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High School Student Attributions, Interest, and Self-Efficacy in Fitness Testing

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HIGH SCHOOL STUDENT ATTRIBUTIONS, INTEREST, AND SELF-EFFICACY IN

FITNESS TESTING

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ABSTRACT

HIGH SCHOOL STUDENT ATTRIBUTIONS, INTEREST, AND SELF-EFFICACY IN FITNESS TESTING

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This study examined the extent to which (a) healthy weight and overweight/obese high school students differ in Progressive Aerobic Cardiorespiratory Endurance Run (PACER) and push-up test performances, (b) attributions for PACER and push-up test outcomes differ based on weight status and performance (in the healthy fitness zone [HFZ] vs not in HFZ), (c) attribution dimension scores differ based on student weight status and performance, and (d) content-specific motivation constructs including personal interest, self-efficacy and attribution dimensions predict PACER and push-up test performances. High school students (*n*=185) first completed questionnaires assessing their interest and self-efficacy for the PACER and push-up fitness tests. After completing the fitness tests, participants filled out the Modified Causal Dimension Scale (CDS-II) to assess their attributions for their fitness test performances. Students' body weight status were categorized as healthy (62%) or overweight/obese (38%) based on their body mass index percentile. Students with healthy weight significantly outperformed those that were overweight/obese. Results of multivariate analysis of covariance revealed that weight status impacted test performances, but not attribution dimension scores for either test. Students primarily attributed their push-up performance to ability (49%) and effort (31%), and their PACER performance to ability (56%). Overweight/obese students who did not perform in the HFZ were more likely to attribute their performance to ability and attitude than their healthy weight peers. There was no significant difference between overweight/obese and healthy weight students' attributions for push-up performance. Student performance had a significant impact on the attribution dimension scores for both fitness tests. Students in the HFZ attributed their performance to more internal, stable, and personally controllable factors than those not in the HFZ. On average, students reported low to moderate levels of personal interest and moderate levels of self-efficacy for the fitness tests. Correlation and path analyses identified attribution dimensions, personal interest, and self-efficacy as positive predictors for PACER performance and, and only causality and stability attribution dimensions, personal interest, and self-efficacy were positively related to push-up performance. The final path model explained approximately 51% of the variances in PACER performance and 48% of the variances in push-up performance.

I would like to dedicate this dissertation to my village. They say it takes a village to raise a child, but I believe the village does not disappear when we become adults. Without my village, I would not be where I am today.

To my husband, Ramsey. The past three years have not been easy, especially when Josiah came into this world. Your dedication as a husband and father, and support through the years has allowed me to achieve things I never thought possible. I am forever grateful for the sacrifices you made to help me reach my dreams.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Physical fitness tests are commonly conducted in physical education, and health-related physical fitness components such as cardiorespiratory endurance and muscular strength are important indicators for overall health and body function (Ortega, Ruiz, Castillo, & Sjöström, 2008). While public schools throughout the nation are conducting fitness tests in physical education (Morrow, Fulton, Brener, & Kohl, 2008), student motivation towards fitness testing has been mixed (Gao, Lee, & Harrison, 2008; Zhu, Chen, & Parrott, 2014). Motivation signifies one's action intension, direction, and consistency (Schunk, Pintrich, & Meece, 2008). With about one third of the students in high schools being overweight/obese (Centers for Disease Control and Prevention [CDC], 2016), understanding student motivation and its relation to physical fitness tests not only has health implications, but is also important for physical educators to understand these students so that they can design and deliver motivating classes to the students. Hence, the purposes of this research were to examine high school students' content-specific motivation towards fitness tests including attributions, personal interest, and self-efficacy and their relations with physical fitness test performances.

Physical Education

Physical education should enable students to become physically literate, and obtain the knowledge, skills, and confidence necessary to maintain a healthy active lifestyle (Society of Health and Physical Educators [SHAPE] America, 2014). Through physical education, young people have the opportunity to develop the skills needed to participate in sports and activities of daily living, be physically active, and gain the knowledge needed to make healthy choices throughout their lives (National Association for Sport and Physical Education [NASPE], 2012). However, physical education can be challenging for students who are overweight/obese. A particular aspect of physical education that is often challenging and unpleasant for overweight/obese students is fitness testing (e.g., Trout & Graber, 2009).

Fitness Testing

Fitness testing has been a common aspect of physical education programs for many years (Corbin et al., 2014; Corbin & Pangrazi, 1992; Keating, 2003). Physical education scholars suggest that if fitness testing is used appropriately, it can promote lifetime physical activity (e.g., Silverman, Keating, & Phillips, 2008; Welk, 2008), which is a primary goal of physical education (SHAPE America, 2014). Historically, there have been numerous rationales for fitness testing such as fitness education, tracking student fitness, evaluating physical education programs, and identifying students who need to improve their fitness (Whitehead, Pemberton, & Corbin, 1990; Freedson, Cureton, & Heath, 2000). Furthermore, researchers have argued that fitness testing facilitates goal setting, motivates students to maintain or enhance their physical fitness and physical activity levels, allows for self-monitoring and self-testing of fitness skills, and improves cognition (e.g., Whitehead et al., 1990).

One common purpose of fitness testing is to assess student fitness (SHAPE America, 2015). According to SHAPE America (2015) there are four essential components of a physical education program, one of which is student assessment. Student assessment involves using evidence-based practices to assess student progress in all areas of instruction, which includes physical fitness (SHAPE America, 2015). It is reported that approximately 65% of the schools in the U.S. carry out fitness tests as part of student assessment in physical education (Morrow et al., 2008) even though it is only legally required in 13 states (SHAPE, 2016).

In recent years, health-related fitness tests (e.g., FitnessGram) have become the dominant measure for fitness testing in schools. Today FitnessGram is the most widely used fitness testing system internationally (Gard & Pluim, 2017). In the U.S. alone, it is estimated that FitnessGram products are used in more than 67,000 schools (The Cooper Institute, 2014). According to the Cooper Institute (2014), the purpose of FitnessGram is to utilize evidence-based standards to assess fitness levels, bring awareness to children’s health, and improve school physical education programs. FitnessGram includes not only a fitness test battery, but also a digital database system designed to assist teachers in the collection, management and distribution of student fitness data (The Cooper Institute, 2014). The test battery measures the five components of health-related fitness including body composition, cardiorespiratory endurance, flexibility, and muscular strength and endurance. Through the years, FitnessGram measures have been revised, but the health-related components of fitness have remained (Plowman et al., 2006).

FitnessGram states that percent fat from skinfolds, bioelectric impedance analysis (BIA), or body mass index (BMI) can be used to estimate body composition (Going, Lohman, & Eisenmann, 2013). To assess aerobic capacity, the Progressive Aerobic Cardiovascular Endurance Run (PACER), 1-mile run test, or the 1.5-mile walk test can be used (Cureton, Plowman, & Mahar, 2013). FitnessGram has various tests to measure muscular strength, muscular endurance, and flexibility. A curl-up test is used to assess abdominal strength and endurance. Trunk extensor strength and flexibility is measured by a trunk lift. To assess upper body strength and endurance, the 90° push-up test can be used. Finally, the back-saver sit-and-reach is used to measure hamstring and back flexibility.

Once students complete the fitness tests, their scores for each test are classified into zones. The two primary zones are the “healthy fitness zone” (HFZ) and “needs improvement zone” (The Cooper Institute, 2014). The HFZ means that the students’ fitness level is adequate to provide important health benefits, and “needs improvement” indicates the student may be at risk for adverse health effects if that level of fitness stays the same over time (The Cooper Institute, 2014). However, for cardiorespiratory endurance and body composition there are two distinct needs improvement zones: “needs improvement” and “needs improvement-health risk zone.” The use of three zones makes it possible to provide more personalized prescriptive messages to students since the differences in the zones are clear and based on potential health risks (The Cooper Institute, 2014). For the purpose of this study, students meet the criteria if their fitness test score falls in the HFZ and if their score did not fall within that zone, then they did not meet the criteria.

Many factors can influence how well students perform on fitness tests including individual (e.g., genetics), motivational (e.g., interest), and environmental and organizational (e.g. school socioeconomic status) variables. Of these factors, while individual and environmental/organizational factors could impact student performances and may have implications for physical education practices, they are deterministic factors that are either almost impossible, or very difficult to change. Motivational factors, particularly those that are content-specific such as self-efficacy, have shown to be related to fitness test performances (e.g., Domangue & Solmon, 2010; Gao et al., 2008). Since content-specific motivation factors are typically generated through students' interaction with the content (in this case fitness testing), they are susceptible to change based on the students' physical education experiences. Hence, content-specific motivational constructs hold potential for physical educators to understand students and adjust their instructional practices. In this study, the content-specific motivational constructs included attributions, which have not been directly examined in relation to specific fitness test performance, personal interest, and self-efficacy, which have shown to be significant predictors for fitness test performances (Gao et al., 2008; Zhu et al., 2014).

Attribution Theory

The attribution model proposed by Weiner (e.g., 1985) theorizes that a person has explanations (i.e., attributions) as to why they succeeded or failed at an activity, and those attributions determine the amount of effort the person will put towards that activity in the future (e.g., Weiner, 1985; 1986; 1992). This model, depicted in figure 1, is often referred to as the three-dimensional model (Gahram, 1991), because Weiner (1985) theorized that attributions can be categorized by three domains: (a) stability (stable and unstable), (b) causality (internal and external), and (c) controllability (controllable and uncontrollable).

The domain of stability refers to the duration and variance of the attribution ranging from stable (e.g., consistent, ability) to unstable (e.g., temporary, luck). Causality is the extent to which the attribution is internal (e.g., effort, mood) or external (e.g., teacher bias, help from others) to the individual. Lastly, controllability refers to the degree to which an individual believes that an outcome can be personally controlled (e.g., through effort) or externally controlled by someone/something else (e.g., teacher bias; Weiner 1985; 1992). Weiner (2005) suggested that individuals will typically attribute their successes and failures to four main causes: ability, effort, task difficulty, and luck.

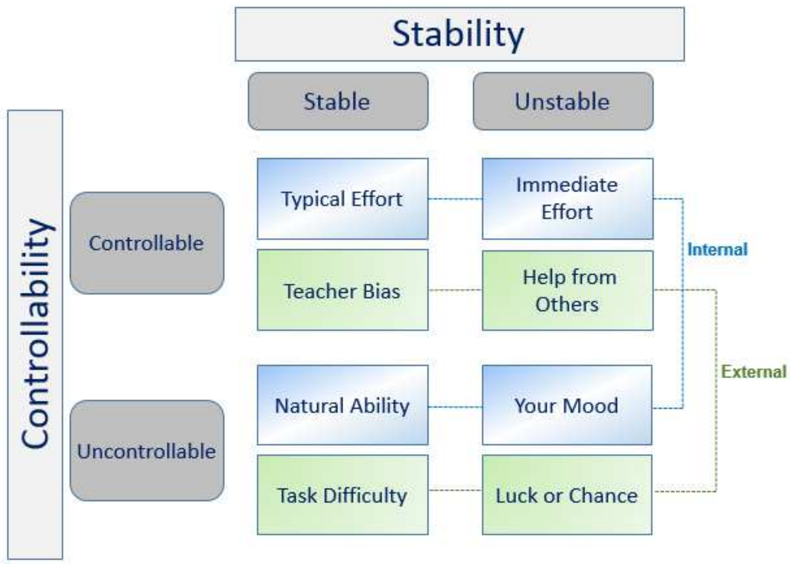

Figure 1. As identified by Weiner (1985), attributions can be categorized by three domains: stability (stable and unstable), causality (internal and external), and controllability (controllable and uncontrollable). This figure was adapted from Russell (1982).

Based on this model, attributions can be considered adaptive or maladaptive (e.g., Weiner, 2010). Attributions are said to be adaptive when a success is attributed to internal, stable, and personally controllable factors (e.g., ability), and when a failure is attributed to factors that are internal, unstable, and personally controllable (e.g., effort; Baron & Downey, 2007; Weiner, 2005). Conversely, maladaptive attributions would be attributing success to external, unstable, uncontrollable factors (e.g., luck), and attributing a failed attempt to stable and personally uncontrollable factors (e.g., task difficulty; Baron & Downey, 2007). Research documents that individuals who make adaptive attributions display increased expectancy of future success, performance levels, task satisfaction, effort, and pride (e.g., Kurtz-Costes & Schneider, 1994; Nicholls, 1984; Weiner, 1988). Conversely, maladaptive attributions produce negative emotions and low expectancy for future success, causing the individual to avoid that task in the future (e.g., Weiner 1985).

An individuals' attributions as to why they succeeded or failed at an activity determine the amount of effort they will put towards that activity in the future (e.g., Weiner, 1985), which is especially important to consider for fitness testing. Ascribing failures of not meeting fitness criteria to relatively stable factors (e.g., lack of ability) is associated with maladaptive motivational patterns. Such attributions can create feelings of hopelessness and hinder performance in future fitness test attempts. Attributing failures to factors that are susceptible to change (e.g., lack of effort) is adaptive, and individuals are more likely to maintain a positive attitude toward the task and remain positive even after failure (Li & Lee, 2004). Maladaptive attributions and learning behaviors have the potential to foster learned helplessness, which would be detrimental to the continued effort, engagement, and participation in physical education and fitness activities.

Personal Interest

Personal interest plays a critical role in student learning behaviors and performance in physical education (Chen & Ennis, 2004). Personal interest is described as one's general disposition towards a topic, and is based on personal knowledge, beliefs, and values (e.g., Hidi & Renninger, 2006). Personal interest generates enduring positive dispositions for individuals to engage and re-engage in a particular activity over time. Personal interest takes a relatively long time to nurture, but those with higher personal interest in one activity are willing to engage in the activity when faced with challenges. Personal interest is content-specific. For example, a student may have a high interest in dance, but have a low interest in basketball. Scholars have found personal interest to be a significant positive predictor in tests for cardiorespiratory endurance (i.e., PACER and 1-mile run; e.g., Zhu et al., 2014). Student interest in certain fitness tests can also vary based on their performance levels (Zhu, 2013). Furthermore, researchers have demonstrated that high personal interest in a task can increase engagement time, improve information retention, and even predict achievement (Chen & Darst, 2002).

Self-efficacy

Self-efficacy refers to a person's confidence in their abilities to perform a specific task successfully in a given situation (Bandura, 1990). Self-efficacy is a content-specific motivation construct in that a student may have a high self-efficacy in running but low efficacy in dance in physical education. Self-efficacy in a school environment is often formed based on previous experiences, vicarious experiences (i.e., observing peers' performance), social persuasion and encouragement, and managing physiological responses (Bandura, 1997). In theory, those who have higher self-efficacy are likely to have higher performance, compared to their peers with lower self-efficacy. Self-efficacy has been linked to learners' effort level, engagement, willingness to actively participate, and perseverance in the physical education setting (Lodewyk & Pybus, 2013; Gao, Newton, & Carson, 2008). Further, self-efficacy has historically demonstrated a predictive relationship with achievement (Nicholls, 1984), engagement and performance in physical activity settings such as physical education (Lirgg, 2006), and fitness-related activities (e.g., Gao et al., 2008). Specifically, Gao and colleagues (2008) found self-efficacy to be a positive predictor of cardiorespiratory endurance in fitness testing.

The purposes of the current research were to examine the extent to which (a) healthy weight and overweight/obese high school students differ in PACER and push-up test performance, (b) attributions for PACER and push-up test outcomes differ based on weight status and performance (in the HFZ vs not in HFZ), (c) attribution dimension scores differ based on student weight status and performance, and (d) personal interest, self-efficacy and attribution dimensions impact performance on the PACER and push-up test performances. Specifically, the following research questions were addressed:

1) To what extent do healthy weight and overweight/obese students differ in PACER and push-up test performance?
2) To what extent do attributions for PACER and push-up test outcomes differ based on weight status and performance (in the HFZ vs not in the zone)?
3) To what extent do attribution dimension scores differ based on student weight status and performance on the PACER and push-up tests?
4) What are the relations between attribution dimensions, interest, self-efficacy, attribution dimensions and performance on the PACER and push-up test tests?

For this dissertation, the researcher adopted a multiple-manuscript format. The individual manuscripts are presented in chapter IV. Nonetheless, to answer the research questions, a non-experimental survey research approach was employed. Participants were 185 ninth and tenth grade students who complete a physical education questionnaire to determine their personal interest and self-efficacy for the PACER and push-up fitness tests. Additionally, participants completed the modified causal dimension scale (CDS-II; McAuley, Duncan & Russell, 1992) to determine their attributions for their performances on the fitness tests (i.e., PACER, push-ups). As part of the physical education questionnaire, students' completed demographic questions providing their age, grade level, and gender. Their BMI was provided by the physical education teacher to categorize students as healthy weight or overweight/obese in order to examine the students' attributions among different body weight statuses.

Delimitations and Limitations

Participants were recruited from one school. The school district requires students to obtain two physical education credits to graduate, and fitness testing is a required component of the curriculum. High school students (approximately aged 13-17 years) were recruited for this study because this particular age group has the highest rates of childhood obesity (20.6%; Hales, Carroll, Fryar, & Ogden, 2017) and therefore provided the most potential participants to yield fruitful results. Students' attributions for their performance on two fitness tests (PACER and push-ups) were measured. These fitness tests measured cardiorespiratory and muscular fitness. These health-related components of fitness were used because they are strongly correlated with overall health and future health benefits (Ortega et al., 2008).

The generalizability of this study's results is limited to areas with similar populations. Further, the use of self-report questionnaire creates the possibility for inaccurate student responses. The students may have felt a sense of social desirability related to the topic, which may have impacted their responses. Even though the researcher assisted the physical education teachers conduct the tests, the teachers may still have had an effect on the administration of the tests, or they may have previously expressed bias towards the tests. The presence of the researcher is also a potential threat to internal validity.

Definition of Key Terms

Attributions: Explanations one makes as to why they succeeded or failed at an activity (Weiner, 1985).

Body mass index (BMI): Estimate of body composition, **c**alculated by dividing a person's weight in kilograms by the square of height in meters (kg/m^2).

Cardiorespiratory endurance: Overall capacity of the cardiovascular and respiratory systems and the ability to carry out prolonged strenuous exercise or maximal oxygen consumption (i.e., VO^2_{max}). Often measured by the Progressive Aerobic Cardiorespiratory Run (PACER) or the mile run (Ortega, Ruiz, Castillo, & Sjöström, 2008).

Causality: The extent to which an attribution is internal or external to the individual (Weiner, 1985).

Controllability: The degree to which an individual believes that an outcome can be personally controlled or externally controlled by someone/something else (Weiner, 1985).

Physical fitness: Ability to carry out daily tasks with vigor and alertness, without fatigue, and with ample energy to enjoy leisure-time pursuits and respond to emergencies (U.S. Department of Health and Human Services [HHS]; 2008).

Healthy weight: Young people with a BMI that falls between the 5^{th} and 85^{th} percentile (CDC, 2016).

Muscular strength and endurance: Capacity to carry out work against a resistance. Often measured by push-ups or sit-ups (Ortega et al., 2008).

Obesity: A BMI greater than the 95^{th} percentile (CDC, 2016).

Overweight: A BMI that falls between the 85^{th} and 95^{th} percentile (CDC, 2016).

Personal interest: One's general disposition towards a topic, and is based on personal knowledge, beliefs, and values (Hidi & Renninger, 2006).

Self-efficacy: One's confidence in their abilities to perform a specific task successfully in a given situation (Bandura, 1990).

Stability: Refers to the duration and variance of an attribution ranging from stable (e.g., consistent, ability) to unstable (Weiner, 1985).

CHAPTER II

LITERATURE REVIEW

In this chapter, a review of literature concerning overweight/obese students in physical education is provided to highlight the relevance and context of the research topic. Further, literature concerning fitness testing and various factors that impact student performance on the tests are thoroughly explained. In particular, the content-specific motivational constructs of personal interest, self-efficacy, and attributions are discussed.

Overweight/Obese Students in Physical Education

Individuals who are overweight/obese are often excluded from and tend to have more negative experiences in physical activity settings (e.g., physical education) than individuals who are of a healthy weight (e.g., Faith, Leon, Ayers, Heo, & Peitrobelli, 2002). Faith and colleagues (2002) examined the association of weight criticism during physical activity with attitudes toward physical activity and reported physical activity levels in children. The results of the study demonstrated that weight criticism was more prominent among girls than boys and among children who more overweight/obese. Similarly, Storch and colleagues (2007) investigated the relationship between peer victimization (i.e., bullying) of overweight/obese students and physical activity and psychosocial adjustment. Bullying was positively related to child-reported depression, anxiety, social physique anxiety, and loneliness. However, peer victimization was negatively related to physical activity. Essentially, overweight/obese students who were bullied reported high levels of psychosocial problems and low physical activity levels.

Existing research regarding overweight/obese students in physical education has showed that students are often teased or bullied because of their weight, various aspects of the course can isolate overweight/obese students, and that certain measuring practices and assessments have made students feel as though they were being put on display (Fox & Edmunds, 2006; Li &

Rukavina, 2012; Sykes & McPhail, 2009; Trout & Graber, 2009). Sykes and McPhail's (2009) research took a retrospective approach to examining the physical education experiences of individuals who self-identified as fat. It was found that fat phobia in physical education was oppressive to the students and made it extremely challenging to develop a positive body-image in physical education.

Overweight/obese students have reported being aware of their body size and acknowledged their weight status (i.e., overweight/obese; Fox & Edmund, 2000). Fox and Edmund (2000) reported how overweight/obese students constantly compared themselves to their peers during physical education, and that social comparison is partially what contributed to the students' body awareness. Meaning, a student may not have felt that they were overweight/obese until they were in a space (physical education) that elicited body comparisons. Further, social comparisons in physical education can often cause students to be hurt and to experience uncomfortable negative feelings about their bodies (Li & Rukavina, 2012).

In addition to the students' own social and physical comparisons to their peers, there are certain measuring practices (e.g., BMI, fitness testing) that take place during physical education that could humiliate individuals who were overweight/obese (Sykes & McPhail, 2009). The students in Fox and Edmund's and Trout and Graber's (2009) studies expressed that they felt as though they were being put on display due to the measuring practices (e.g., fitness testing). The public nature of physical education creates an environment that makes overweight/ obese and low skilled individuals easy targets for bullying (Trout & Graber, 2009).

Researchers have found bullying and weight related teasing during physical education to be a primary concern (Bauer, Yang, & Austin, 2004; Li & Rukavina, 2012; Sykes & McPhail, 2009; Trout & Graber, 2009). Specifically, Li and Rukavina revealed that bullying took place in all aspects of physical education. The overweight/obese students reported that their classmates made playful but negative comments, usually in relation to physical skills and fitness activities. Team games have also been noted as sources of issues related to bullying and size discrimination (Sykes & McPhail, 2009). Bauer et al. (2004) also reported that students perceived to be overweight/obese were often teased because they showed a lack in ability. Furthermore, the overweight/obese students perceived this weight-related teasing to be a major barrier for them to become fully engaged in physical education (Bauer et al., 2004).

In summary, overweight/obese students are often teased and ridiculed in physical education because of their weight. The competitive nature of physical education courses creates situations in which isolating overweight/obese students can become second nature. Furthermore, certain measuring practices and assessments in physical education can display the deficiencies in skills or abilities of these students. Researchers (e.g., Li & Rukavina, 2012; Trout & Graber, 2009) have commonly reported that a particular activity in physical education that is often problematic for students who are overweight/obese is fitness testing.

Fitness Testing

According to the U.S. Department of Health and Human Services (HHS; 2008), physical fitness is 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. 53). One of the national standards for physical education states that students must demonstrate the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness (SHAPE, 2014). Fitness education and fitness assessments (i.e., fitness testing) offer students an opportunity to assess, track, and improve their fitness level. Physical educators are encouraged to integrate assessments into instruction as a link between fitness, health, and physical activity (Presidential Youth Fitness Program, 2014).

Health-related fitness focuses on cardiovascular and muscular health, which are critical for overall health and preventing chronic health conditions (Janz, Dawson, & Mahoney, 2002; Welk, Maduro, Laurson, & Brown, 2011). Health-related fitness is often used as an indicator of health or health risks in young people (Institute of Medicine, 2012). Additionally, health-related fitness is not only critical to overall health and wellbeing, it is also strongly linked to student academic achievement (Kohl & Cook, 2013; Welk et al., 2011).

There is an abundance of literature regarding fitness testing in school settings (e.g., Silverman et al., 2008). Currently, with school districts nationwide administering fitness tests as part of student assessment in physical education (The Cooper Institute, 2014), it is important to consider the various factors (i.e., individual, motivational, and environmental/organizational) that may influence student fitness test performance.

Individual. One of the rationales for fitness testing is to assess students' fitness (Presidential Youth Fitness Program, 2014). Physical fitness is determined by various influences such as lifestyle, nutrition, maturation and heredity (e.g., Corbin, 2002; Institute of Medicine, 2012). Additionally, a range of individual factors (e.g., student attitudes, perspectives, and knowledge towards tests) can influence test performance (Fox & Biddle, 1988; Jackson, 2000).

Student attitudes toward fitness testing has been a topic of interest examined by researchers for many years (e.g., Hopple & Graham, 1995; Jackson, 2000; Luke & Sinclair, 1991; Mercier & Silverman, 2014). Research has revealed that attitudes towards fitness testing tend to be unfavorable (Luke & Sinclair, 1991), and decrease as age and grade level increase (Mercier & Silverman, 2014). For example, Hopple and Graham (1995) investigated children's opinions about the mile run test. The results revealed that students did not enjoying running the mile, they experienced discomfort during and after then test, and had little knowledge as to why they were participating in the test. As such, students reported a variety of avoidance behaviors in advance of the test. An apathetic or nonchalant attitude such as not taking testing seriously would also be reflected in test performance (Keating, 2003). The presence of one, or a combination of these factors (e.g., lack of knowledge, discomfort), would influence students' performance on fitness testing.

Other individual factors such as heredity, genetics, and maturation have been considered to have the most influence on fitness test results (Silverman et al., 2008; Naughton, Carlson, & Greene, 2006; Pangrazi, 2000). It is assumed that a students' performance on fitness tests can only be within the scope of their current maturation and genetic potential (e.g., Silverman et al., 2008; Welk, 2002). For example, there may be a natural increase in student performance on fitness tests over time simply due to the increase in physical age. Accompanied by maturity and age is familiarity of the tests. Practicing for the fitness tests and exposure to the tests over a number of years can also influence student performance (Naughton et al., 2006; Pangrazi, 2000).

Furthermore, gender is associated with performance of fitness tests. Differences in test performance based on gender are apparent even before puberty (Domangue & Solmon, 2012). After puberty, performance differences due to gender are only exacerbated because an increase in size and strength in boys typically provides a distinct advantage in most fitness measures (Thomas & French, 1985). It was reported that the President's Challenge physical fitness test predicted boys to outperform girls on more than half of the tests. Items concerning flexibility tend to be the only assessments that expected girls to outperform boys (Domangue & Solmon, 2009). It should be noted that in order for students to be in the HFZ for each fitness test, their scores are criterion-referenced based on gender and age (Plowman & Meredith, 2013). Meaning even if a boy scores higher than a girl on a certain test, it does not always mean that he performed better than her, and vice versa. The goal for each student is to do their personal best and try to perform at a level that provides sufficient health benefits (Plowman & Meredith, 2013).

Other individual factors such excess weight may chronically hinder the performance of students, particularly those who are overweight/obese (Dumith et al., 2010; Naughton et al., 2006; Trout & Graber, 2009). In a study conducted by Dumith and colleagues (2010), it was found that students of a healthy weight outperformed overweight/obese students on a majority of the fitness tests, except flexibility and a strength test. Cardiorespiratory fitness had the strongest association with students' BMI with overweight/obese students scoring lower than healthy weight students.

There are certain aspects of day to day life that may only impact fitness test performance on one given day. These factors include, but are not limited to, nutrition (e.g., type of foods, if any, were consumed before the test), sleep (e.g., Naughton et al., 2006), and emotional state (Lodewyk & Muir, 2017). For example, if a student was up all night studying, or forgot to eat breakfast on the day fitness testing was being conducted, there is an increased likelihood that they will not have optimal performance. In addition to the various individual factors, motivation can also influence student fitness test performance.

Motivation. In a general sense, motivation signals the strength and direction of why a person engages or performs a behavior (Schunk et al., 2008). Students' motivation for participating in fitness tests is important to their performance, accuracy of the results, and the testing atmosphere (Martin, Ede, Morrow, & Jackson, 2010; Naughton et al., 2006; Pangrazi, 2000; Silverman et al., 2008). Many empirical studies have investigated students' motivation during fitness testing classes (Domangue & Solmon, 2010; Jaakkola, Washington, & Yli-Piipari, 2013; Wiersma & Sherman, 2008). Students' motivation towards testing has been found to be influenced by various factors (e.g., feedback, competence, interest; Dewy, 1913; Whitehead & Corbin, 1991). Additionally, research concerning motivation and fitness testing has been conducted based on various theoretical frameworks (e.g., Expectancy Value Theory; Zhu & Chen, 2015).

Elements such as feedback and rewards have also been found to influence motivation for fitness testing. Students who received negative feedback experienced a decrease in intrinsic motivation compared to students who received positive feedback (Whitehead & Corbin, 1991). Domangue and Solmon (2010) determined that the students who received a reward for performing well (i.e., above the 50^{th} percentile of the national standards), reported higher levels of enjoyment, effort, task-involvement, competence, and future intentions related to fitness testing than the students who did not receive an award.

Researchers have determined that there are both intrinsic and extrinsic motives for participating in fitness testing (Domangue & Solmon, 2010; Garn & Sun, 2009), which could impact the test outcomes. The type of motivation a student has for fitness tests (i.e., amotivation, intrinsic, extrinsic; Deci & Ryan, 2000) would affect how much effort they give and hence impact their performance. For example, students who are intrinsically (e.g., they enjoy the tests) or extrinsically (e.g., they may receive a reward) motivated for the fitness tests would most likely perform better than students who are amotivated to participate in fitness testing. In conjunction with individual and motivational factors, organizational and environmental aspects can also influence performance on fitness tests.

A factor that plays a critical role in student motivation for learning behaviors and performance is interest (Chen & Ennis, 2004; Dewey, 1913). Interest is theorized to be situational or personal. Personal interest is essentially ones preference to certain objects and activities that tends to develop over time, whereas situational interest is dependent on the specific context and task and can vary based on the situation (Chen, Darst, & Pangrazi, 1999). Student engagement and performance during fitness testing may be influenced by situational and personal interests (Chen, 2001). Student situational interest in certain fitness tests (i.e., PACER or 1-mile run) can vary based on past experiences and performance (Zhu, 2014).

Personal interest. Personal interest often fosters long lasting positive dispositions towards an activity which promotes individuals to engage and re-engage in a particular activity over time (Hidi, 1990). Personal interest takes a relatively long time to nurture, but those with higher personal interest in one activity are willing to engage in the activity when faced with challenges (Chen & Darst, 2002). Personal interest is content-specific. For example, a student may have a high interest in dance, but have a low interest in basketball. Research has shown personal interest to be positively correlated with the grade achieved in a dance unit in physical education; the higher the personal interest, the higher the grade received (Shen, Chen, Scrabis, & Tolley, 2003). Scholars have examined middle school students' situational and personal interest in tests for cardiorespiratory endurance (i.e., PACER and 1-mile run) and found personal interest to be a significant positive predictor of performance on the tests (Zhu et al., 2014). Student personal interest in certain fitness tests (e.g., PACER) can also vary based on their performance levels and past experiences related to the tests (Zhu, 2013). Furthermore, researchers have demonstrated that high individual interest in a task can increase engagement time, improve information retention, and predict achievement (e.g., Chen & Darst, 2002).

Self-efficacy. Personal beliefs such as self-efficacy (Bandura, 1990; 1997) also plays a critical role in student performance on fitness tests. Self-efficacy refers to a person's confidence in their abilities to perform a specific task successfully in a given situation (Bandura, 1990). Self-efficacy is very similar to, and often used interchangeably with, perceived competence (Rodgers, Markland, Selzler, Murray, & Wilson, 2014). Self-efficacy and perceived competence have emerged as significant predictors of achievement (Nicholls, 1984), engagement and performance in physical activity settings such as physical education (e.g., Lirgg, 2006), and more specifically fitness related activities (e.g., Gao, Newton, & Carson, 2008). Self-efficacy is a content-specific motivation construct in that a student may have a high self-efficacy in running but low efficacy in dance in physical education. Self-efficacy in a school environment is often formed based on previous experiences, vicarious experiences (i.e., observing peers' performance), social persuasion and encouragement, and managing physiological responses (Bandura, 1997). In theory, those who have a higher self-efficacy are likely to have higher performance, compared to their peers with lower self-efficacy.

Gao and colleagues (2008) found self-efficacy to be a positive predictor of cardiorespiratory endurance, but not for muscular strength/endurance in middle school students. Similarly, Jaakkola et al. (2013) found that fitness and physical activity participation were positively related to perceived competence. Recently, Zhu and Chen (2015) found that self-efficacy was a mediator for student expectancy belief and cardiorespiratory endurance performance, and that these two motivation factors explained about 51% of the variance in the test performance. It can be concluded that personal beliefs about one's competence play a crucial role in students' performance and motivation for fitness tests.

Organizational and environmental. Researchers (e.g., Cale & Harris, 2009; Wiersma & Sherman, 2008) have expressed concerns about how inappropriate practices in fitness testing could cause stress, anxiety, discomfort and embarrassment among students, all of which influence how students perform on the tests. Domangue and Solmon (2009) proposed that fitness testing practices and physical education environments can account for some of the variation in test outcomes. Specifically in reference to gender differences, physical education is one of the few subject areas that separates girls and boys based on expected physiological differences and assumptions of gender-based outcomes (Domangue & Solmon, 2012). This gender separation is highlighted by fitness testing in that there are different standards for boys and girls.

Environmental factors can also directly influence student performance on fitness tests (e.g., Cale & Harris, 2009; Naughton et al., 2006; Pangrazi, 2000). Wiersma and Sherman (2008) argue that fitness testing outcomes are correlated with the environment. There are various aspects that comprise the testing environment. The physical environment such as facilities and equipment can impact student performance (e.g., Naughton et al., 2006). If the space where the testing is taking place is in deplorable conditions, or the equipment needed is either not in good shape or accessible, then student performance can be hindered. Additionally, if the testing environment is being shared with other classes or subject areas, students may become distracted.

In addition to the physical environment, the motivational climate must also be taken into consideration. Researchers suggest that if the environment is positive (e.g., encouraging, non-judgmental, bully free), test performances are more likely to be positive (Silverman et al., 2008). One of the dominate factors in the environment is the physical education teacher. Teachers generally have positive attitudes toward fitness testing (Mercier, Phillips & Silverman, 2016). However, researchers (e.g., Gard & Pluim, 2016; Zhu, Davis, Kirk, Haegele, & Knott, 2018) have reported inappropriate administration of fitness tests among teachers, which would influence how students perform (Naughton et al., 2006). For example, if clear instructions are not given for a specific test item, the students may not perform the test correctly, resulting is a poor score.

The previously discussed individual, motivational, organizational, and environmental factors that can impact students' fitness test performance is not exhaustive. However, the literature provides sufficient evidence regarding the various influences that were discussed. It can be assumed that fitness testing will continue to be a part of physical education curriculums for many years (Keating et al., 2013). Therefore, stakeholders in physical education need to carefully consider the multitude of factors that can influence student performance on fitness tests, especially if test data are part of student assessment. Additionally, how students attribute their fitness test performance in class impacts their future engagement and expectancy for success in fitness testing, physical education, and physical activity.

Attribution Theory

Attribution theory states that an individual will provide reasons to explain his/her successful or unsuccessful outcomes, and these explanations (i.e., attribution dimensions) can influence future motivation (Weiner, 1985; 2010). Students will often attribute their outcomes to a variety of causes, such as effort, ability, task difficulty, luck, or teacher bias (McClure et al., 2011). Attributions can be categorized by three dimensions: causality, stability, and controllability. The stability dimension refers to the duration of the cause, ranging from stable (e.g., ability) to unstable (e.g., effort). Causality describes whether the attribution originates from an internal (e.g., effort) or external (e.g. luck) source. Lastly, the controllability dimension refers to whether the individual believes that an outcome can be personally (e.g., effort) or externally controlled (teacher bias; Weiner 1985; 2010).

Attribution theory has been widely utilized in general education research, however attribution research concerning physical education has been less prominent. Vispoel and Austin (1995) were some of the first scholars to include attributions in the physical education context in their research. They found that interest and luck attributions for success were seen more in physical education as compared to other subjects. However, ability, strategy, and task difficulty attributions for failure were not as common. Patterns of attributions were also seen based on activity. For instance, attributions for failures during fitness testing were different from dancing. Fitness test failures were attributed to ability-related factors (ability, task difficulty), whereas failure in dancing was attributed to motivation-related factors (effort, interest; Vispoel & Austin, 1995).

Soon after Vispoel and Austin conducted their attribution research, Vlachopoulos, Biddle, and Fox (1997) explored the relationships between achievement goal orientation, situational goal involvement, perceived competence, attributions, and achievement-related emotions after participating in a cardiorespiratory fitness test. It was found that internal attributions for success significantly predicted positive emotion (Vlachopoulos et al., 1997).

The relationship between self-efficacy, performance, and attributions in physical education has also been an area of research. Chase (2001) investigated how differences in students' self-efficacy, age, and gender impacted their motivational intentions, future self-efficacy, and attributions following unsuccessful outcomes. Specifically regarding self-efficacy, students with high self-efficacy attributed failure to lack of effort compared to those with low self-efficacy who attributed failure to lack of ability (Chase, 2001). Most recently, Lodewyk and

Muire (2017) compared high school girls' enjoyment, state and social physique anxiety, self-efficacy and casual attribution between a fitness testing and soccer unit. In the fitness testing unit, the girls were more likely to make internal, unstable attributions for their failures as compared to the soccer unit where they were more concerned with lack of ability.

Attributions in physical education have been examined in relation to gender (Chedzoy & Burden, 2009) and age (Baron & Downey, 2007). Baron and Downey (2007) conducted a study to investigate elementary students' enjoyment in physical education and their attributions for success. Activity type, gender, and age affected students' attributions for success, and enjoyment scores. Dance activities presented the most variability in attributions, but ability attributions were least reported. Students in second grade were more likely to attribute their performance outcomes to internal factors than students in fourth and sixth grade. Additionally, girls were more likely than boys to attribute outcomes to internal, controllable factors for dance and gymnastic activities.

Gender differences in attributions in physical education were closely examined by Chedzoy and Burden (2009). Both girls and boys attributed effort as the main reason for succeeding in physical education activities. Boys also viewed effort (lack of effort) as the primary attribute for failures, whereas girls mainly attributed failures to having a negative attitude toward physical education. As mentioned above, Chase (2001) also investigated how differences in self-efficacy, age, and gender impacted student's motivational intentions, future self-efficacy, and attributions after a failed outcome. Contrary to other literature (e.g., Baron & Downey, 2007) there were no significant differences in attributions relative to gender and age.

Learned helplessness is often situated within attribution theories (e.g., Trout & Graber, 2009), and has provided another useful framework for conducting research in physical education.

Trout and Graber (2009) investigated overweight students' experiences in physical education through the lens of learned helplessness. Even though students recognized the relationship between obesity and lack of physical activity, many students exhibited symptoms consistent with learned helplessness, meaning they avoided participation and engagement in physical education because they had previous negative experiences. Essentially, they learned that their efforts would not produce success, and therefore they no longer wanted to put fourth effort.

Overall, attribution theories have provided a robust foundation and framework for conducting research in education, including sport and physical education. Attributions for successes and failures can vary based on age, gender, and specific activity in physical education. Certain attributions are can be maladaptive (e.g. attributing a success to luck) and hinder future achievement, whereas adaptive attributions (e.g., attributing success to effort) are positively related to future achievement. Hence, assessing overweight/obese and healthy weight students' attributions for fitness test outcomes can provide valuable information that could impact how these students approach fitness activities in the future.

Attributions are essentially a tool for understanding behavior, and they also influence future behavior and decision making (Weiner, 2010). By examining how students attribute their successes and failures in fitness testing, attributional patterns can be identified for the various tests. If there is a specific test (e.g., PACER) in which students consistently display maladaptive attributions, it can be a red flag for physical educators, and an investigation as to why these maladaptive attributions are being made can take place. Ascribing failures to relatively stable factors (e.g., lack of ability) is associated with maladaptive motivational patterns. Such attributions can create feelings of hopelessness and hinder performance in future attempts. Attributing failures to factors that are susceptible to change (e.g., lack of effort) is adaptive and individuals are more likely to maintain a positive attitude toward the task and remain positive even after failure (Li & Lee, 2004). Because fitness testing can provide valuable fitness information to students, educators, parents, and policy makers, it is critical to identify students' attributions for their fitness test outcomes. Maladaptive attributions and learning behaviors have the potential to foster learned helplessness, which could be detrimental to the continued effort, engagement, and participation in physical education.

In summary, research has explored the various factors that can impact student performance on fitness tests and has particularly demonstrated the importance of certain content specific motivational constructs (i.e., personal interest and self-efficacy) and their influence on fitness test performance. Similarly, researchers have explored student attributions in physical education, however, it has primarily focused on differences in age, gender, or activity as they relate to attributions (e.g., Baron & Downy, 2009; Chedzoy & Burden, 2009). Further, it has been documented that healthy weight students often outperform overweight/obese students in fitness tests (e.g., Dumith et al., 2010), but it is not known whether their attributions for their performances differ based on their weight status, or performance, and with one third of the population being overweight/obese, this area warrants investigation. Furthermore, how personal interest, self-efficacy, and attribution dimensions, impact test performance is unexplored. This research aimed to examine the extent to which (a) healthy weight and overweight/obese high school students differ in PACER and push-up test performance, (b) attributions for PACER and push-up test outcomes differ based on weight status and performance (in the HFZ vs not in HFZ), (c) attribution dimension scores differ based on student weight status and performance, and (d) personal interest, self-efficacy and attribution dimensions impact performance on the PACER and push-up test performances.

Chapter III

METHODOLOGY

The purpose of the chapter is to explain the methods employed in this research to address the research questions. While this dissertation follows a multiple-manuscript approach to present the results, the general methodology is subsequently discussed in the current chapter. As such, each manuscript includes a separate methodology section unique to the purposes of that particular article.

Research Design & Context

A non-experimental survey research design was employed. The district in which the study took place requires two years of physical education to graduate. Further, fitness testing is a required aspect of the physical education courses. The students were enrolled in one of two physical education courses. Physical Education I, predominately for ninth grade students, offers a variety of physical activities designed to encourage and prepare student to be active for life. Activities may include but are not limited to sport activities, lifetime physical activities and fitness education. As part of the course requirement, students have to develop a personal fitness plan. In Physical Education II, for tenth grade students, activities are designed to encourage students to become proficient in individual, dual or team sport, and other lifetime physical activities (e.g., golf). During this course, students are to continue to improve the development of their personal fitness program. Throughout the school year, physical education lessons should include fitness activities to help students enhance their fitness levels.

Data were collected from an urban high school located in southeastern Virginia where physical education is a required course for graduation (SHAPE America, 2016). Recent demographics of students from this school district were White (43.3%), Black (49.9%), American Indian (.4%), Asian (2.4%), Pacific Islander (.2%), two or more races (3.8%), and Hispanic/Latino (5.3%). Total enrollment at the high school is approximately 1,900 students, with about 52% of students eligible for free and reduced lunch.

Population and Sample

For this study, 185 high school ninth and tenth grade students (approximately aged 13-16 years) were recruited. This particular age group (12-19 years) has the highest rates of childhood obesity (Hales et al., 2017), and is therefore most applicable to this study. Approximately 38.4% of students who participated in this study were overweight/obese. The classifications of childhood BMI can be seen in Table 1. It is reported that in addition to the children and adolescents with obesity, another 15% of all children are overweight and 4% are underweight (Fryar, Carroll, & Ogden, 2014). Given the small percentage of the population that is underweight, data from students in this weight class were not included in data analysis.

Table 1. *BMI Categories for Children and Adolescents.*

Category	Percentile Range of BMI
Underweight	< 5^{th} percentile
Healthy Weight	5^{th} percentile to <85^{th} percentile
Overweight	85^{th} to < 95^{th} percentile
Obese	95^{th} percentile or greater

Note. Adapted from CDC (2016).

Variables and Measures

Demographics. Students completed demographic items as part of the physical education questionnaire (Appendix A). They were asked to provide their age, grade level, gender, and race/ethnicity. While not of primary interest to this study, demographic data provided context for the generalizability of the results.

Body composition. BMI was used to determine students' weight status (i.e., healthy weight or overweight/obesity; CDC, 2016). BMI is calculated by dividing a person's weight in kilograms by the square of height in meters. For children and teens, BMI is age- and sex-specific. The students' weight status (healthy weight or overweight/obese) was determined using an age- and sex-specific percentile for their BMI. For the purposes of this study, the students with a BMI higher than the 85th percentile for their age and gender were grouped into one category, overweight/obese, and healthy weight students were between the 5th and 85th percentile. The students' height and weight were measured at the beginning of the school year by the physical education teacher or school nurse, as part of the protocol for fitness testing to calculate their BMI (Going et al., 2013).

Personal interest. Student personal interest for the PACER and push-up test was assessed using an eight-item interest scale (Chen & Darst, 2002). Students first wrote a physical education activity that they are most interested in doing. Then, they wrote that activity on the first line of a chart that contained four of the most common activities in physical education (Lee, Burgeson, Fulton, & Spain, 2007), and the two fitness tests of interest. For each activity, the student used a 7-point Likert scale to identify how interested they are in the various activities. The selection ranged from "1 not interested," to "7 most interested." Students were instructed to circle "7" for the activity they wrote in, because they identified that activity as most interesting to them. The number selected for the PACER and push-ups was the interest score the fitness tests. The interest scale demonstrated good internal consistency with an α value of .89.

Self-efficacy. Student self-efficacy for their performance on the PACER and push-ups was measured. The hierarchical self-efficacy scale (Bandura, 2006) contained five statements for each fitness test (i.e., PACER and push-ups). Each statement regarding the PACER reads, "I am confident I can run at least __PACER laps." Likewise, the statements for push-ups read, "I am confident I can perform at least__push-ups." In each blank was a number that corresponded to a score in the HFZ for that test. The score in the first statement is on the low end of the HFZ and statement five contains a score that is on the highest end of the HFZ. Males and females have two different scales because the HFZ criteria differs based on gender. The composite score for each fitness test was calculated served as the students' self-efficacy score for the corresponding test. This hierarchical method has been used in previous research and demonstrated high internal consistency (α = .91; Zhu & Chen, 2015). In the current study α values for the PACER and push-up tests were .93 and .91 respectively. This scale is the last one on the physical education survey (Appendix A).

Fitness test performance. The students' health-related fitness scores were collected via FitnessGram protocols (Welk & Meredith, 2010). While FitnessGram in its entirety includes a possible nine items to assess students health-related fitness across five domains (i.e., cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility), for the purposes of this study only items assessing cardiorespiratory endurance, and muscular strength and endurance were used because of their positive correlation to overall health (Ortega et al., 2008). Each of the items from FitnessGram have demonstrated adequate reliably and validity (Plowman & Meredith, 2013).

Cardiorespiratory endurance. The 20-meter PACER test was used to assess cardiorespiratory endurance (Cureton et al., 2013). The PACER is adapted from the 20-meter shuttle run in which students run back and forth across a 20-meter span in tempo with music played from an audio recording. A sound track includes beeps that indicate when students should reach the other side of the course. The test starts off with long pauses in between beeps, then the beeps get progressively closer as each minute passes. Students continue running until they can no longer maintain the pace (Cureton et al., 2013). The validity for the PACER test has been established in numerous studies by correlating the VO_2 max at the end of the test or the highest test stage (running speed) reached, with VO_2 max directly measured on the treadmill (e.g., Mahar et al., 2011). Numerous researchers have also tested the reliability of the PACER test with α values ranging from .64 to .90 (e.g., Beets & Pitetti, 2006; Mahar et al., 1997). In order to meet the HFZ criteria for the PACER, girls aged 13-14, 15-16, and 17 years needed to complete at least 23 laps, 32 laps, and 41 laps respectively. For boys aged 13-14, 15, and 16-17 years, 41, 51, and 61 laps were needed to meet HFZ criteria.

Muscular strength and endurance. To assess upper body strength and endurance, the 90° push-up test, set to a cadence, was used. The use of a set pace helps to avoid fatigue, allows for a smooth unified movement from person to person, and makes it easier to judge whether a full proper repetition has been completed (Plowman, 2013). Students start in the “up” position with their neck, back, and shoulders in a straight line. Then in time with the cadence, students bend their elbows to a 90° angle and push back up to complete a push-up. Students continue until correct form is broken or they are too fatigued to continue (Plowman, 2013). McManis, Baumgartner, and West (2000) reported intra-class stability reliability coefficients of the 90° push-up to range from .50 to .86. In order to be in the push-up HFZ, girls needed to complete at least seven push-ups regardless of age. For boys aged 13, 14, 15, and 16-17 years, 12, 14, 16, and 18 push-ups respectively, needed to be completed to be in the HFZ.

Attributions. The modified Causal Dimension Scale (CDS-II; McAuley et al., 1992) was used to determine students' causal attributions for their fitness test outcomes. The CDS-II was taken after students completed the fitness tests and took approximately 15 minutes to complete. Students were asked to think about their recent performance on the PACER and push up tests. Then, participants selected whether their score "did" or "did not" meet the criteria to be in the HFZ. Students then completed an open-ended attribution item to indicate what they perceived to be the cause of their performance ("The most important reason why I was or was not able to meet the HFZ criteria…"). The open-ended nature of this question was to allow the students to come up with their own attribution and reduces research bias (Russell, 1982). The students were then prompted with the question, "Is the cause something:" Participants then used a 9-point Likert scale to rate the degree to which 12 statements from the three causal dimensions (i.e., causality, stability, and controllability) describe their attribution. There were three statements for each dimension with controllability including three statements each for personal control and external control to determine the control of the attribution. For causality and stability scores ≥ 6 indicated an internal, stable cause, and scores ≤ 4 indicated an external, unstable cause. The controllability dimension, scores ≥ 6 for personal control items indicated the cause was controllable by the individual. Scores ≥ 6 for the external control items indicated the cause was controllable by an outside person. If both sets of statements for controllability had a score ≤ 4, the cause was uncontrollable (McAuley et al., 1992). The CDS-II has been reported to be internally consistent with α ranging from .60 to .92 (McAuley et al., 1992). In the current study, α values for PACER/push-up causality, stability, external control and personal control were

.72/.68, .95/.91, .95/.90, and .94/.93 respectively. The attribution questionnaire (Appendix B) was taken after students complete the fitness tests and took approximately 15 minutes to complete.

Table 2. *Example Statements from the CDS-II.*

Attribution Dimension	Example Statement
Causality	"Inside of you"
Stability	"Stable"
Controllability	"Over which others have control"

Procedures

University IRB approved the study protocols (Appendix C) and permission was granted by the participating school district (Appendix D). Then, the researcher went and directly spoke to the students about the study protocols, and distributed child assent and parental consent forms (Appendix E-F). Once the forms were received, the researcher worked with the teachers to administer the first questionnaire, and fitness tests. Immediately following the fitness tests the students completed the attribution questionnaire and handed it in to the researcher. The physical education teachers provided the researcher with a class roster including names and the students' BMI. The researcher used the initials and physical education class time the participants provided on their questionnaire to match their BMI to the questionnaire. The students' BMI determined their weight category (i.e., overweight/obese or healthy weight). The class roster was returned to the teacher.

Students who were not fluent in English, or who were in need of accommodations, were able to have an instructional aid assist them if needed. A number of steps were taken to protect student anonymity. First, students were only asked to provide their full initials and time at which they have physical education. The physical education teacher provided the researcher with a class roster that included student names and BMI. The researcher then matched the BMI to the student surveys' based on their initials and time of the course. Student initials were then removed from the survey and replaced with an anonymous numeric code, and the roster was returned to the teacher. The survey information was entered into a database on a password protected computer in a secured office. The hard copies of the surveys with no identifying information were stored in a locked cabinet in a secured office and will be destroyed five years after the study is complete.

Analytic Approach

Data from the questionnaires were first checked for missing data, outliers, normal distribution, and assumptions. Internal consistency and reliability coefficients were calculated for each subscale in the CDS-II (controllability, stability, and causality), and the interest and self-efficacy scales. Composite averages were calculated for each attribution dimension (i.e., causality, stability, personal control, and external control), and interest and self-efficacy for both the PACER and push-up tests. Descriptive statistical analyses were conducted to examine the distribution patterns and characteristics of the variables. Bivariate (Pearson) correlation coefficients were computed to identify the relations between the variables and possible collinearity issues. Box's M test of equal covariance was conducted to examine the normality assumption of the data distribution. Based on the correlation analysis, separate multivariate analyses of covariance (MANCOVA) were conducted to determine differences in the attribution dimensions among students of different weight status and performances, with gender as a covariate. Data analysis procedures were performed using the Statistical Package for the Social

Sciences (SPSS Version 22.0, IBM; Armonk, NY), with $\alpha = .05$. A path analysis was conducted using EQS 6.3 (Bentler, 2006) to examine the relationship between interest, self-efficacy, and the attribution dimensions on PACER and push-up performance.

For the open-ended question on attribution of the performance, we used a deductive coding approach (Strauss & Corbin, 1998) to categorize the attributions made by the participants for each fitness test. The attribution codes that were assigned to the participants' statements came from previous attribution research (e.g., ability, effort; Weiner, 1988). However, due to the nature of this study, when the participants entered "I am bad at running because I'm overweight" or simply "I am fat" the attribution code of "weight" was added. The code examples are listed in Table 3. The first author and another researcher who was not involved in the research but familiar with the study, also coded the open-ended attribution item. The Cohen's $\kappa = .89$ for PACER attribution codes, and $\kappa = .92$ for push-up attributions, indicating good consistency among the two coders. The codes were then used to examine the difference in attributions between overweight/obese and healthy weight students.

CHAPTER IV

RESULTS: MULTIPLE MANUSCRIPTS

The results of this research are presented in this chapter as two separate manuscripts. Each manuscript was formatted and written as a potentially publishable journal article. The first article titled, High School Student Fitness Test Attributions: Does BMI or Performance Matter? addressed research questions 1-3. The second article titled, Fitness Test Performance and Content Specific Motivation: Attributions, Interest, and Self-Efficacy addressed the fourth research question. Each manuscript contains an abstract, introduction, purpose statement, methodology, results, discussion, and references. To ensure consistency, both manuscripts were formatted according to the guidelines set forth by the American Psychological Association.

MANUSCRIPT I

High School Student Fitness Test Attributions: Does BMI or Performance Matter?

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Abstract

The purposes of this study were to determine if there were differences in performance on the PACER and push-up fitness tests between high school students of different weight status (i.e., healthy weigh and overweight/obese), to examine the attributions made for fitness test performance, and to determine if those attributions and attribution dimension scores differed based on weight status or performance. High school students (*n*=185) completed the Progressive Aerobic Cardiovascular Endurance Run (PACER) and the push-up fitness tests. Participants then completed the Modified Causal Dimension Scale (CDS-II) to assess their attributions for their fitness test performances. Students of a healthy weight performed significantly higher than overweight/obese students on both fitness tests. While weight status played a role in performance, overall there were no significant differences in attribution dimension scores for either test between healthy weight and overweight/obese students. However, student performance, whether they were in the HFZ or not, did have a significant impact on the attribution dimension scores for both the PACER and push-up tests. Lastly, students primarily attributed their push-up performance to ability (49%) and effort (31%), and their PACER performance to ability (56%).

Keywords: adolescent, physical fitness, PACER, push-up, body weight

High School Student Fitness Test Attributions: Does BMI or Performance Matter?

Physical fitness testing is a common assessment in physical education. Health-related physical fitness components such as cardiorespiratory endurance and muscular strength are important indicators for overall health and body function (Ortega et al., 2008). A recent study shows that as students move to a higher grade they are less likely to meet the criteria to be in the healthy fitness zone (HFZ; Zhu, Haegele, Shao, & Davis, 2019), and some high school students view fitness testing as a negative factor in deciding whether to enroll in elective physical education (Davis, Zhu, & Haegele, 2018). To better motivate students for fitness tests and related activities, physical educators need to understand students' explanations for their performance and behavioral choices.

The attribution model proposed by Weiner (e.g., 1985) theorizes that a person has explanations (i.e., attributions) as to why he/she was successful or unsuccessful at an activity, and those attributions can determine the amount of effort the person will put towards that activity in the future (e.g., Weiner, 1985; 2005). In educational research, the three-dimensional attributional model is commonly used (Graham, 1991). These three dimensions include: (a) stability (stable and unstable), (b) causality (internal and external), and (c) controllability (controllable and uncontrollable). The stability dimension refers to the duration and variances of the attribution ranging from stable (e.g., ability) to unstable (e.g., luck). Causality is the extent to which the attribution is internal (e.g., effort, mood) or external (e.g., teacher bias, help from others) to the individual. Lastly, controllability refers to the degree to which an individual believes that an outcome can be personally controlled (e.g., through effort) or externally controlled by someone/something else (e.g., teacher bias; Weiner 1985; 1992). Individuals will typically attribute their successes and failures to four main causes: ability, effort, task difficulty or luck (Weiner, 1985). However, other factors such as mood, attitude, environment, teacher bias, and help from others can also be attributions for an outcome.

Attributions are said to be adaptive when a success is attributed to internal, stable, and personally controllable factors (e.g., ability), and when a failure is attributed to factors that are internal, unstable, and personally controllable (e.g., effort; Baron & Downey, 2007; Weiner, 1988). Conversely, maladaptive attributions would be ascribing success to external, unstable, uncontrollable factors (e.g., luck), and attributing a failed attempt to stable and personally uncontrollable factors (e.g., task difficulty; Baron & Downey, 2007). Research documents that individuals who make adaptive attributions display increased expectancy of future success, performance levels, task satisfaction, effort, and pride (Kurtz-Costes & Schneider, 1994; Nicholls, 1984; Weiner, 1988). Conversely, maladaptive attributions produce negative emotions and low expectancy for future success, causing the individual to avoid that task in the future (e.g., Weiner 1985).

Attribution research in physical education has been mostly descriptive. Vispoel and Austin (1995) found that interest and luck attributions for success were more common in physical education as compared to other subjects. However, ability, strategy, and task difficulty attributions for failure were not as common in physical education. Patterns of attributions varied among different activities. For instance, unsuccessful fitness test attempts were primarily attributed to ability and task difficulty, whereas failure in dancing was attributed to motivation-related factors (i.e., effort, interest; Vispoel & Austin, 1995). Baron and Downey (2007) showed that physical activity type, gender, and age affected students' attributions for success, and enjoyment scores in physical education. Dance activities presented the highest variability in attributions, but ability attributions were the least reported. When it came to games, students in second grade were more likely to attribute their performance outcomes to internal factors than those in fourth and sixth grades. Additionally, girls were more likely than boys to attribute outcomes to internal, controllable factors for dance and gymnastic activities (Baron & Downey, 2007). Lodewyk and Muir (2017) compared high school girls' enjoyment, state and social physique anxiety, self-efficacy and casual attributions for a fitness testing and soccer unit. In the fitness testing unit, girls were more likely to make internal, unstable attributions for their failures (adaptive) as compared to the soccer unit where they were more concerned with lack of ability.

Applying attribution theory in physical education can be advantageous in many aspects, particularly in regards to fitness testing. Health-related fitness tests (e.g., FitnessGram) are presently the dominate measure for fitness testing in schools and assess the five components of health-related fitness (i.e., body composition, cardiorespiratory endurance, flexibility, and muscular strength and endurance). Approximately 65% of the schools in the U.S. conduct fitness tests as a part of student assessment in physical education (Morrow et al., 2008). Scholars have suggested that if fitness testing is used appropriately, it can promote lifetime physical activity (e.g., Silverman et al., 2008; Welk, 2008), which is a primary goal of physical education (SHAPE America, 2014).

Student physical fitness experiences and performances are determined by various factors such as motivation, lifestyle, nutrition, heredity, and maturation (Corbin, 2002; Institute of Medicine, 2012). While children's nutrition, maturation, and heredity typically account for a percentage of individual differences in fitness performance (Naughton et al., 2006), they can be difficult to measure and to control. Research has shown that students' attitudes and knowledge impacted their participation for those as young as elementary students (Hopple & Graham, 1995; Mercier & Silverman, 2014). Specifically, studies have revealed that attitudes towards fitness testing tend to be unfavorable (Luke & Sinclair, 1991), and decrease as age and grade level increase (Mercier & Silverman, 2014). Nevertheless, research shows that students' individual interest and personal interest tend to be positively associated with fitness test performances (Zhu et al., 2014). Additionally, students' self-efficacy and expectancy beliefs are also positive predictors for their fitness test performance (Zhu & Chen, 2015). Gender is associated with fitness test performance (e.g., Domangue & Solmon, 2012). Particularly after puberty, performance differences between boys and girls are exacerbated due to an increase in size and strength in boys which typically provide a distinct advantage in most fitness measures (Thomas & French, 1985). Items concerning flexibility tend to be the only assessments that expected girls to outperform boys (Domangue & Solmon, 2009). Personal factors such as body composition, also plays a determining factor for physical fitness tests (Dumith et al., 2010; Trout & Graber, 2009). Students of a healthy weight tend to significantly outperform those who are overweight or obese on all fitness tests, except for flexibility and strength tests (Dumith et al., 2010).

Physical education can be difficult for students who are overweight/obese (Fairclough & Stratton, 2006), particularly during fitness testing (Trout & Graber, 2009). While it is known that students who are of a healthy weight often outperform students who are overweight/obese on fitness tests (Dumith et al., 2010), it is not known whether their weight status or performance impacts attributions for these fitness test performances. With about one third of children being overweight/obese (CDC, 2016), understanding their attributions would help generate means that physical educators could use to motivate students in physical education. Thus far, attribution research in physical education has primarily focused on differences based on activity type, gender and age, but not weight status or performances. Therefore, the purposes of this study were to determine if there were differences in performance on the PACER and push-up fitness tests between high school students of different weight status (i.e., healthy weigh and overweight/obese), examine the attributions made for fitness test performance, and to determine if those attributions and attribution dimension scores differed based on weight status or performance. Specifically, this study addresses the following research questions: (a) To what extent do healthy weight and overweight/obese students differ in PACER and push-up test performance? (b) To what extent do attributions for PACER and push-up test outcomes differ based on weight status and performance (in the HFZ vs not in the zone)? (c) To what extent do attribution dimension scores differ based on student weight status and performance on the PACER and push-up tests?

Methods

Research Design & Context

A non-experimental survey research design was employed. The district in which the study took place requires two years of physical education to graduate. The high school at which the study was conducted is an urban school located in a Mid-Atlantic state. The high school had approximately 1,900 students enrolled, of which about 52% qualified for free or reduced lunches. The participants were enrolled in one of two physical education courses. Physical Education I, predominately for ninth grade students, offers a variety of physical activities designed to encourage and prepare students to be active for life. Activities may include but are not limited to team sport activities, individual sports, and fitness education. As a part of the course requirements, students are to develop a personal fitness plan. In Physical Education II, for tenth grade students, physical activities are designed to encourage students to become proficient in individual, dual or team sports, and other lifetime physical activities (e.g., golf). During this course, students are to continue to improve the development of their personal fitness program.

Both Physical Education I and II required physical fitness testing, thus providing a proper context for this study.

Participants

A convenient sample of high school students (*n*=186) participated in the study. The participants were either 14 (35.7%), 15 (50.3%), 16 (13%) or 17 (1.1%) years of age, and in the 9th (67%) or 10th (33%) grade. Participants identified as male (47.7%) or female (57.3%), White (17.3%), Black (43.8%), American Indian (1.6%), Asian or Pacific Islander (5.9%), Hispanic/Latino (14.1%), or two or more races (17.3%). Based on the CDC's (2016) guideline, approximately 38% of students (*n*=71) who participated in this study were overweight/obese. The remaining students were of a healthy weight.

Variables and Measures

Demographics. Students were asked to provide their age, grade level, gender, and their race/ethnicity in the self-reported survey.

Body composition. Body mass index (BMI), which is an estimate of body composition, was used to determine students' weight status (i.e., healthy weight or overweight/obesity; CDC, 2016). BMI was calculated by dividing the student's weight in kilograms by the square of height in meters. For children and teens, BMI criteria for weight status are age- and sex-specific. The students' weight status (healthy weight or overweight/obese) was determined using an age- and sex-specific percentile for their BMI (CDC, 2016). For the purposes of this study, the students with a BMI higher than the 85th percentile for their age and gender were grouped into one category, overweight/obese, and healthy weight students had a BMI between the 5th and 85th percentiles. The students' height and weight were measured by the physical education teacher or school nurse as part of the protocol for fitness testing to calculate their BMI for the body composition health related component of fitness (Going et al., 2013).

Fitness test performance. The students' health-related fitness scores were collected via FitnessGram protocols (Welk & Meredith, 2010). While FitnessGram in its entirety includes a possible nine items to assess students health-related fitness across five domains (i.e., cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility), for the purposes of this study only items assessing cardiorespiratory endurance and muscular strength and endurance were used because of their correlation to overall health (Ortega et al., 2008). Each of the items from FitnessGram have demonstrated adequate reliably and validity (Plowman & Meredith, 2013).

Cardiorespiratory endurance. The 20-meter PACER test, the most widely used test to assess cardiorespiratory endurance, was employed in this study (Cureton et al., 2013). The PACER is adapted from the 20-meter shuttle run in which students run back and forth across a 20-meter span in tempo with music played from an audio recording. A sound track includes beeps that indicate when students should reach the other side of the course. The test starts off with long pauses in between beeps, then the beeps get progressively closer as each minute passes. Students continue running until they can no longer maintain the pace (Cureton et al., 2013). The validity for the PACER test has been established by correlating the VO_2max at the end of the test or the highest test stage (running speed) reached, with VO_2max directly measured on the treadmill (e.g., Mahar et al., 2011). Researchers have also tested the reliability of the PACER test with α values ranging from .64 to .90 (e.g., Beets & Pitetti, 2006; Mahar et al., 1997). In order to meet the HFZ criteria for the PACER, girls aged 13-14, 15-16, and 17 years needed to complete at least 23 laps, 32 laps, and 41 laps respectively. For boys aged 13-14, 15, and 16-17 years, 41, 51, and 61 laps were needed to meet HFZ criteria.

Muscular strength and endurance. To assess upper body strength and endurance, the 90° push-up test, set to a cadence, was used. The use of a set pace helps to avoid fatigue, allows for a smooth unified movement from person to person, and makes it easier to judge whether a full proper repetition has been completed (Plowman, 2013). Students start in the “up” position with their neck, back, and shoulders in a straight line. Then in time with the cadence, students bend their elbows to a 90^{0} angel and push back up to complete a push-up. Students continue until correct form is broken or they are too fatigued to continue (Plowman, 2013). McManis, Baumgartner, and West (2000) reported intra-class stability reliability coefficients of the 90^{0} push-up to range from .50 to .86. In order to be in the push-up HFZ, girls needed to complete at least 7 push-ups regardless of age. For boys aged 13, 14, 15, and 16-17 years, 12, 14, 16, and 18 push-ups, needed to be completed to be in the HFZ.

Attributions. The modified Causal Dimension Scale (CDS-II; McAuley et al., 1992) was used to determine students’ causal attributions for their fitness test outcomes. The CDS-II was taken after students completed the fitness tests and took approximately 15 minutes to complete. Students were asked to think about their recent performance on the PACER and push up tests. Then, participants selected whether their score “did” or “did not” meet the criteria to be in the HFZ. Students then completed an open-ended attribution item to indicate what they perceived to be the cause of their performance (“The most important reason why I was or was not able to meet the HFZ criteria…”). The open-ended nature of this question was to allow the students to come up with their own attribution and reduces researcher bias (Russell, 1982). The students were then prompted with the question stem, “Is the cause something:” Participants then used a 9-

point Likert scale to rate the degree to which 12 statements from the three causal dimensions (i.e., causality, stability, and controllability) describe their attribution. There were three statements for each dimension with controllability including three statements each for personal control and external control to determine the control of the attribution. For causality and stability scores ≥ 6 indicated an internal, stable cause, and scores ≤ 4 indicated an external, unstable cause. The controllability dimension, scores ≥ 6 for personal control items indicated the cause was controllable by the individual. Scores ≥ 6 for the external control items indicated the cause was controllable by an outside person. If both sets of statements for controllability had a score ≤ 4, the cause was uncontrollable (McAuley et al., 1992). The CDS-II has been reported to be internally consistent with α ranging from .60 to .92 (McAuley et al., 1992). In the current study, α values for PACER/push-up causality, stability, external control and personal control were .72/.68, .95/.91, .95/.90, and .94/.93 respectively.

Procedures

The instructional review board at the researcher's university approved the study protocols, and the school district granted permission for data collection. Then, the researcher went and directly spoke to the students about the study protocols, and distributed child assent and parental consent forms. Once the forms were received, the researcher helped the teachers administer the fitness tests and distributed the demographic questionnaire and the CSD-II. For each of the two fitness tests (i.e., PACER and push-ups), immediately following the fitness test, the students completed the attribution questionnaire and turned it in. Students' height and weight were measured by the health/physical educator or school nurse to calculate their BMI. Finally, the researcher assigned a numeric ID for each participant, and entered anonymous data into a computer database for analysis.

Data Analysis

Composite averages were calculated for each attribution dimension (i.e., causality, stability, personal control, and external control) for both the PACER and push-up tests. Descriptive statistics were examined to review the distribution and characterization of the variables. Bivariate (Pearson) correlations were analyzed between each attribution dimension for both fitness tests and the test scores. Box's M test of equal covariance was conducted to examine the normality assumption of the data distribution. Based on the correlation analysis, separate multivariate analyses of covariance (MANCOVA) were conducted to determine differences in the attribution dimensions among students of different weight status and performances, with gender as a covariate. Data analysis procedures were performed using the Statistical Package for the Social Sciences (SPSS Version 22.0, IBM; Armonk, NY), with $\alpha = .05$.

For the open-ended question on attribution of the performance, a deductive coding approach was used (Strauss & Corbin, 1998) to categorize the attributions made by the participants for each fitness test. The attribution codes that were assigned to the participants' statements came from previous attribution research (e.g., ability, effort; Weiner, 1988). However, due to the nature of this study, when the participants entered "I am bad at running because I'm overweight" or simply "I am fat" the attribution code of "weight" was added. Code examples are listed in Table 3. The first author, and another researcher who was not involved in the research but familiar with the study, also coded the open-ended attribution item. The Cohen's $\kappa = .89$ for PACER attribution codes, and $\kappa = .92$ for push-up attributions, indicating good consistency among the two coders. The codes were then used to examine the difference in attributions between overweight/obese and healthy weight students. The proportion differences in attribution made by students with healthy weight and overweight/obese were tested using chi-square tests.

Table 3. *PACER and Push-up Attribution Code Examples.*

PACER			Push-ups		
HFZ	Not in HFZ	Code	HFZ	Not in HFZ	Code
I am an athlete, so I am good at running	I am really out of shape	Ability	I have good upper body strength.	I can't do push-ups	Ability
I tried my hardest.	I gave up	Effort	I really pushed myself	I didn't try	Effort
I enjoy running	I hate running	Attitude	I like push-ups	Push-ups are stupid	Attitude
---	I am fat	Weight	---	I'm too heavy to do them	Weight
---	I have asthma	Illness	---	I had a headache	Illness
---	The teacher lied	Teacher Bias	Push-ups are easy	Push-ups are hard	Task Difficulty
My teacher encouraged me.	---	Help from others	Stopped when my friend stopped	I didn't eat breakfast	Other
---	My pants were too tight	Other			

Results

The results of the first MANCOVA indicated that body weight status was significantly associated with PACER and push-up test performances $F_{1, 182} = 17.74$, $p < .05$, Wilk's $\Lambda = 0.90$, $\eta_p^2 = .09$ and push-up tests $F_{1, 182} = 9.95$, $p < .05$, Wilk's $\Lambda = 0.90$, $\eta_p^2 = .05$. Box's M test result was not significant, Box's $M = 5.46$, $F = 1.80$, $p = .15$, supporting the assumption of multivariate normality and equivalence. Participants with healthy weight outperformed their overweight/obese counterparts in both PACER and push-up tests. The average PACER and push-up scores are shown in Table 4, as well as the attribution dimension scores for these two tests, separated by participants' weight status. Of the healthy weight participants, 56 (49%) were in the HFZ, and 58 (51%) were not in zone for the PACER, while the overweight/obese

Table 4. *Means and Standard Deviations for PACER and Push-up Scores and Attribution Dimensions.*

Performance and Attributions	Total ($m \pm sd$) (n=185)	Healthy Weight (n=114)	Overweight/obese (n=71)
PACER			
Test Score (# laps)	30.74 ± 16.63	34.48 ± 17.33*	24.72 ± 13.50*
Causality	7.33 ± 1.73	7.48 ± 1.65	7.10 ± 1.84
Stability	4.36 ± 2.78	4.55 ± 2.81	4.05 ± 2.72
Personal Control	6.67 ± 2.60	6.92 ± 2.47	6.27 ± 2.77
External Control	1.70 ± 1.47	1.58 ± 1.31	1.88 ± 1.68
Push-ups			
Test Score (#)	13.26 ± 7.38	14.58 ± 7.29*	11.14 ± 7.07*
Causality	7.49 ± 2.54	7.41 ± 1.66	7.63 ± 3.51
Stability	4.04 ± 2.68	4.38 ± 2.71	3.50 ± 2.57
Personal Control	7.72 ± 1.77	7.86 ± 1.57	7.49 ± 2.05
External Control	1.75 ± 1.43	1.68 ± 1.33	1.89 ± 1.59

* $p < .05$

participants had 14 (20%) in the HFZ, and 57 (80%) not in zone. For push-up performance, participants with a healthy weight had 74 (65%) in the HFZ and 40 (35%) not in zone, while the overweight/obese participants had 30 (42%) in the HFZ, 41 (58%) not. Participants of a healthy weight were more likely to be in the HFZ for these two tests.

Based on the open-ended attribution question, participants most commonly attributed their push-up performance to ability (49%) or effort (31%), and their PACER performance to ability (56%), illness (14%), or attitude (12%). The most commonly reported attributions, categorized by weight status and performance (i.e., in HFZ or not in zone), can be seen in Table 3. Other attributions made for PACER performance were effort (10%), help from others (.5%), and teacher bias (.5%). Approximately 4% of participants made attributions that were placed in the “other” category. Additional push-up attributions were task difficulty (8%), attitude (4%), illness (3%), and others (1%). Twelve (6.5%) of the overweight/obese participants did attribute their unsuccessful attempts on the PACER (*n*=5) and push-up (*n*=7) tests directly to their weight, although not a primary attribution. Overall, as seen in Table 5, overweight/obese students were more likely to attribute their not-in-HFZ PACER performance to ability and attitude than their healthy weight counterparts. There was, however, no significant difference in their attributions for not-in-HFZ push-up performance between the overweight/obese and healthy weight students.

Participants' fitness test performance, whether they were in the HFZ or not, significantly impacted their attribution dimension scores for both the PACER, $F_{1,180} = 31.91$, $p < .05$ Wilk's $\Lambda = 0.58$, $\eta_p^2 = .42$ and push-up test, $F_{1,180} = 12.72$, $p < .05$ Wilk's $\Lambda = 0.98$, $\eta_p^2 = .22$. As displayed in Table 6, controlling for gender, MANCOVA results showed that those students in the HFZ reported significantly higher causality, stability, and personal control, for push-up and PACER performance. This suggested that those students who met the performance criteria for the HFZ attributed their success to more internal, stable, and personally controllable factors than students not in the zone.

Table 5. *Frequency of Attributions by Weight Status and Perceived Success for PACER and Push-up Tests*

Group	PACER (*n*/%)			Push-Ups (*n*/%)	
	Ability 104/56%	Illness 26/14%	Attitude 23/12%	Ability 91/49%	Effort 57/31%
Healthy Weight	67	13	15	57	39
HFZ	42/62.7%	0/0%	8/53.3%	35/61.4%	31/79.5%
Not in HFZ	25/37.3%	13/100%	7/46.7%	22/38.6%	8/20.5%
Overweight/obese	37	13	8	34	18
HFZ	9/24.3%	0/0%	0/0%	16/47.1%	12/66.7%
Not in HFZ	28/ 75.7%	13/100%	8/100%	18/52.9%	6/33.3%
χ^2/p*	13.93 / p < .01	0 / p = 1	6.25 / p=.01	1.75 / p=.18	1.07 / p=.30

*Test based on proportion of attributions for not in HFZ

Table 6. Univariate Effects of Performance on Attribution Dimensions for PACER and Push-up

Fitness Test	Attribution	$F_{1,182}$	η_p^2	p	Performance	Mean*	95% CI
PACER (#lap)	Causality	14.70	.08	.00	Not in Zone	6.96	6.65-7.27
					HFZ	7.95	7.55-8.35
	Stability	39.18	.18	.00	Not in Zone	3.44	2.97-3.91
					HFZ	5.88	5.27-6.48
	Personal Control	5.64	.03	.02	Not in Zone	5.67	5.24-6.09
					HFZ	8.32	7.77-8.56
	External Control	56.60	.24	.00	Not in Zone	1.63	1.63-2.16
					HFZ	1.02	1.02-1.71
Pushup (#)	Causality	7.07	.04	.01	Not in Zone	7.00	6.45-7.55
					HFZ	8.03	7.50-8.57
	Stability	36.19	.17	.00	Not in Zone	2.76	2.22-3.29
					HFZ	5.04	4.51-5.56
	Personal Control	6.15	.03	.01	Not in Zone	7.30	6.92-7.68
					HFZ	7.97	7.60-8.34
	External Control	.071	.00	.79	Not in Zone	1.83	2.22-3.29
					HFZ	1.77	4.51-5.56

* Marginal mean, HFZ= Healthy Fitness Zone

Participants' body weight status did not impact their attribution dimension scores for their performances on the PACER, $F_{1,\,182} = 1.19$, $p = .32$, Wilk's $\Lambda = 0.99$, $\eta_p^2 = .03$ and push-up test $F_{1,\,182} = 1.99$, $p = .10$, Wilk's $\Lambda = 0.96$, $\eta_p^2 = .04$. As displayed in Table 7, after controlling for gender, MANCOVA results showed that those students who were of a healthy weight did not have significantly different attribution dimension scores as compared to their overweight/obese peers for the push-up or PACER performance. This finding suggests that the attributions healthy weight and overweight/obese students make for their performance on the PACER and push-up tests do not differ in regards to causality, stability or controllability. The only exception was for the stability dimension on the push-up test, in which healthy weight students made attributions that were more stable than the attributions made by overweight/obese students.

Table 7. *Univariate Effects of Weight on Attribution Dimensions for PACER and Push-up Tests*

Fitness Test	Attribution	$F_{1,182}$	η_p^2	p	Weight Status	Mean*	95% CI
PACER (#lap)	Causality	2.16	.01	.14	Healthy Weight	7.48	7.16-7.80
					Overweight/Obese	7.10	6.69-7.50
	Stability	1.28	.01	.26	Healthy Weight	4.52	4.03-5.06
					Overweight/Obese	4.07	3.42-4.72
	Personal Control	2.69	.02	.10	Healthy Weight	6.92	6.44-7.40
					Overweight/Obese	6.27	5.66-6.88
	External Control	2.12	.01	.15	Healthy Weight	1.57	1.30-1.84
					Overweight/Obese	1.89	1.55-2.34
Push-up (#)	Causality	.31	.00	.58	Healthy Weight	7.41	6.94-7.88
					Overweight/Obese	7.63	7.03-8.22
	Stability	4.56	.02	.03	Healthy Weight	4.37	3.88-4.86
					Overweight/Obese	3.51	2.89-4.14
	Personal Control	1.89	.01	.17	Healthy Weight	7.86	7.53-8.19
					Overweight/Obese	7.49	7.08-7.19
	External Control	.79	.00	.38	Healthy Weight	1.68	1.43-1.94
					Overweight/Obese	1.87	1.54-2.21

* Marginal mean

In summary, the results showed that students of a healthy weight performed significantly higher than overweight/obese students on both the PACER and push-up tests. While weight status played a role in performance, overall there were no significant differences in attribution dimension scores for either test between healthy weight and overweight/obese students, with the exception of the stability domain for push-ups. However, student performance, whether they were in the HFZ or not, did have a significant impact on the attribution dimension scores for both the PACER and push-up tests. The open-ended attribution question revealed that the students primarily attributed their push-up performance to ability and effort, and their PACER performance mostly to ability.

Discussion

The purposes of this study were to determine if there were differences in performance on the PACER and push-up fitness tests between high school students of different weight status (i.e., healthy weigh and overweight/obese), examine the attributions made for fitness test performance, and to determine if those attributions and attribution dimension scores differed based on weight status or performance.

Fitness Test Performance

Students' weight status significantly impacted their scores on the PACER and push-up tests, with students who were overweight/obese scoring significantly lower on both tests. This result aligns with previous research regarding fitness testing and weight status (e.g. Dumith et al., 2010; Bove, Auguste, & Burdette, 2007). Excessive body weight can make it difficult to have optimal performance on fitness tests, and the results of this study, which utilized the PACER and push-up tests, provide further support for this notion. Research indicates that cardiorespiratory fitness is strongly associated with risk for cardiovascular disease, particularly in overweight/obese children (e.g., Ekelund et al., 2007). Therefore, it is crucial for overweight/obese students to continue assessing cardiorespiratory health and improving their performance.

While healthy weight students on average performed better than overweight/obese students on both fitness tests, there were a number of overweight/obese students who were successful passing on the tests. More specifically, 14 overweight/obese students were in the HFZ for the PACER, whereas 30 were in the HFZ the push-ups. In Dumith and colleagues (2010) study, a strength test was one of the only fitness tests that overweight/obese students performed well on. In the current study, even though there were significantly more healthy weight students who were in the HFZ for push-ups (49% of healthy weight students), it should not be overlooked that approximately 42% of the overweight/obese students were also in the HFZ. If overweight/obese students can be successful at tests of muscular strength during physical education, more positive experiences could occur during fitness testing to perhaps help combat the negative experiences often described in research (e.g., Trout & Graber, 2009).

Attributions

The second purpose of this research was to examine the extent to which attributions for fitness test performance differed based on weight status and performance. For students not in the HFZ for the PACER, overweight/obese students were more likely to attribute their PACER performance to ability and attitude than their healthy weight counterparts. This difference in attributions for the PACER test suggests that when both overweight/obese and healthy weight students do not perform in the HFZ, the overweight/obese students feel it is because of their running ability, or negative attitudes towards running or the PACER. In previous research, overweight/obese students have discussed their struggles with running, especially for long periods of time (Trout & Graber, 2009), hence ability attributions for not performing in the HFZ are not surprising. Further, overweight/obese students have reported being teased during fitness tests, particularly running activities (Trout & Graber, 2009), which might explain the negative attitudes of the overweight/obese students for performances not in the HFZ. No significant differences were seen in attributions for not-in-HFZ push-up performance between the overweight/obese and healthy weight students.

Regardless of weight status or performance, ability was the most reported attribution for performance on the PACER (56%) and push-up tests (49%). This finding aligns with previous attribution research in fitness testing (Vispoel & Austin, 1995), as well as research in general physical education activities (e.g., Baron & Downey, 2007; Chedzoy & Burden, 2009). This means that high school students primarily explain their performance on fitness tests based on whether or not they believe they have the ability to complete the activity. Because fitness testing has clear performance criteria, students might perceive that their ability does not meet the criteria, which is maladaptive in that students might feel that regardless how hard they try, their innate ability may not meet the criteria. However, Li and Lee (2004) discuss that there is controversy surrounding the nature of ability and whether it is an attribute that is changeable or unchangeable (i.e., stability). An individual can view ability as a trait that can be changed with practice, or a naturally occurring, stable trait. The concept of ability being changeable or not would need to be taken into consideration when assessing whether ability attributions are adaptive or maladaptive.

After ability, effort was the most reported attribution for performance on the push-ups (31 %). Previous attribution research in physical education has reported that effort, or lack of effort, is often an attribution commonly made by students (e.g., Chedzoy & Burden, 2009; Vispoel & Austin, 1995). Effort attributions for unsuccessful attempts are often considered adaptive because the individual believes that if they tried harder the next time, they could be successful (Treasure & Roberts, 2001). Because effort is internal, unlike ability, it is typically viewed as adaptive for successful attempts. However, it is important to note that effort can be immediate/situational or typical/general effort (e.g., Weiner, 1988). Immediate effort is often viewed as unstable (changeable) whereas typical effort is viewed at stable (unchangeable; e.g., Weiner, 1985). Attributing a successful attempt to immediate effort would be viewed as more maladaptive because it is unstable. Likewise, attributing a failure to typical effort would be maladaptive because it is stable. Whether effort is immediate or typical helps determine if the attribution is adaptive or not. This study did not specifically examine whether effort attributions were typical or immediate, however, future researchers should consider assessing whether effort in fitness related activities, particularly fitness testing, is typical or immediate.

Thirteen students (14% of all participants) from each weight category attributed their performance to illness, and none of the performances were in the HFZ. Illnesses, medical conditions (e.g., asthma) or injuries (e.g., sprained ankle) can have a substantial impact performance on fitness tests (Naughton et al., 2006), therefore finding that only students not in the HFZ are attributing their performance to such factors is not surprising. Weiner (1985) suggests that illness would serve as a sufficient attribution for unsuccessful attempts, however, illness/injuries were not reported as a primary attribution in previous physical education attribution research. Illness is usually temporary (i.e. unstable), and would be a more adaptive attribution because the student may feel that if he or she was not sick or injured, then the outcome would have been different. This belief would be a motivating factor for future fitness testing attempts.

Attitude attributions (12%) were also made for PACER performance. These attributions are related to student attitude towards running, or the PACER test itself. Previous studies have noted that attitude and mood contribute to how well an individual performs tasks or activities in physical education (Chedzoy & Burden, 2009). Chedzoy and Burden (2009) reported that attitude towards health and fitness were significant indicators of both successful and unsuccessful experiences in physical education. Research concerning student attitudes specifically toward fitness testing has found that attitudes towards fitness testing tend to be unfavorable (Luke & Sinclair, 1991), and decrease as age and grade level increase (Mercier & Silverman, 2014). The findings in this study are consistent with the previous reports because only eight students reported attitude as their attribution for performing in the HFZ, but 15 students who were not in the HFZ attributed their performance to attitude.

Attribution Dimensions

Attributing an unsuccessful attempt to lack of ability in theory is maladaptive. However, when individuals view ability as something that can be changed, the attribution becomes unstable. Attributing failures to an unstable factor such as changeable ability becomes adaptive (e.g., Weiner, 2005). While in general there were no significant differences in the attribution dimension scores between students of different weight status, 12 overweight/obese participants attributed their performance (not in HFZ) on the fitness tests directly to their weight. When examining those 12 students' attribution dimension rating, all of them rated their weight attribution as unstable. Even though these students did not perform in the HFZ, and they attributed that performance to being overweight/obese, they all believed that being overweight/obese is only temporary and subject to change. This attribution could be adaptive, and is promising to these students' future weight status, which adds new insight to the research on attributions in relation to weight status.

There were significant differences in attribution dimension scores based on performance. For both fitness tests, students in the HFZ had significantly higher attribution dimension scores than students not in the zone. Even though students in both performance groups rated their attribution as internal, students who performed better rated their attribution as more internal than students not in the zone. This means that these high school students feel a sense of responsibility for their performance whether they were in the HFZ or not, which is adaptive. Internal attributions have been reported for physical education activities in various other studies (Chedzoy & Burden, 2009; Lodewky & Muir, 2017). The participants from Lodewyk and Muirs' (2017) research were also high school students but were all female. The internal attributions reported were in reference to a fitness unit that included various fitness activities and tests, rather than just standardized fitness tests as used in the current study. Furthermore, of the internal attributions made by the participants in Chedzoy and Burden's research, effort and ability were most commonly reported, similar to the present study.

For both the PACER and the push-up tests, students not in the HFZ rated their attributions as unstable, meaning it can be changed. Students in Lodewky and Muir's (2017) research also primarily made unstable attributions in the fitness testing unit. This is an adaptive pattern. Attributing a successful performance to stable factors and unsuccessful performances to unstable factors is believed to have a positive influence on motivation and expectancy for future success (Weiner, 2005). Those students in the HFZ rated their attributions are more stable, or permanent, meaning the reason they performed well should not change and they should perform well in the future. Stability is said to be directly related to the expectations for future success in the activity, so it is beneficial for students to assess the stability of their performance in an adaptive way (Baron & Downey, 2007).

On average, participants rated their attributions as personally controllable for both fitness tests, with students in the HFZ having significantly higher scores than students not in the zone. The students in the current study viewed their attributions as personally controllable, which is adaptive for performances in both the HFZ and not in the HFZ, because the students felt as though they had control over the outcome. By feeling a sense of control over the outcomes in fitness testing, similar to internal causality, students take responsibility for how they perform. This finding is concurrent with other literature regarding attributions and fitness testing and physical education (Chedzoy & Burden, 2009; Lodewky & Muir, 2017).

Conclusion

Based on the findings of this study, student weight status significantly impacts their performance on the PACER and push-up tests, but not their attribution dimension scores. Performance on the fitness tests, whether students were in the HFZ or not, did make a significant difference in attributions and dimension scores. Overall, students primarily made attributions related to ability and effort for their performances on the PACER and push-up tests. Overweight/obese students who did not perform in the HFZ were more likely to attribute their performance to ability and attitude than their healthy weight peers. However, there was no significant difference between overweight/obese and healthy weight students' attributions for push-up performance not in the HFZ. On average, students viewed their attributions as internal, personally controllable, and stable. Internal and personally controllable attributions are typically viewed as adaptive (Weiner, 2005), therefore, future research should utilize a measure that distinguishes stable ability from changeable ability, and situational or typical effort. Accurately assessing these attributions is critical to determine the adaptive nature of the attribution. Finally, since weight status had limited impact on attribution dimensions, and it is was student performance that determined how attributions were viewed in the various dimensions, increasing performance (i.e., more students performing in the HFZ) should be a primary goal of physical education teachers. Improving fitness test performance should subsequently foster adaptive attributions, which should facilitate high expectancy for future success (Weiner, 2005).

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MANUSCRIPT II

Fitness Test Performance and Content-Specific Motivation: Attributions, Interest, and Self-Efficacy

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Abstract

This study sought to examine the relations between personal interest, self-efficacy, and attribution dimensions on PACER and push-up performances. High schools (n=185) participated in the study. They first completed an interest and self-efficacy survey, then completed the PACER and push-up tests, and finally completed the causal dimension scale. Data were analyzed descriptively, and path analysis was conducted to examine the relation between the motivation constructs and fitness test performances. The results of a path analysis revealed the content-specific motivational constructs of interest, self-efficacy and attribution dimensions as positive predictors of performance on the PACER test, and interest, self-efficacy and the causal dimensions of stability and causality as positive predictors for the push-up test. The final path model explained approximately 51% of the variances in PACER performance and 48% of the variances in push-up performance. The findings suggest that this multi-theoretical approach is beneficial to providing detailed insight into motivational factors that influence performance on fitness tests.

Keywords: physical fitness, adolescent, high school, physical education,

Fitness Test Performance and Content Specific Motivation: Attributions, Interest, and Self-Efficacy

Physical fitness testing, which typically gives students a lasting impression about physical education, is a ritual in the gymnasia every semester in many schools (Morrow et al., 2008; Silverman et al., 2008). Students from various grade levels lack motivation for fitness testing which often results in unwillingness to participate, lower motivation for physical education, and/or lower test performance. For example, students in elementary school have reported that they are not motivated to participate in fitness testing and resorted to “dodging” or finding excuses to not participate (Hopple & Graham, 1995). In middle schools, fitness testing and related tasks are reported as factors that lower student motivation for physical education (Zhu & Chen, 2013). When physical education becomes elective in high school, students name fitness testing as one of the negative factors contributing to the decision to not attend physical education (Davis, Zhu, & Haegele, 2018). Hence, focusing on motivational factors related to fitness testing may be advantageous in helping develop strategies to motivate students in physical education and potentially improve their fitness test performances.

Several content-specific motivation constructs and theories have been used in physical education and physical fitness research. One motivational construct that plays a critical role in student learning behaviors and performance in physical education is personal interest (Chen & Ennis, 2004; Dewy, 1913). Personal interest generates enduring positive dispositions for individuals to engage and re-engage in a particular activity over time (Hidi & Renninger, 2006). Personal interest takes a relatively long time to nurture, but those with higher personal interest in one activity tend to be willing to engage in the activity when faced with challenges (Hidi, 1990). Personal interest is content-specific, meaning, a student may have a high interest in dance, but have a low interest in basketball. Scholars in the physical education field found personal interest to be a significant positive predictor in fitness tests, specifically those focusing on cardiorespiratory endurance (i.e., PACER and 1-mile run; e.g., Zhu et al., 2014). Student interest in certain fitness tests (e.g., PACER) can also vary based on their performance levels (Zhu, 2013). Furthermore, researchers have demonstrated that high individual interest in a task can increase engagement time, improve information retention, and predict achievement (Chen & Darst, 2002).

In addition to specific motivational constructs such as interest, certain beliefs about oneself (e.g., self-efficacy) can also play a significant role in student performance on fitness tests. As a construct in social cognitive theory, self-efficacy refers to a person's confidence in their abilities to perform a specific task successfully in a given situation (Bandura, 1990). Self-efficacy is also content-specific in that a student may have a high self-efficacy in running but low efficacy in dance in physical education. Self-efficacy in a school environment is often formed based on previous experiences, vicarious experiences (i.e., observing peers' performance), social persuasion and encouragement, and managing physiological responses (Bandura, 1997). In theory, those who have a higher self-efficacy are likely to have higher performance compared to their peers with lower self-efficacy. Self-efficacy has been linked to learners' effort level, engagement, willingness to actively participate, and perseverance in the physical education setting (Lodewyk & Pybus, 2013; Gao et al., 2008). Further, self-efficacy has historically demonstrated a predictive relationship with achievement (Nicholls, 1984), engagement and performance in physical activity settings such as physical education (Lirgg, 2006), and fitness related activities (e.g., Gao et al., 2008). Specifically, Gao and colleagues (2008) found self-efficacy to be a positive predictor of cardiorespiratory endurance in fitness testing.

While it is important to assess motivational factors that can influence performance on fitness tests (e.g., interest, self-efficacy), it is also valuable to examine students' attributions for their performance. Attribution theory states that an individual will provide reasons to explain his/her successful or unsuccessful outcomes, and these explanations (i.e., attribution dimensions) can influence future motivation (Weiner, 1985; 2010). Students will often attribute their outcomes to a variety of causes, such as effort, ability, task difficulty, luck, and/or teacher bias (McClure et al., 2011). Attributions can be categorized by three dimensions: causality, stability, and controllability. The stability dimension refers to the duration of the cause, ranging from stable (e.g., ability) to unstable (e.g., effort). Causality describes whether the attribution originates from an internal (e.g., effort) or external (e.g. luck) source. Lastly, the controllability dimension refers to whether the individual believes that an outcome can be personally (e.g., effort) or externally controlled (teacher bias; Weiner 1985; 2010).

Attribution dimensions are content specific, and attributions can subsequently impact future efforts and expectancy for success for a specific activity (Fishman & Husman, 2017; Weiner, 2010). For example, a study compared high school girls' enjoyment, state and social physique anxiety, self-efficacy and casual attribution between a fitness testing and a soccer unit (Lodewyk & Muir, 2017). In the fitness testing unit, internal, unstable attributions were made more often than in the soccer unit, where lack of ability was the primary concern. However, self-efficacy and attribution dimensions were not significant predictors of fitness performance (Lodewyk & Muir, 2017).

Previous research has integrated multiple theories and motivation constructs to offer multi-perspective explanations pertaining to an individual's attributions, interest, self-efficacy and fitness test performances in physical education. For example, Lodewky and Muir (2017) sought to determine if beliefs (self-efficacy and causal attributions), and emotions (anxiety, enjoyment, and social physique anxiety) predicted students' performance in soccer and fitness testing units. Based on a regression analysis, it was found that emotions and beliefs did not predict performance in fitness testing (R^2= .40, p = .18). Chase (2001) examined the impact children's self-efficacy, age, and gender had on motivation, future self-efficacy, and causal attributions. A multiple analysis of variance indicated that children with high self-efficacy attributed failure to lack of effort, in comparison to those with lower efficacy who attributed failure to lack of ability. In another study, Zhu and Chen (2015) used expectancy-value constructs and self-efficacy to predict cardiorespiratory performance. A path analysis revealed that expectancy-related beliefs about cardiorespiratory fitness was partially mediated by self-efficacy, which explained 51% of the variance in performance on the PACER test.

In summary, previous research has documented the relationship between interest and performance, as well as self-efficacy and performance on fitness tests (Zhu & Chen, 2015). The relationship between self-efficacy and causal attributions has also been examined (Lodewyk & Muir, 2017). However, attribution theory, as it specifically relates to fitness test engagement and performance, has rarely been applied in physical education. While one study found that self-efficacy and attributions did not predict fitness testing outcomes, the sample size was small (*n*=67) and the participants were all females (Lodewyk & Muir, 2017). How these content specific motivational constructs (i.e., individual interest, self-efficacy, and causal attributions) relate to physical fitness performance on the PACER and push-up tests has not been well-established. Additionally, rather than examining these individual constructs as a single theoretical framework, utilizing a multiple theoretical approach tends to produce more explanatory power. The purpose of this study was to investigate the relationship between interest, self-efficacy, attribution dimensions and performance on the PACER and push-up fitness tests. The following research question was asked: What are the relations between attribution dimensions, interest, self-efficacy, causal dimensions and performance on the PACER and push-up test tests? It is hypothesized that these content specific motivation constructs will be positively related to fitness test performance except for external control, which may be negatively related to the performance. The hypothesized model can be seen in Figure 2.

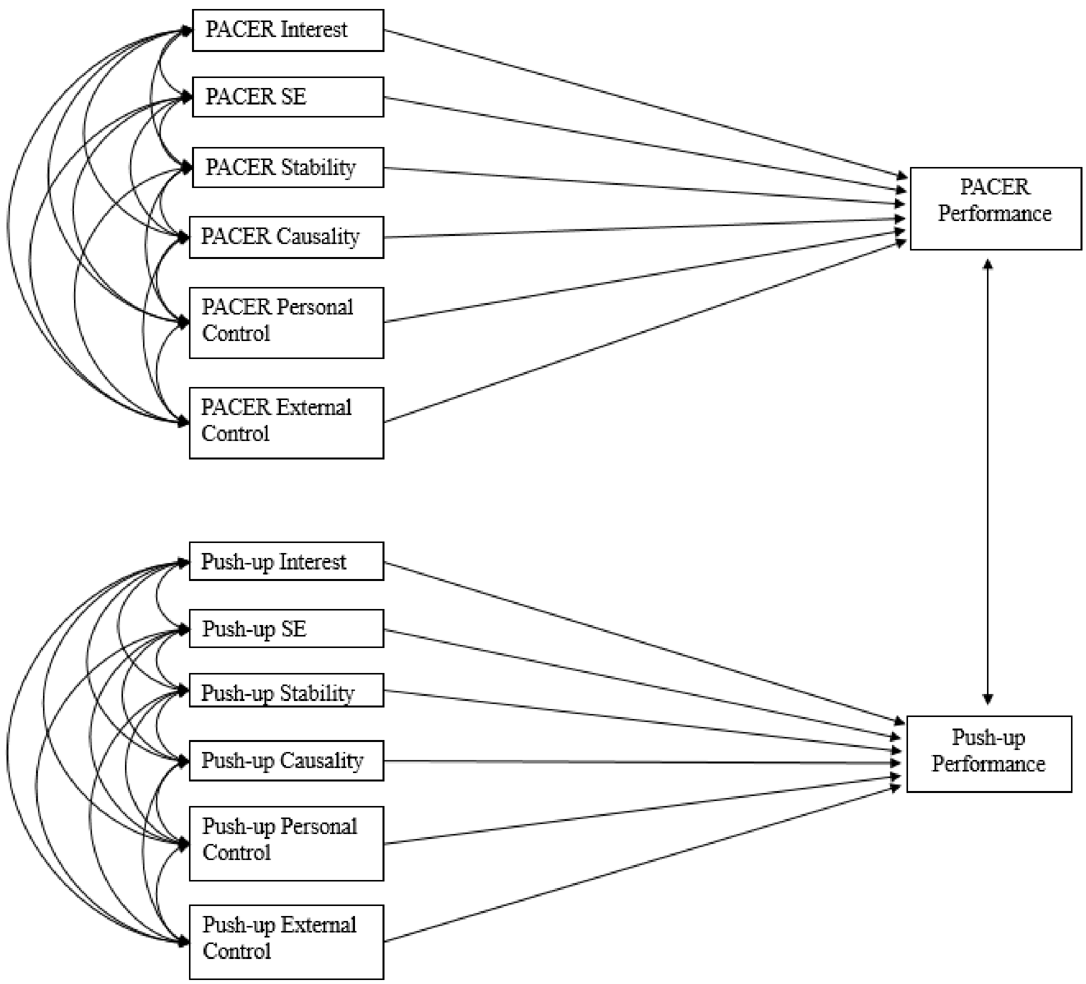

Figure 2. Hypothesized path model of interest, self-efficacy, attributions, and fitness performance. Note: PACER = Progressive Aerobic Cardiovascular Endurance Run, SE = Self-Efficacy.

Methods

Research Design & Context

A non-experimental survey research approach was utilized to collect data. The study took place in an Eastern state, in a district that requires two years of physical education at the high school level to graduate. Participants were enrolled in either Physical Education I or Physical Education II. Physical Education I offers ninth grade students a multitude of activities designed to promote and prepare students to be physically active for life. Such activities may include but are not limited to individual and sport activities, and fitness education. Physical Education II, primarily for tenth grade students, involves physical activities that are designed to provide students with the skills to become proficient in individual, dual, or team sports, and other lifetime physical activities (e.g., tennis). Fitness testing is a required component of both physical education courses, and therefore provided an appropriate context for this study.

Participants

Participants were a sample of 185 high school students. The participants were in the 9th (67%) or 10th (33%) grade, and were aged either 14 (35.7%), 15 (50.3%), 16 (13%) or 17 (1.1%) years. Participants identified as male (47.7%) or female (57.3%), Black (43.8%), White (17.3%), Hispanic/Latino (14.1%), Asian or Pacific Islander (5.9%), American Indian (1.6%), or two or more races (17.3%).

Variables and Measures

Interest. Student personal interest for the PACER and push-up test was assessed using an eight-item interest scale (Chen & Darst, 2002). Students first wrote a physical education activity that they were most interested in doing. Then, they wrote that activity on the first line of a chart that contained four of the most common activities in physical education (Lee, Burgeson, Fulton,

& Spain, 2007), and the two fitness tests of interest. For each activity, the students used a 7-point Likert scale to identify how interested they are in the various activities. The selection ranged from “1 not interested,” to “7 most interested.” Students were instructed to circle “7” for the activity they wrote in, because they identified that activity as most interesting to them. The number selected for the PACER and push-ups were the interest scores those fitness tests. The interest scale demonstrated strong internal consistency with an α value of .89.

Self-efficacy. Student self-efficacy for their performance on the PACER and push-ups was measured using a hierarchical scale (Bandura, 2006) containing five statements for each fitness test (i.e., PACER and push-ups). Each statement regarding the PACER read, “I am confident I can run at least __PACER laps.” Likewise, the statements for push-ups read, “I am confident I can perform at least__push-ups.” In each blank is a number that corresponds to a score in the HFZ for that test. The score in the first statement is on the low end of the HFZ and statement five contains a score that is on the highest end of the HFZ. Males and females had two different scales because the HFZ criteria differs based on gender. The composite score for each fitness test was calculated and served as the students’ self-efficacy score for the corresponding test. This hierarchical method has been used in previous research and demonstrated high internal consistency (α = .91; Zhu & Chen, 2015). In the current study, α values for the PACER and push-up tests were .93 and .91, respectively.

Fitness test performance. FitnessGram protocols (Welk & Meredith, 2010) were employed to collect participants’ fitness scores for the PACER and push-up fitness tests. The entire FitnessGram protocol includes nine items to measure health-related fitness across five areas (i.e., cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility). However, for the purposes of this study only items assessing muscular strength and cardiorespiratory endurance (i.e., PACER and push-ups) were utilized due to their correlation to overall health (Ortega et al., 2008; Welk, Maduro, Laurson, & Brown, 2011).

PACER. The PACER is the most commonly used test in schools to evaluate cardiorespiratory endurance (Cureton et al., 2013). Validity for the PACER has been established by correlating the VO_2max measured on the treadmill, with the VO_2max at the end of the test (e.g., Mahar et al., 2011). Previous research has also documented the reliability of the PACER test with α values ranging from .64 to .90 (Beets & Pitetti, 2006). Adapted from the 20-meter shuttle run, the PACER requires students to run back and forth across a 20-meter span. As students run, they are instructed to keep pace with music from an audio recording. Beeps on the recording indicate when students should reach the other side of the course. The test starts off slow, with more time in between beeps, then increases in speed (i.e., beeps get closer together) as each minute passes. Students continue running until they are unable to keep up with the beeps (Cureton et al., 2013). Their final score is the total number of laps completed.

Push-up. The 90° push-up test was utilized to assess upper body strength and endurance. Similar to the PACER, an audio recording with a set cadence was used, which allowed for a smooth unified movement, helped avoid fatigue, and made it easier to judge whether a full proper repetition had been completed (Plowman, 2013). Starting in the “up” position with their neck, back, and shoulders in a straight line, students then bent their elbows to a 90° angle and pushed back up to complete a push-up in time with the cadence. Students performed push-ups until they were too tired to continue, or they broke proper form (Plowman, 2013), and their final scores were the number of completed push-ups. Intra-class stability reliability coefficients of the 90° push-up range from .50 to .86 (McManis, Baumgartner, & West, 2000).

Attributions. We used the modified Causal Dimension Scale (CDS-II; McAuley et al., 1992) to measure attribution dimensions. After completing the fitness tests, participants were asked to recall their recent performance on the PACER and push-up tests. They were then asked if their performance met the criteria to be in the HFZ or not. An open-ended attribution item was provided for participants to indicate what they perceived to be the cause of their performance ("The most important reason why I was or was not able to meet the healthy fitness zone criteria . . ."). Allowing students to answer the open-ended question and provide their own attribution reduces researcher bias and prompting (Russell, 1982). The participants were then asked, "Is the cause something:" followed by a series of 12 statements from the three causal dimensions (i.e., causality, stability, and controllability). The students then used a 9-point Likert scale to rate the degree to which each statement described their attribution (McAuley et al., 1992). The causality and stability dimensions contained three statements each. However, the controllability dimension contained six, three statements for personal control, and three statements for external control. The CDS-II has demonstrated to be valid and reliable with α values ranging from .60 to .92 (McAuley et al., 1992). In the present study, α values for PACER and push-up causality, stability, external control and personal control ranged from .68 to .95, which indicated satisfactory internal reliability. All α values can be seen in Table 1.

Procedures

After the study protocols were approved by the university intuitional review board, permission to conduct this study was granted by the participating school district. The researcher then went and spoke directly to the students to provide details about the study, and distribute parent consent and student assent forms. After the consent and assent forms were received, the researcher distributed the first part of the questionnaire containing the interest items, and self-efficacy items. The research then helped administer the fitness tests and distributed the second part of the questionnaire, the CSD-II. The entire questionnaire took approximately 15 minutes to complete. Once the data collection was complete, the researcher entered the data and assigned a numeric pseudonym for each participant to link the survey and performance data.

Data Analysis

Descriptive statistical analyses were conducted to examine the distribution patterns and characteristics of the variables. For each attribution dimension (i.e., causality, stability, personal control, and external control), composite averages were calculated. Internal consistency of the causal dimensions, interest scale, and self-efficacy were examined using Cronbach's alpha. Bivariate (Pearson) correlation coefficients were computed to identify the relations between the variables and possible collinearity issues. A path analysis was conducted to test the hypothesized model (Figure 1) using EQS 6.3 (Bentler, 2006). Multivariate normality was examined using the normalized multivariate kurtosis (Yuan, Lambert, & Fouladi, 2004). Combined goodness of fit indices were used to evaluate model fit during the analysis: χ^2 statistic, normed comparative fit index (CFI; > .95 great, > .90 traditionally acceptable), the root mean square error of approximation (RMSEA; < .05 great, .05 - .10 is acceptable, > .10 poor), and standardized root mean square residual (SRMR; < .09 is acceptable). The Wald and Lagrange multiplier test results for model re-specification suggestions were also examined. These indices reflect both absolute, parsimonious, and incremental fit statistics, and are commonly used path analysis and structural equation modeling (Hu & Bentler, 1999; Kline, 2011).

Results

All of the content specific constructs showed good internal consistency for this study, except for causality for push-up test, which has an adequate Cronbach α. As shown in Table 8, students reported low to moderate levels of personal interest, and moderate levels of self-efficacy for the PACER and push-up tests. Student scores for the PACER test averaged 37.24, SD = 19.23, ranging from 9 to 97 laps, and for the push-up test averaged 37.24, SD = 19.23, ranging from 9 to 97 push-ups. For the attribution dimensions, students rated their attributions as highly internal ($\geq$ 6) and personally controllable ($\geq$ 6), and moderately stable (<4) for both the PACER and push-up tests.

Table 8. *Descriptive statistics of interest, self-efficacy, causal dimensions, and performances.*

Variable	Cronbach's α	*M*	*SD*	Min	Max
Interest PACER	.89	2.77	1.97	1	7
Interest Push-up	.89	2.78	1.80	1	7
SE PACER	.93	25.49	12.79	5	50
SE Push-up	.91	38.46	11.02	5	50
Causality PACER	.72	7.33	1.73	1	9
Stability PACER	.95	4.36	2.78	1	9
Ext. Cont. PACER	.95	1.70	1.47	1	9
Pers. Cont. PACER	.94	6.67	2.60	1	9
Causality Push-up	.68	7.49	2.54	1	9
Stability Push-up	.91	4.04	2.68	1	9
Ext. Cont. Push-up	.90	1.75	1.43	1	9
Pers. Cont. Push-up	.93	7.72	1.77	1	9
PACER (laps)	--	30.74	16.63	2	70
Push-up (# count)	--	13.26	7.38	1	30

Note: PACER= Progressive Aerobic Capacity Endurance Run; SE= Self-efficacy; Ext. Cont.= External Control; Pers. Cont.= Personal Control

Moderate positive correlations (.30 $\leq r \leq$ .69) were found between PACER performance and PACER interest, self-efficacy, stability, and personal control, PACER personal control and

PACER self-efficacy and causality, PACER interest and self-efficacy, push-up interest and self-efficacy, push-up personal control and causality, and between push-up performance and interest, self-efficacy, and stability. As shown in Table 9, PACER performance and push-up performance also had a moderate positive correlation. Low to moderate negative correlations ($-.30 \le r \le -.69$) were found between PACER external control, causality, and personal control, and push-up external control, causality, and personal control.

Table 9. *Pearson product-moment correlation coefficients between variables.*

Variables	1	2	3	4	5	6	PACER
1.Interest	-	.47**	.10	.16*	-.02	.25**	.48**
2. SE	.41**	-	.15*	.14*	-.12	.36**	.61**
3. Causality	-.01	-.01	-	.16*	-.56**	.33**	.25**
4. Stability	.20**	.24**	-.04	-	-.11	.02	.34**
5. External Control	.03	.06	-.41**	.06	-	-.35**	-.09
6. Personal Control	.16*	.12	.46**	.06	-.60**	-	.39**
Push-up	.43**	.59**	.14	.40**	-.04	.21**	.52**

Note: Correlation coefficients for PACER are above the main diagonal (shaded) and those for push-ups are below the main diagonal. PACER= Progressive Aerobic Capacity Endurance Run, SE= Self-efficacy; * $p < .05$, ** $p < .01$.

The normalized multivariate kurtosis was 44.40, which is greater than 30, as such the Yuan-Bentler (YB) scaled statistics were used. The path analysis results showed excellent goodness of fit indices for the hypothesized model, YB-χ^2 = 8.31, df = 14, p = .87, CFI = .99,

SRMR = .015, RMSEA = .00 (90% CI: .00, .03). Wald and Lagrange multiplier tests showed no significant model re-specification suggestions. As shown in Figure 3, while attribution dimensions, personal interest, and self-efficacy were statistically positively related to PACER performance, only causality and stability attribution dimensions, and personal interest, and self-efficacy were statistically positively related to push-up performance. Of the attribution dimensions, neither personal control nor external control were significantly related to push-up performance. Overall, the path model explains about 51.4% of the variances in PACER, and about 47.9% of the variances in push-up performances.

Discussion

The purpose of this study was to investigate the relationship between interest, self-efficacy, attribution dimensions and performance on the PACER and push-up fitness tests. Overall, students reported low to moderate levels of interest and moderate levels of self-efficacy for the PACER and push-up tests. Students also identified their attributions for their performance as internal, stable, and personally controllable. Correlation and path analysis identified that attribution dimensions, personal interest, and self-efficacy were positively related PACER performance, and only causality and stability attribution dimensions, personal interest, and self-efficacy were positively related to push-up performance.

In regards to student interest for the PACER, the low to moderate levels of personal interest reported (M = 2.77 out of 7) is consistent with previous research (Zhu et al., 2014), while another study reported relatively high levels of personal interest for fitness activities (Gao et al., 2008). Low to moderate personal interest was also reported for the push-up test (M = 2.78 out of

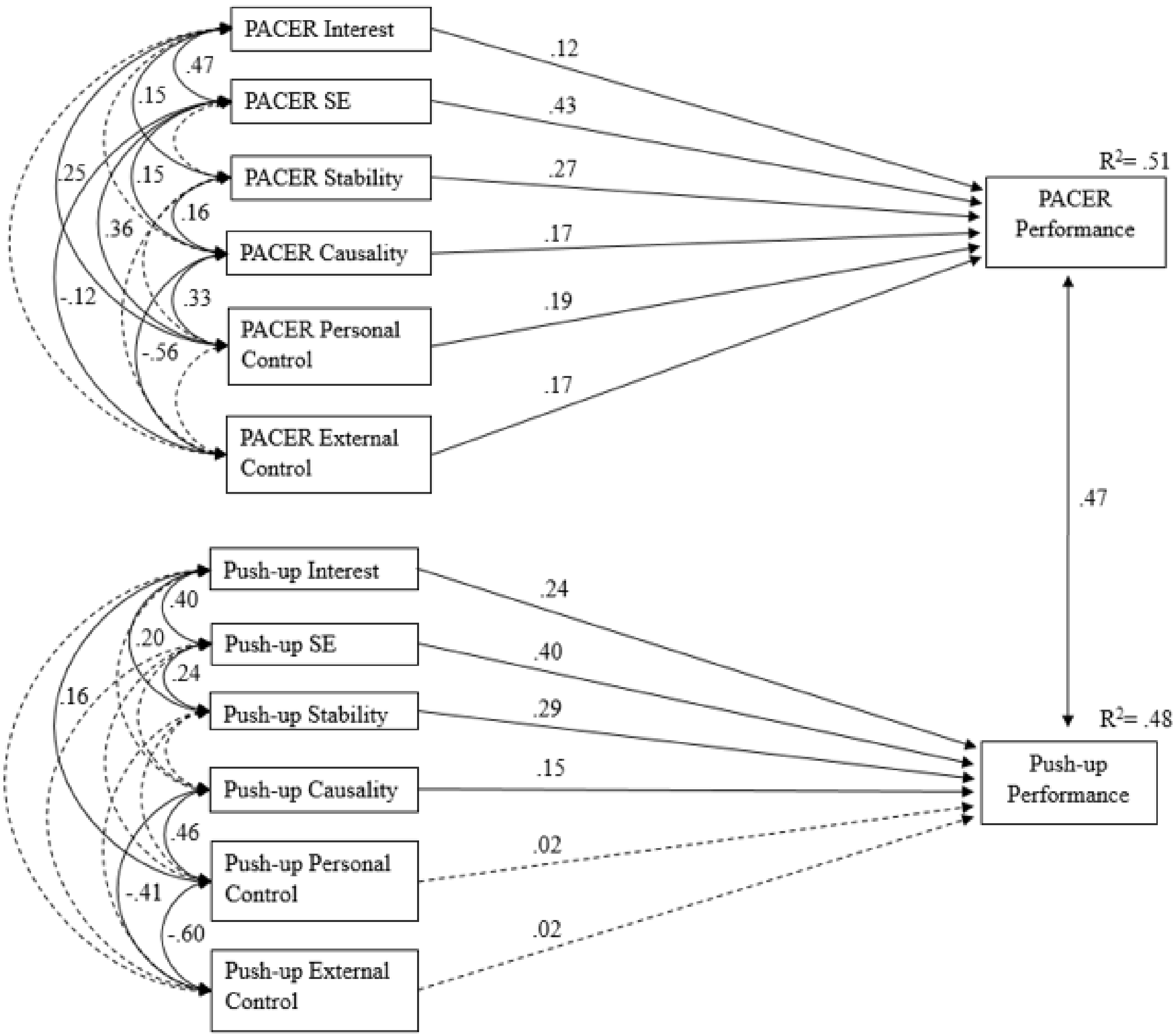

Figure 3. Final path model of interest, self-efficacy, and attribution dimensions on PACER and push-up performance. The dashed lines indicated paths and correlations that were not significant.

7), however, previous research has reported that student interest for muscular strength was relatively high (Gao et al., 2008). Contextual and content differences may help explain the differences between the current study and Gao et al., (2008) study. For example, the participants in Gao and associates' study were middle school students rather than high school students.

Additionally, the curl-up test was used to assess muscular strength and endurance rather than push-ups. If personal interest for the fitness tests remains low, it could lead to potential issues in the future related to the students' ability to maintain high levels of engagement with the activities over time (Alexander, 2002). Consistent with previous research (Chen & Darst, 2002; Zhu et al., 2014), personal interest was identified as a positive predictor for PACER and push-up performances in the current study, though a previous study found that interest did not play a significant role in predicting performance on a muscular strength/endurance test (i.e., curl-ups; Gao et al., 2008).

Moderate to high levels of self-efficacy for both PACER (25.49 out of 50) and push-up (38.46 out of 50) tests were reported by students in the current study, consistent with previous research (Gao, 2009; Gao et al., 2008; Zhu & Chen, 2015). Both PACER and push-up self-efficacy positively predicted fitness test performance, respectively. Previous studies have documented similar results for PACER performance (Gao et al., 2008; Zhu & Chen, 2015). However, it has also been reported that self-efficacy was not predictive of muscular strength/endurance performance (Gao et al., 2008) or performance in a fitness unit (Lodewyk & Muir, 2017). As previously noted, Gao and colleagues' research involved middle school students, and a curl-up test was used to measure muscular strength and endurance. The difference in age and fitness test could explain the conflicting results. While Lodewyk and Muir's research involved high school students, the study's analysis included numerous other constructs (i.e., anxiety, social physique anxiety, enjoyment, and attributions), and the scores used for analysis were based on all the fitness tests in the unit (sit-ups, push-ups, long jump, flexibility, and a cardiovascular test), not for each individual test.

The scores for the attribution dimensions (i.e., causality, stability, and controllability) revealed that students rated their attributions as internal and personally controllable. This means that the students felt the cause of their performances on the tests came from within themselves, and that they had control over the outcome. The mean scores for the stability domain were not high enough to say the attributions were stable for the PACER (4.36 out of 9) and push-up (4.04 out of 9) tests. This means that on average, the participants did not view their attributions for their fitness test performance as stable nor unstable. In the model, all of the attribution dimensions positively predicted PACER performance, whereas only the stability and causality domains predicted push-up performance. This finding contradicts a previous study, where attributions were not related to fitness performance (Lodewyk & Muir, 2017). However, one of the fundamental aspects of attribution theory is the relationship of attributions to future motivation. Namely, attributions that are internal and personally controllable are adaptive, and foster positive affect and increase expectancy for future success (Fishman & Husman, 2017; Weiner, 2010). Therefore, the positive relationship these attribution dimensions have with PACER performance is not unexpected.

In summary, this study sought to examine the relations between personal interest, self-efficacy, and attribution dimensions on PACER and push-up performances. The results of the path analysis revealed the content-specific motivational constructs of interest, self-efficacy and attribution dimensions as positive predictors of performance on the PACER test, and interest, self-efficacy and the causal dimensions of stability and causality as positive predictors for the push-up test. As utilized in previous research (Lodewyk & Muir, 2017; Zhu & Chen, 2015), this multi-theoretical approach is beneficial to providing detailed insight into motivational factors that influence performance on fitness tests. With the decline in fitness test performance for older students (Zhu et al., 2019), examining multiple constructs that impact performance is valuable for stakeholders in order to target efforts at these specific areas to subsequently improve fitness scores.

The predictive pattern of the motivation constructs in this model provides practical implications for physical education teachers to consider. Interest has been theorized to be an important factor facilitating student performance in physical education (Chen, 2001), and the results of the current and previous research, provides support for the value of personal interest in enhancing students' performance. Therefore, increasing student interest in fitness activities would be advantageous for physical educators in order to improve student fitness scores. To improve students' self-efficacy, the four sources for self-efficacy should be considered. For example, physical educators can utilize peer modeling to offer vicarious experiences and should provide opportunities for students to be successful and have mastery experiences in fitness related activities (Gao et al., 2008). Positive learning experiences should in turn create outcomes to which students continue to make internal and personally controllable attributions. By focusing on these content-specific motivational constructs and their positive influence on fitness test performance, not only can physical educators improve students' motivation in fitness testing, but also improve their test performances.

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CHAPTER V

DISCUSSION

The purposes of this research were to examine the extent to which (a) healthy weight and overweight/obese high school students differ in PACER and push-up test performance, (b) attributions for PACER and push-up test outcomes differ based on weight status and performance (in the HFZ vs not in HFZ), (c) attribution dimension scores differ based on student weight status and performance, and (d) personal interest, self-efficacy and attribution dimensions impact performance on the PACER and push-up test performances. Studying high school students' attributions, interest and self-efficacy as they relate to performance on the PACER and push-up tests has provided valuable insights that can be used by physical educators to motivate students for fitness testing, and to potentially increase these fitness tests performances.

While student weight status played a role in performance, overall there were no significant differences in attribution dimension scores between healthy weight and overweight/obese students for either test. The open-ended attribution question revealed that the students primarily attributed their push-up performance to ability and effort, and their PACER performance mostly to ability. Overweight/obese students who did not perform in the HFZ were more likely to attribute their performance to ability and attitude than their healthy weight counterparts. However, there was no significant difference between overweight/obese and healthy weight students' attributions for push-up performance not in the HFZ. This finding has valuable implications for current and future physical education teachers regarding fitness test administration. Since overweight/obese students who did not perform in the HFZ were concerned with their ability and attitude for the PACER, perhaps teachers need to take extra precautions when administering that particular fitness test to try and ensure the overweight/obese students feel comfortable and put forth their best effort. However, when administering the push-up test, extra precautions may not need to be taken because there were no differences in the attributions made by the overweight/obese students not in the HFZ.

The findings of this research show content specificity for high school students' attributions for fitness tests. For PACER, students mostly attributed performances to ability, and based on the attribution dimension scores, they viewed ability as personally controllable. This finding is unique in that ability attributions can be viewed as personally controllable (fixed), or not controllable (changeable; Li & Lee, 2004). Numerus theorists believe that conceptions of ability are both individually and socially constructed; however, it was reported that many researchers support the notion that ability is a fixed, innate entity that cannot be changed or improved (Dweck, 2002). It is also theorized that ability can be modified through learning and effort (e.g., Ericsson, Nandagopal, & Roring, 2009). It is clear that the evidence and viewpoints surrounding conceptions of ability are conflicting, therefore, future researchers should continue to examine students' conception of ability, particularly in relation to fitness activities where ability is so commonly reported as the source of success or failure.

Student performance, whether they were in the HFZ or not, did have a significant impact on the attribution dimension scores for both the PACER and push-up tests. Students in the HFZ attributed their performance to more internal, stable, and personally controllable factors than students not in the HFZ. This finding reveals an important factor in student attributions for fitness tests, and unravels the role student performance plays in their attribution style. Previous studies have primarily been descriptive in nature, compared attributions based on gender and grade level (Baron & Downey, 2007; Chedzoy & Burden, 2009), or activity (Lodewyk & Muir, 2017). The role of performance on attributions has not specifically been examined, and therefore this study fills a gap in the current literature. Specifically, in the case of fitness tests, while weight status may impact student performance, it has limited impact on their attribution dimensions. It is their performance that determines how the students view their attributions in the various dimensions. In general, the findings show students with higher performance, make attributions that are more internal, personally controllable, and stable. In other words, student performance (success or unsuccessful) played a critical role in how they attributed the outcome. Similar with the role of previous experiences in self-efficacy (Gao et al., 2008), it seems that individuals' performances were at the center of this content-specific motivation construct, which then determines their future expectancy and performance (Weiner, 2005). This finding indicates that increasing performance (i.e., more students performing in the HFZ) should subsequently foster adaptive attributions, which in theory, should facilitate high expectancy for future success (Weiner, 2005).

On average, students identified their attributions for their performance on the PACER and push-up tests as internal and personally controllable. Furthermore, students reported low to moderate levels of personal interest and moderate levels of self-efficacy for the fitness tests. Correlation and path analyses identified attribution dimensions, personal interest, and self-efficacy as positively related PACER performance and, only causality and stability attribution dimensions, personal interest, and self-efficacy as positively related to push-up performance. The final model revealed that the content-specific motivation constructs accounted for approximately 51% of the variances in PACER performance and 48% of the variances in push-up performance. These findings in general are consistent with the existing literature on the directionality of the relationship between these content-specific motivation constructs and performances (e.g., Gao et al., 2008; Zhu & Chen, 2015). However, this is the first research, to the author's knowledge, that has included attributions, personal interest, self-efficacy and fitness performances. Compared to earlier studies, the magnitude of the relation between attribution dimensions and fitness performances is higher than a study that had previously reported there was no significant relationship (Lodewyk & Muir, 2017). The conflicting findings might be explained by the difference in sample; Lodewyk & Muir's participants were all girls, and the sample size was small (*n*=67). Additionally, the performance scores used for analysis in the previous study were based on all the fitness tests in the unit (sit-up, push-up, long jump, flexibility, and a cardiovascular run), not each individual test that may contradict the content-specificity of the motivation construct, as among the fitness tests, students may perform highly in flexibility but low in push-up.

Considering that students often take fitness tests multiple times during a school year, it is advantageous for them to have positive beliefs about their future performances. Similarly, students' self-efficacy plays a critical role in PACER and push-up performance as demonstrated by this study. Along with personal interest and attributions dimensions, self-efficacy was found to be a positive predictor of PACER performance. Based on the impact personal interest and self-efficacy have on PACER and push-up performance, increasing these two motivational constructs should positively influence performance on the fitness tests. In other words, students with higher self-efficacy and personal interest should have higher scores on the PACER and push-up tests than their peers with lower self-efficacy and personal interest.

While this research resulted in valuable findings, there were certain limitations of the study that should be noted. First, this study used a convenient sample with a relatively small sample size. Future research should aim to have a larger and more representative sample size if a path analysis is to be utilized. Further, only one school was used to collect data, limiting generalizability. Additionally, there are other extraneous variables, such as school social economic status and enrollment factors, which were not accounted for, and their potential impact on the results is unknown. Despite the limitations, the results of this study were insightful in that it added to our understanding of the relations between weight status, performance, and the content-specific motivational constructs. Future research in attribution theory should utilize a measure that distinguishes stable ability from changeable ability, and likewise, situational or typical effort. Accurately assessing those attributions is critical to determine whether the attribution is adaptive or maladaptive. Moreover, efforts should be aimed at increasing self-efficacy and personal interest in fitness tests. In particular, physical education teacher education programs should emphasize to pre-service teachers the importance of providing experiences that would allow students to become self-efficacious and foster personal interest in activities. Additionally, teachers should be aware of how they administer the fitness tests to ensure all students feel they can be successful. When employed appropriately, fitness testing can provide teachers, students, and other stakeholders with important information, and promote lifelong physical activity (e.g., Silverman et al., 2008). Therefore, it is in the best interest of the students for scholars and physical educators to understand how the various motivational constructs can impact fitness test performance.

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APPENDIX A

Physical Education Survey

Fill in the blanks, and circle ONE answer that best describes you.

1. My full initials (PRINT First Middle Last): __________________________

2. I am a: Male Female

3. I am _________ years old.

4. I am in 9th 10th grade.

5. My PE class is during _______block/bell.

6. If PE were offered as an elective I __________enroll in the course.

A. would B. would not

7. I am: African American Caucasian Hispanic/Latino

Asian American Native American Other______________________

Interest Survey

Think about all the activities you do in PE, and then identify one activity that you are most interested in doing. Write it down on the line below.

The activity that I am most interested in doing [in PE] is______________________.
Now, write that answer in the first box below and circle "7" to show that it is the most interesting fitness test to you. Then, compare the other activities listed with this one and circle the number to tell us how interested you are in each of those activities.

Activity	Not Interested	Least Interested	Less Interested	Not sure	Somewhat Interested	Interested	Most Interested
	1	2	3	4	5	6	7
Volleyball	1	2	3	4	5	6	7
Basketball	1	2	3	4	5	6	7
Track & Field	1	2	3	4	5	6	7
Frisbee Golf	1	2	3	4	5	6	7
PACER	1	2	3	4	5	6	7
Push-ups	1	2	3	4	5	6	7

PLEASE CONTINUE ON BACK OF PAPER

Male Efficacy Survey

For each statement below, please circle the number that is closest to how true that statement is.

PACER

1. I am confident I can run at least **41** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

2. I am confident I can run at least **51** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

3. I am confident I can run at least **61** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

4. I am confident I can run at least **83** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

5. I am confident I can run at least **94** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

Push-up Test

1. I am confident I can perform at least **12** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

2. I am confident I can perform at least **14** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

3. I am confident I can perform at least **16** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

4. I am confident I can perform at least **18** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

5. I am confident I can perform at least **30** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

Female Efficacy Survey

For each statement below, please circle the number that is closest to how true that statement is.

PACER

1. I am confident I can run at least **23** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

2. I am confident I can run at least **32** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

3. I am confident I can run at least **41** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

4. I am confident I can run at least **51** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

5. I am confident I can run at least **61** PACER laps.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

Push-up Test

1. I am confident I can perform at least **5** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

2. I am confident I can perform at least **7** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

3. I am confident I can perform at least **12** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

4. I am confident I can perform at least **15** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

5. I am confident I can perform at least **18** push-ups.

(Not at all true) 1 2 3 4 5 6 7 8 9 10 (Very true)

APPENDIX B

Fitness Test Survey

You just completed the fitness tests. Please think about your performance on the fitness test mentioned below as you complete the survey.

PACER

1. My recent PACER score is ___________laps.

2. I believe my recent PACER score ________ meet age specific healthy fitness criteria.

A. does B. does not

3. The most important reason why I was or was not able to meet the healthy fitness criteria is:

Think about you response in Question 2 and the reason you wrote for Question 3. For each statement below, circle the number that you feel best describes the reason why you performed the way you did on the PACER. Please circle only **one** number for each statement.

Is the reason something:

1. That is about to yourself	9	8	7	6	5	4	3	2	1	About the situation
2. Controllable by you	9	8	7	6	5	4	3	2	1	Not controllable by you
3. Permanent	9	8	7	6	5	4	3	2	1	Temporary
4. You can regulate	9	8	7	6	5	4	3	2	1	You cannot regulate
5. Others can control	9	8	7	6	5	4	3	2	1	Others have no control
6. Inside of you	9	8	7	6	5	4	3	2	1	Outside of you
7. Stable over time	9	8	7	6	5	4	3	2	1	Not stable over time
8. Within the power of other people	9	8	7	6	5	4	3	2	1	Not within the power of other people
9. Something about you	9	8	7	6	5	4	3	2	1	Something about others
10. You have power over	9	8	7	6	5	4	3	2	1	You have no power over
11. Unchangeable	9	8	7	6	5	4	3	2	1	Changeable
12. Other people can control	9	8	7	6	5	4	3	2	1	Other people cannot control

Push-ups

1. My recent push-up score was ___________ push-ups.

2. I believe my recent push-up score ________ meet age specific healthy fitness criteria.

A. does B. does not

3. The most important reason why my score did or did not meet the healthy fitness criteria is:

Think about you response in Question 3 and the reason you have written in Question 4. For each statement below, circle the number that you feel best describes the reason why you performed the way you did on push-ups. Please circle only one number for each of the questions..

Is the reason something:

1. That is about to yourself	9	8	7	6	5	4	3	2	1	About the situation
2. Controllable by you	9	8	7	6	5	4	3	2	1	Not controllable by you
3. Permanent	9	8	7	6	5	4	3	2	1	Temporary
4. You can regulate	9	8	7	6	5	4	3	2	1	You cannot regulate
5. Others can control	9	8	7	6	5	4	3	2	1	Others have no control
6. Inside of you	9	8	7	6	5	4	3	2	1	Outside of you
7. Stable over time	9	8	7	6	5	4	3	2	1	Not stable over time
8. Within the power of other people	9	8	7	6	5	4	3	2	1	Not within the power of other people
9. Something about you	9	8	7	6	5	4	3	2	1	Something about others
10. You have power over	9	8	7	6	5	4	3	2	1	You have no power over
11. Unchangeable	9	8	7	6	5	4	3	2	1	Changeable
12. Other people can control	9	8	7	6	5	4	3	2	1	Other people cannot control

My full initials (PRINT): ___________________.

I have PE class is during _______block/bell.

APPENDIX C

IRB Approval Letter

OLD DOMINION UNIVERSITY

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

Physical Address
4111 Monarch Way, Suite 203
Norfolk, Virginia 23508
Mailing Address
Office of Research
1 Old Dominion University
Norfolk, Virginia 23529
Phone(757) 683-3460
Fax(757) 683-5902

DATE:	January 2, 2019
TO:	Xihe Zhu
FROM:	Old Dominion University Institutional Review Board
PROJECT TITLE:	[1256961-5] High School Student Fitness Test Attributions
REFERENCE #:	18-127
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	January 2, 2019
EXPIRATION DATE:	June 20, 2019
REVIEW TYPE:	Full Committee Review

Thank you for your submission of New Project materials for this project. The Old Dominion University Institutional Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Full Committee Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this committee. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this committee.

This project has been determined to be a MINIMAL RISK project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of June 20, 2019.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Danielle Faulkner at (757) 683-4636 or dcfaulkn@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Institutional Review Board's records.

APPENDIX D

Letter of Support from Norfolk Public Schools

Norfolk Public Schools
The cornerstone of a proudly diverse community

December 12, 2018

Summer Davis
Doctoral candidate, Old Dominion University
sdavi003@odu.edu

Approval is granted to conduct the proposed study, *High School Student Fitness Test Attributions,* in fulfillment of requirements for the degree of Doctor of Education from Old Dominion University. The proposed study meets the technical criteria following the Norfolk Public Schools Research and Survey Policy (www.nps.k12.va.us) and must follow the stipulations below:

- Data collected will be at Norview High School and students must have a parent or guardian sign a consent form.
- Voluntary participation allows each participant to decide individually whether to participate or withdraw at any time, without question, consequence, or follow-up.
- All participants, Norview High School and Norfolk Public Schools, will remain anonymous in data and survey collection, and reporting results. Identifiable characteristics or linkage to the identity of any individual, school, or school district is prohibited.
- Approval does not constitute commitment of resources or the endorsement of the study or its findings by the school district or the School Board.
- Data collected and results will not become part of any principal, school, or district record. All research records must be locked in a secured location.
- The researcher will email a copy of the final report for the school district, and report any changes or problems while conducting the study, to Dr. Bailey.

We look forward to your findings and contribution to instructional practice, program services, and achievement for *ALL* students.

Sincerely,

Karren P. Bailey

Karren P. Bailey, Ed.D.
Chief Accountability & Information Officer
Norfolk Public Schools
Office: 757-628-3850
email: kbailey1@npsk12.com

APPENDIX E

Parent Permission Letter

Dear Parents/Guardians,

We are conducting a study to explore your child's explanations for their performance on fitness tests in physical education. To conduct this study, we need participants from ninth and tenth graders who take physical education as part of their regular school curriculum. The attached "Permission for Child's Participation" form describes the study and asks your permission for your child to participate.

Please carefully read the attached "Permission for Child's Participation" form. It provides important information for you and your child. If you have any questions pertaining to the attached form or to the research study, please feel free to contact Summer Davis or Dr. Xihe Zhu (Responsible Project Investigator) at the numbers below.

After reviewing the attached information, please return a signed copy of the "Permission for Child's Participation" form to your child's teacher if you decide to allow your child to participate in the study. Keep the additional copy of the form for your records. Even when you give the consent, your child will be able to participate only if he/she is willing to do so. Participation in the study is completely voluntary. You and/or your child can withdraw from the study at any time. Your decision will not affect his/her normal health/physical education participation.

We thank you in advance for taking the time to consider your child's participation in this study.

Sincerely,

Xihe Zhu, Ph.D. (Responsible Project Investigator)
Department of Human Movement Sciences
Darden College of Education
Old Dominion University, Norfolk, VA 23529
Tel.: 757-683-3545

Summer Davis
Department of Human Movement Sciences
Darden College of Education
Old Dominion University, Norfolk, VA 23529
Tel.: 757-262-7491

PERMISSION FOR CHILD'S PARTICIPATION

The purposes of this form are to provide information that may affect decisions regarding your child's participation and to record the consent of those who are willing for their child to participate in this study.

TITLE OF RESEARCH: High School Student Fitness Test Attributions

RESEARCHERS: The researchers include: Xihe Zhu, Ph.D. (Responsible Project Investigator), Assistant professor in the Department of Human Movement Sciences, and Summer Davis, Doctoral student at Old Dominion University.

DESCRIPTION OF RESEARCH STUDY: The purpose of this study is to examine the reasons your child gives to explain why they did or didn't do well on their fitness tests in physical education. How your child explains their performance on fitness tests can impact their future engagement in fitness testing and fitness activities. Since fitness testing is a required aspect of your child's physical education curriculum, it is important to examine these explanations. Additionally, there are many factors that can influence your child's performance on the fitness tests such as their body mass index (BMI), interest, self-efficacy, body-image, etc. During physical education, your child will be given an initial survey that asks questions about their interest in physical education activities, self-efficacy for fitness tests, body-image, and teasing in physical education. Then, as part of their regular physical education course your child will participate in various fitness tests, which includes the physical education teacher calculating your child's BMI. After the fitness tests, your child will be given another short survey asking about their explanations for their performance on two of the fitness tests (PACER/Shuttle run and pushups).

EXCLUSIONARY CRITERIA: In order for your child to participate in this study, your child must be physically and mentally healthy to be able to attend regular health/physical education classes independently.

RISKS: There is a potential risk of for release of confidential information such as student fitness test scores, interest in fitness testing, self-efficacy for fitness testing, body image, and information about teasing in physical education. There will be extensive measures taken to keep this information confidential. Questions about teasing and body image may cause your child emotional distress. They may seek support from their school counselor or reach out for peer support at https://teenlineonline.org/ if needed.

BENEFITS: There is no direct benefit for participating in the study.

COSTS AND PAYMENTS: There is no cost to participate in the study. The researchers are unable to offer any payment for participating in the study.

NEW INFORMATION: You will be contacted if new information is discovered that would reasonably change your decision about your child's participation in this study.

CONFIDENTIALITY: The researchers will remove identifiers from the data and store the data in a password protected e-file prior to its processing. The results of this study may be used in reports, presentations, and publications; but the researcher will not identify the school district or individual student. Of course, the records may be subpoenaed by court order or inspected by government bodies with oversight authority.

WITHDRAWAL PRIVILEGE: Your child's participation in this study is completely voluntary. It is all right to refuse your child's participation. Even if you agree now, you may withdraw your child from the study at any time. In addition, your child can withdraw at any time if he/she so chooses.

COMPENSATION FOR ILLNESS AND INJURY: Agreeing to your child's participation does not waive any of your legal rights. However, in the event of harm arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation. In the event that your child suffers harm as a result of participation in this research project, you may contact the Office of Research at 757-683-3460, the current IRB chair Dr. Tancy Vandecar-Burdin at tvandeca@odu.edu, 683-3802, or Dr. Xihe Zhu at 757-683-3545 at Old Dominion University, who will be glad to review the matter with you.

VOLUNTARY CONSENT: By signing this form, you are confirming (1) that you have read this form or have had it read to you, and (2) that you are satisfied and understand this form, the research study, and its risks and benefits. The researchers will be happy to answer any questions you have about the research. If you have any questions, please feel free to contact Dr. Xihe Zhu at 757-683-3545.

If at any time you feel pressured to allow your child to participate, or if you have any questions about your rights or this form, please call the Old Dominion University Office of Research (757-683-3460).

Note: By signing below, you are telling the researchers YES, that you will allow your child to participate in this study. Please keep one copy of this form for your records.

Your child's name (please print): ______________________________

Your name (please print): ______________________________

Your Signature: ______________________________

Date: ______________________________

<u>INVESTIGATOR'S STATEMENT</u>: I certify that this form includes all information concerning the study relevant to the protection of the rights of the participants, including the nature and purpose of this research, benefits, risks, costs, and any experimental procedures.

I have described the rights and protections afforded to human research participants and have done nothing to pressure, coerce, or falsely entice the parent into allowing this child to participate. I am available to answer the parent's questions and have encouraged him/her to ask additional questions at any time during the course of the study.

Investigator's Signature: ______________________________

Date: ______________________________

APPENDIX F

Student Assent Letter

PARTICIPANT ASSENT

HIGH SCHOOL STUDENTS FITNESS TEST ATTRIBUTIONS

Dear Student,

I am asking you to take part in a research study because I want to learn more about the reasons you give to explain your performance on fitness tests. I also want to know more about some of the things that can affect your performance on the fitness tests such as your interest in physical education activities and how confident you are about taking the fitness tests.

If you agree, you will be asked to complete two short surveys. The first one will help assess your interest in physical education activities, confidence in taking fitness tests, body-image, and teasing in physical education. The second one will be given to after you complete the fitness tests and it will ask about your explanations for your performance on the PACER/shuttle run and push-ups. Your physical education teacher will also provide your BMI that was calculated as part of the fitness tests. If any part of these surveys causes you emotional distress, may contact your school counselor at (757) 825-4424 or reach out for peer support at https://teenlineonline.org/ if needed.

You do not have to be in this study. No one will be mad at you if you decide not to participate in this study. Even if you start, you can stop later if you want. You may also ask questions about the study. You can still attend health/physical education class as you normally do regardless of the decision you make.

If you decide to participate in the study, all of your answers and results will be kept in a way that only I will see them.

By signing this form, you are willing to be a part of this study.

Signature of Subject____

Subject's printed name ____

Signature of investigator____

Date____

VITA

Summer Davis
Department of Human Movement Sciences
2016 Student Rec Center
Norfolk, VA 23529

EDUCATION

2016-Current	**Ph.D.** in Education, Old Dominion University Emphasis: Health and Sport Pedagogy
2016	**M.S. Ed**., Old Dominion University Physical Education Concentration: Curriculum and Instruction
2012	**B.S.**, James Madison University Health Sciences Concentration: Public Health Education

SELECTED PUBLICATIONS

Peer Reviewed Journal Articles

Davis, S., Zhu, X., & Haegele, J. (2018). Factors influencing high school girls' enrolment in elective physical education: An exploratory qualitative inquiry. *Curriculum Studies in Health and Physical Education, 9*(3), 286-299.

Haegele, J.A., Zhu, X., & Davis, S. (2018). Barriers and facilitators of physical education participation for students with disabilities: An exploratory study. *International Journal of Inclusive Education, 22*(2), 130-141.

Zhu, X., Davis, S., Kirk, T.N., Haegele, J.A., & Knott, S. (2018). Inappropriate practices in fitness testing and reporting: Alternative strategies. *Journal of Physical Education, Recreation, & Dance*, *89*(3), 46-51.

Zhu, X., Haegele, J.A., & Davis, S. (2018). Physical educators' habitual physical activity and self-efficacy for regular exercise. *The Physical Educator*, *75*(1), 50-63.

Haegele, J.A., Zhu, X., & Davis, S. (2017). The meaning of physical education and sport among elite athletes with visual impairments. *European Physical Education Review, 23*(4), 375-391.