRUE
616	26	37	1	1	0.423	42.31	TRUE
617	31	44	1	2	0.419	41.94	TRUE
618	24	37	1	1	0.542	54.17	TRUE
619	41	52	1	2	0.268	26.83	TRUE
620	29	39	1	2	0.345	34.48	TRUE
621	29	50	1	1	0.724	72.41	TRUE
622	31	44	1	2	0.419	41.94	TRUE
623	28	41	1	1	0.464	46.43	TRUE
624	26	44	1	1	0.692	69.23	TRUE
625	23	34	1	2	0.478	47.83	TRUE
626	27	45	1	2	0.667	66.67	TRUE
627	30	31	1	1	0.033	3.33	TRUE
628	28	34	1	2	0.214	21.43	TRUE
701	34	46	1	1	0.353	35.29	TRUE
702	27	38	1	2	0.407	40.74	TRUE
703	42	49	1	2	0.167	16.67	TRUE
704	39	47	1	2	0.205	20.51	TRUE
705	29	52	1	1	0.793	79.31	TRUE
706	34	42	1	2	0.235	23.53	TRUE
707	31	38	1	2	0.226	22.58	TRUE
708	29	38	1	1	0.310	31.03	TRUE
709	40	47	1	1	0.175	17.50	TRUE
710	31	41	1	1	0.323	32.26	TRUE
711	37	46	1	2	0.243	24.32	TRUE
712	37	46	1	1	0.243	24.32	TRUE
713	36	38	1	2	0.056	5.56	TRUE
714	41	46	1	1	0.122	12.20	TRUE
715	33	41	1	2	0.242	24.24	TRUE
716	48	49	1	2	0.021	2.08	TRUE
717	15	28	1	2	0.867	86.67	TRUE
718	26	36	1	2	0.385	38.46	TRUE
719	42	54	1	2	0.286	28.57	TRUE
720	34	44	1	2	0.294	29.41	TRUE
721	37	54	1	2	0.459	45.95	TRUE
722	31	38	1	1	0.226	22.58	TRUE
723	28	49	1	2	0.750	75.00	TRUE
724	39	44	1	2	0.128	12.82	TRUE
725	39	44	1	2	0.128	12.82	TRUE
726	32	44	1	1	0.375	37.50	TRUE
801	51	51	1	2	0.000	0.00	TRUE
802	27	38	1	1	0.407	40.74	TRUE
803	37	44	1	2	0.189	18.92	TRUE
804	25	38	1	1	0.520	52.00	TRUE
805	16	33	1	2	1.063	106.25	TRUE
806	26	44	1	1	0.692	69.23	TRUE
807	25	35	1	1	0.400	40.00	TRUE
808	51	53	1	2	0.039	3.92	TRUE
809	22	37	1	1	0.682	68.18	TRUE
810	18	33	1	2	0.833	83.33	TRUE
812	51	51	1	2	0.000	0.00	TRUE
813	43	44	1	2	0.023	2.33	TRUE
814	35	51	1	2	0.457	45.71	TRUE
815	25	35	1	1	0.400	40.00	TRUE
816	32	44	1	1	0.375	37.50	TRUE
817	36	38	1	1	0.056	5.56	TRUE
818	17	34	1	2	1.000	100.00	TRUE

Standard Deviation (*SD*) =
34.11

Average Improvement (%) =
23.61

Avg. Improvement +/- 3x*SD* =
125.95
-78.73

See note below for "Outlier Test" formula.

(table continues)

Student Code	Run #1	Run #2	Run Type	Gender	Percent Improvement (decimal)	Percent Improvement (%)	Outlier Test
819	29	44	1	2	0.517	51.72	TRUE
820	32	38	1	1	0.188	18.75	TRUE
821	25	34	1	2	0.360	36.00	TRUE
822	17	32	1	1	0.882	88.24	TRUE
824	17	32	1	1	0.882	88.24	TRUE
825	37	38	1	2	0.027	2.70	TRUE
826	27	37	1	1	0.370	37.04	TRUE
827	32	41	1	1	0.281	28.13	TRUE
828	35	49	1	2	0.400	40.00	TRUE
829	26	44	1	2	0.692	69.23	TRUE
830	43	45	1	1	0.047	4.65	TRUE
838	27	44	1	2	0.630	62.96	TRUE
839	25	33	1	1	0.320	32.00	TRUE
901	33	38	1	2	0.152	15.15	TRUE
902	54	45	1	2	-0.167	-16.67	TRUE
903	20	44	1	2	1.200	120.00	TRUE
905	37	43	1	1	0.162	16.22	TRUE
907	51	38	1	2	-0.255	-25.49	TRUE
908	40	33	1	1	-0.175	-17.50	TRUE
909	33	44	1	1	0.333	33.33	TRUE
910	25	38	1	2	0.520	52.00	TRUE
911	25	44	1	2	0.760	76.00	TRUE
912	41	38	1	2	-0.073	-7.32	TRUE
914	41	40	1	1	-0.024	-2.44	TRUE
915	30	44	1	1	0.467	46.67	TRUE
916	30	23	1	1	-0.233	-23.33	TRUE
917	25	38	1	1	0.520	52.00	TRUE
918	40	46	1	2	0.150	15.00	TRUE
919	41	40	1	2	-0.024	-2.44	TRUE
920	54	44	1	1	-0.185	-18.52	TRUE
921	28	38	1	2	0.357	35.71	TRUE
922	19	17	1	2	-0.105	-10.53	TRUE
923	17	38	1	1	1.235	123.53	TRUE
924	37	38	1	1	0.027	2.70	TRUE
925	55	42	1	2	-0.236	-23.64	TRUE
926	55	55	1	2	0.000	0.00	TRUE
927	54	46	1	2	-0.148	-14.81	TRUE
928	46	43	1	2	-0.065	-6.52	TRUE
929	51	42	1	2	-0.176	-17.65	TRUE
1601	39	43	1	1	0.103	10.26	TRUE
1602	44	54	1	2	0.227	22.73	TRUE
1603	53	25	1	1	-0.528	-52.83	TRUE
1604	64	40	1	2	-0.375	-37.50	TRUE
1605	32	39	1	1	0.219	21.88	TRUE
1607	20	29	1	2	0.450	45.00	TRUE
1608	32	36	1	1	0.125	12.50	TRUE
1609	32	44	1	1	0.375	37.50	TRUE
1611	16	40	1	2	1.500	150.00	FALSE
1612	56	41	1	2	-0.268	-26.79	TRUE
1613	50	54	1	2	0.080	8.00	TRUE
1614	40	40	1	2	0.000	0.00	TRUE
1615	63	50	1	1	-0.206	-20.63	TRUE
1616	47	53	1	1	0.128	12.77	TRUE
1618	54	51	1	1	-0.056	-5.56	TRUE
1619	52	40	1	2	-0.231	-23.08	TRUE
1620	51	40	1	2	-0.216	-21.57	TRUE
1622	50	26	1	1	-0.480	-48.00	TRUE
1624	47	41	1	1	-0.128	-12.77	TRUE
1625	61	66	1	2	0.082	8.20	TRUE
1626	29	42	1	1	0.448	44.83	TRUE
1627	56	45	1	2	-0.196	-19.64	TRUE
1628	45	40	1	2	-0.111	-11.11	TRUE
1632	63	48	1	2	-0.238	-23.81	TRUE
1638	45	45	1	1	0.000	0.00	TRUE
1701	48	67	1	2	0.396	39.58	TRUE
1702	59	65	1	2	0.102	10.17	TRUE
1703	33	33	1	2	0.000	0.00	TRUE
1706	30	32	1	2	0.067	6.67	TRUE
1707	31	56	1	2	0.806	80.65	TRUE
1708	39	47	1	1	0.205	20.51	TRUE
1709	44	67	1	2	0.523	52.27	TRUE
1710	31	33	1	2	0.065	6.45	TRUE
1713	47	56	1	1	0.191	19.15	TRUE
1715	47	32	1	2	-0.319	-31.91	TRUE
1716	31	39	1	1	0.258	25.81	TRUE

(table continues)

Student Code	Run #1	Run #2	Run Type	Gender	Percent Improvement (decimal)	Percent Improvement (%)	Outlier Test
1717	35	40	1	1	0.143	14.29	TRUE
1718	31	33	1	1	0.065	6.45	TRUE
1719	47	35	1	1	-0.255	-25.53	TRUE
1720	41	33	1	1	-0.195	-19.51	TRUE
1721	36	44	1	1	0.222	22.22	TRUE
1722	35	36	1	2	0.029	2.86	TRUE
1723	47	63	1	1	0.340	34.04	TRUE
1724	41	41	1	1	0.000	0.00	TRUE
1725	40	66	1	1	0.650	65.00	TRUE
1726	38	35	1	1	-0.079	-7.89	TRUE
1728	36	39	1	1	0.083	8.33	TRUE
1729	59	64	1	2	0.085	8.47	TRUE
1730	47	68	1	1	0.447	44.68	TRUE
1901	40	46	1	1	0.150	15.00	TRUE
1904	36	38	1	2	0.056	5.56	TRUE
1905	47	56	1	2	0.191	19.15	TRUE
1906	38	35	1	1	-0.079	-7.89	TRUE
1907	56	67	1	2	0.196	19.64	TRUE
1908	26	30	1	2	0.154	15.38	TRUE
1909	24	35	1	1	0.458	45.83	TRUE
1910	32	32	1	1	0.000	0.00	TRUE
1911	31	32	1	1	0.032	3.23	TRUE
1913	40	55	1	2	0.375	37.50	TRUE
1915	27	30	1	2	0.111	11.11	TRUE
1916	24	40	1	1	0.667	66.67	TRUE
1917	40	55	1	1	0.375	37.50	TRUE
1918	39	54	1	1	0.385	38.46	TRUE
1919	39	39	1	2	0.000	0.00	TRUE
1920	24	39	1	1	0.625	62.50	TRUE
1921	24	20	1	1	-0.167	-16.67	TRUE
1923	42	41	1	2	-0.024	-2.38	TRUE
1924	52	53	1	2	0.019	1.92	TRUE
1926	52	50	1	2	-0.038	-3.85	TRUE
1927	39	40	1	1	0.026	2.56	TRUE
1928	40	56	1	1	0.400	40.00	TRUE
2001	45	54	1	1	0.200	20.00	TRUE
2002	26	51	1	1	0.962	96.15	TRUE
2003	45	57	1	2	0.267	26.67	TRUE
2004	53	36	1	1	-0.321	-32.08	TRUE
2005	64	62	1	2	-0.031	-3.13	TRUE
2006	53	62	1	2	0.170	16.98	TRUE
2007	33	36	1	2	0.091	9.09	TRUE
2008	64	76	1	2	0.188	18.75	TRUE
2009	37	27	1	1	-0.270	-27.03	TRUE
2010	33	36	1	1	0.091	9.09	TRUE
2011	37	29	1	1	-0.216	-21.62	TRUE
2012	49	62	1	2	0.265	26.53	TRUE
2013	26	37	1	1	0.423	42.31	TRUE
2014	37	62	1	1	0.676	67.57	TRUE
2015	38	36	1	2	-0.053	-5.26	TRUE
2018	49	43	1	2	-0.122	-12.24	TRUE
2019	32	28	1	1	-0.125	-12.50	TRUE
2020	63	67	1	2	0.063	6.35	TRUE
2021	34	36	1	1	0.059	5.88	TRUE
2022	33	44	1	1	0.333	33.33	TRUE
2023	33	29	1	1	-0.121	-12.12	TRUE
2024	57	57	1	2	0.000	0.00	TRUE
2025	45	36	1	1	-0.200	-20.00	TRUE
2026	39	27	1	1	-0.308	-30.77	TRUE
2027	41	40	1	2	-0.024	-2.44	TRUE
2028	27	27	1	2	0.000	0.00	TRUE
2125	40	39	1	1	-0.025	-2.50	TRUE
2200	16	32	1	1	1.000	100.00	TRUE
2201	39	38	1	1	-0.026	-2.56	TRUE
2203	32	28	1	1	-0.125	-12.50	TRUE

Note:

Values of percentage improvement found to be outside the range of the average improvement +/- 3 times the *SD* are considered outliers.
Example of "Outlier Test" formula for first "Percent Improvement" student entry above: =IF(G3<=$J$11,IF(G3>=$J$12,TRUE))
"Outlier Test" formula translation: If "Percent Improvement" is less than or equal to the "Average Improvement" plus 3 times the *SD*, or if the "Percent Improvement" is greater than or equal to the "Average Improvement" minus 3 times the *SD*, then the outlier test is "TRUE"; otherwise, the result is "FALSE" and the student "Percent Improvement" is statistically considered to be an outlier.

Appendix I: Teacher-Participant Data Summary

Teacher-participant coded and themed comments used in the results narrative. Comments are from the online teacher blog, field notes, interviews, and from follow-up meetings. Teacher names kept anonymous.

Code:
Red: past history; preparation
Blue: Day of conditions; weather, track; student confusion; card confusion;
Green: student motivation; effort
Student comments
Sources: parent, teacher
Students not feeling well; not trying
Kid quotes
Purple: Student outcomes; performance comments; improvements
Light blue: Future comments; assessment eval

Last year they were able to see other students running the mile, so they were aware what to expect and what the perimeter looked like.

At my school students have PE every day. We work a lot on fitness by doing fun activities.

They get ready for the run mostly in the spring but also some in the fall.

They start early in first grade with doing runs to the fence and back and to various locations on the campus before we start PE.

Miss R has them ready to go and most of them do really well.

First time around the track for some kids.

I feel like we are ready for our fitness tests in the Spring and prepare all year round….even our little guys get ready but at their level.

has a strong PE emphasis and things haven't changed much over the years.

Sure online games have had an impact with after school stuff, but for the most part things are the same.

Seems like most kids some something after school that sports related; you know, soccer or swim team.

We have added more things to teach and pay more attention to the standards…you know, so many hours per week, but kids are the same and need PE every day, which most are getting.

Yeah, those in sports, and most other kids as well do OK in PE and learn how to do skills and play games. Most kids do really well, it's just a few that seem to struggle from the beginning….which grows by a couple kids each year.

Yes. Like I said, you can see these same kids sit around at recess and generally not the active type. They are usually bigger kids and sometimes awkward in PE and really don't care that much. Good is good enough. Again, I don't blame them, it's hard for some kids to run around the track without stopping or walking. And then the athletic kids can run easily and try hard each time.

Not until fifth grade. In fourth grade we run three laps (around the track) and then we run four laps in the fall, just like we did.

The kids have been doing bits of the mile run since first grade so there was nothing new about the run, except it was the first time that we actually timed the mile.

Yeah, that's what I do for the mile….we start with just a walk, then we run, and most times it is just one or two laps. We start them in first grade and gradually get longer in the runs. This works well with the little ones.

The only thing is that I wish that I could have started them at 5 minutes first and then 10 minutes and then add more time to get used to how long the run was.

The students were less prepared (#2)…(due to time for testing).

It was cold when we ran the mile for assessment #2.

It was almost winter break and they had been testing in class all morning.
It's cold, I' m cold (tallies) IIIII II (7)

We love our new track!

It was confusing at first but I think that they got the idea better on the second run.

We had a good day though. The weather was cold but it cleared up for a couple days at the end and we got it done.

Time too long for the first time runners

Students ran on a very cold day so scores are not a good as expected

Students did better job of remembering their lap and number

Still a little long for most students

I hand out colored straws so that each student knows what # lap that they are on.

The mile test was ran after lunch recess.

Weather as cooler than last month's mile
We run around it five times for a mile, and at least it is accurate. I guess that before they ran around the school and Miss R wasn't positive that it was right.

The new track helped, everyone was excited to try out the new track.
Time seemed long but no one really complained.

Second time weather was dry and the track was OK

There should be eight colors on the rainbow, not seven. It would be easier to convert to a mile that way. Several kids ran the entire card and needed to repeat the card again, maybe if they do that they should just stop….or have more colors.

I had to pick a day that didn't rain and cause the track to be all muddy. It took me two weeks to find a day. I hope that was OK.

. I explained the track and the cones. And then I explained the rainbow part, which was confusing at first….however, it made sense once they got started. The numbers and colors were confusing. I think that we got though by the end.

15 minutes was much longer than I thought and I think the kids as well.

I was surprised that they remembered so much from the first time. They remembered the colors and what they did before, which was surprising.

D. Why surprising?

B. Kids usually don't remember those things, really. I think that it was so new, or maybe looking at the card (rainbow) helped them remember…that is what one boy said.
A few kids were sick on the day of the run.

Weather was OK but windy and cold.

Yup, seemed like it was the same as before. The new track was really exciting for everyone….it's nice to be able to use it.

We had a course around the school and we ran on the HS dirt track if not muddy.

The kids were excited and I think that they tried hard.
Due to the cold, I think the students ran a little quicker in general because they knew we would be going inside after the run.

Before the run, they were complaining about the cold.

Students were aware of the mile run that day and had brought water, wore running attire and we're excited.

During the run, students got to run on our new track, which made this run faster for them (a couple of students said).

A couple of students stated that they were nervous before we started.

Many were proud and excited about the run.

One girl, who came in almost last, said, "Well, I did my best."

One boy who came in last said, "I don't care about my time." He is the same boy who doesn't care about his basketball layup, his soccer kicking nor his Frisbee throw. His teachers have said that he has the same attitude about math, science, and writing.

A different boy who came in first, asked about other students' time on the mike run in other classes. He wants to be the fastest kid in the school and competes very well to achieve his goals.

Some students said, "it's cold" or "I'm cold."

No one was upset about their time on the run.

A handful of students were happy about their time on the run.

There were a couple kids that didn't feel well but tried anyway, and I recorded their scores ….maybe I should have circled them on the roll sheet.

Kid quotes: J said, "I did better Mrs. E, I ran more this time and only walked a little"; D said, "I wanted to get to the yellow lap because it was next in the rainbow". N said, "Next time I can do better and get into the purple number".

There are always a couple kids that don't try or put for the effort.

I encourage them and tell them to try their hardest, like I do for all the kids. Sometimes this works. Two laps are kind of far for them.

We just try to improve from the last time, that's all I ask…this seems to work best, you know, no pressure, just try your hardest.

Sometimes for some reason they might do better, but for the most part (referring to less athletic kids), the attitude or will to do better just isn't there, so, I try to be positive and say that you'll do better next time.

Well, most kids won't mess with this (points to self), you know, I'm really, really big to them.

And they know my expectations and routine.

So when it's time to go to the HS, I make a big deal of it and get the kids all fired up.

It's like a fieldtrip next door.

D. What's different with the fifth graders?

B. We look at the standards when the kids get into fifth grade and we start in the fall to see how close everyone is.

The standards help with knowing what is needed and some kids do well there.

. Yeah, I saw kids try really hard to go past their first color and lap, or, cones, sorry, you know.

After the end of the assessment Dario said, "I don't think I did as well as I could have because I walked a lot." Monica said, "I was nervous at first, but I think it was easier than I thought it would be." Hector said, "I felt like I couldn't breathe, I didn't want to get a bad time because my dad wants to know my time."

During the 2nd assessment students were much more relaxed.
They acted like they knew what to expect.

At least 80% of their times improved form the last mile.

It is a team effort here with the teaching staff at my school when kids run the mile. The teachers come out of the classrooms and cheer them on. Denise yelled, "I did it, I improved." Kendel said, " It was much easier this time, I knew how to pace myself better because I listened to you yelling out the times.."

Some students were nervous about getting better times that their last mile. They were even talking about it at the beginning of the school day.

Mr. Carr played the bongos

Teachers of the student stood and cheered around the perimeter of the running area.

Some 2nd and 3rd grade classes came out to cheer them on.

Some students were finished early ran to cheer on their classmates

Very exciting atmosphere.

L. A speech to try your hardest and to pace themselves.

And we showed them the standard for boys and girls.

We also said that the “real” run will be in the Spring…so we tried not to pressure them but to just do their best.

Everyone gave it a good effort I think….it was new and different.

I think the kids know why we run and that we are getting ready for fitness testing in the spring.

L. Yeah, maybe. This one kid is so lazy and unmotivated, it’s weird.

Yeah it seemed so, at least they acted happy. I just asked them to past the cone from last time. Anyway, they were excited for the second time….and to be outside after so much rain.

B. Sure, same as always. It always helps when you record the scores, kids know that you mean it.

It’s the same with the mile, we just want them to improve, but this was different, something new and colorful.

All I wanted was for my kids to improve from the last time. In the spring we’ll worry about making the standard.

After the run, students sated that they ran the fastest that they had ever run.

Most of them achieved a similar result as the October run.

Most kids did improve from September and a couple did not. Some of those kids were not feeling well, one boy was injured but ran it away….you know, it’s never 100%, but we did well.

Kids were excited to try to do better.

They knew what it was, you know, the first time, and wanted to do better. I was kind of surprised.

B. I think that they did OK.

Most tried hard to get to the purple color, however, some were OK at the yellow level.

D. Any other thoughts?

B. I have a couple.

D. It's OK as long as the survey was taken after the last run.

B. It was the last week of December so I don't know. No one gave the survey before the run. I hope that they remembered before vacation.

D. I will check with Carol and I can tell via the survey program online, Survey Monkey, it gives me a date and numbers. It's so nice that all the surveys are online for this school.
B. Yeah, I hope that the teachers know what to do.

D. Don't worry, I have been working with Carol and she's on it and sent me an email right away when I asked her last time….during the first run…you know, before the first run.

After the run, they drank water and stretched.

B. Oh, the kids did great.

B. Yeah, I think that the kids knew how long 15 minutes was…that helped them time their run.

D. They were able to pace better?

B. Yes pace and not to start to fast too soon. This is normal for kids to learn this, especially in fifth grade when they have to run the mile. I don't know if these kids have run an entire mile yet….however, some of these guys ran over two miles in 15 minutes…now that pretty good.
I think most did OK and improved their time.

Some kids didn't do well managing their running/breathing
Tried to run too much
Wanted to stop due to hard breathing
Did stop on far die of the track

Also, I found that I could be with some students because we were all doing it together…that was nice that I could be anywhere, not just at the finish line.

I am going to continue this style of practice run but drop the time limit to 10 minutes and see how the scores compare (after formal tests).

I am looking forward to building on the 15-minute walk/run idea

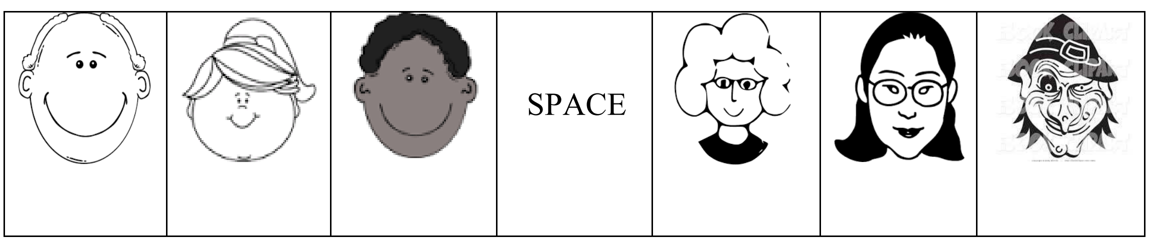
Can I keep the rainbow cards? I want to use them with my younger kids…..and to start slow.

Appendix J: Railroad Car Ice Breaker Activity

RAILROAD CARS

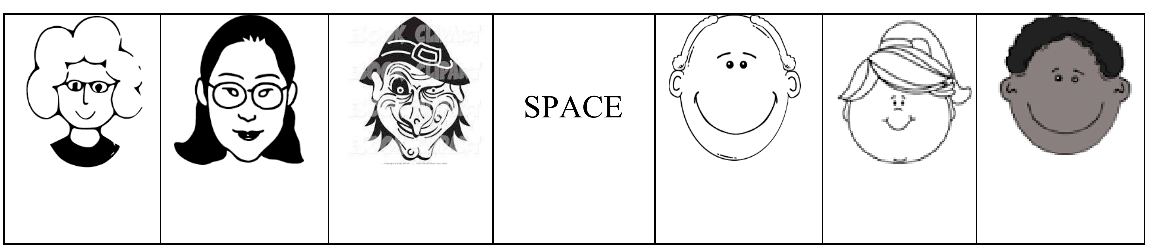
The purpose of this activity is to respectfully communicate (use names) with members in your group as you cooperate to solve the problem. There are seven spaces and six people participating. Three people are facing east while three are facing west. By taking turns and staying in the same order, the people on the west will move to the east and visa versa until all have switched sides. You can only go forward, one space at a time, and can only pass (go around) people from the other side, one person at a time. The problem is, what is the right sequence of moves so that all participants have switched sides?

Participant positions at the beginning of the activity:



EAST WEST

Participant positions at the end of the activity:



Appendix K: Scavenger Hunt

SCAVENGER HUNT

The purpose of this activity is to review basic math concepts and to review familiar physical education terms. Workshop participants are asked to find (hunt) posters placed around the room with a partner. Together, participants follow the directions on the poster to either solve the problem and/or answer the question (answers on back of poster).

Rainbow Run Workshop

What is the AVERAGE score? What is another name for “average”?

34, 27, 35

12, 15, 18

Answer: mean, 32, 15

Rainbow Run Workshop

Convert the following mile scores from min.:seconds to all seconds.

10:15

15:30

Answer: 75, 120

Rainbow Run Workshop

Convert the following Rainbow Run scores from color:cones to all cones.

Purple:4

Red:6

Answer: 60, 14

Rainbow Run Workshop

Define physical activity self-efficacy. Name other terms similar to PASE.

Answer: confident, motivated, positive attitude

Rainbow Run Workshop

How does exercise intensity and exercise duration affect aerobic fitness training?

Answer: aerobic fitness training is best when the intensity level allows for longer bouts of exercise

Rainbow Run Workshop

Share examples with your partner of aerobic exercise using light, moderate, and vigorous intensities.

Answer: walk, easy bicycle riding; volleyball, softball; run, jump rope

Rainbow Run Workshop

What is the difference between qualitative and quantitative research?

Answer: Qualitative: perceptions, observations; quantitative: measured, use of numbers

Rainbow Run Workshop

How do you calculate percent? What is percent improvement?

Answer: divide number by 100, move decimal 2 spaces; improvement amount compared to total score

Rainbow Run Workshop

What are the differences between aerobic and anaerobic exercise?

Answer: Aerobic uses oxygen, slower paced, longer duration; anaerobic Is w/o oxygen, fast paced, short duration