MEDIATING THE RELATIONSHIP BETWEEN MOTIVATIONAL CLIMATE AND INTRINSIC MOTIVATION IN COLLEGIATE PHYSICAL ACTIVITY COURSES

A Dissertation

by

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ABSTRACT

Global populations struggle with meeting recommended guidelines for physical activity. Americans are urged to achieve 60 minutes per day and 150 minutes per week of moderate to vigorous physical activity to maintain a healthful lifestyle and to combat chronic disease. However, adolescents and college-age youth are not meeting these recommendations. In an effort to combat physical inactivity, one theory is to make physical activity intrinsically motivating for participants by intentionally influencing the motivational climate surrounding the activity.

The basic psychological needs theory, a subtheory within self-determination theory, and the psychological needs of autonomy, competency, and relatedness potentially mediate the relationship between motivational climates and intrinsic motivation. Addressing the potential mediating effect of each of these three constructs, results provided evidence to support previous literature that autonomy plays a causal role in mediating the relationship. Competency and relatedness also provided significant and positive indirect effects, although not to the same level as autonomy.

This study examined the relationship between motivational climate and intrinsic motivation by testing the mediation effects of the basic psychological needs of autonomy, competency, and relatedness. Assessing the psychometric properties of the Basic Psychological Needs-Physical Education instrument, relating to a different population, might provide insight into new ways to study college students.

DEDICATION

I dedicate this scholarly work to my Savior, my wife, and my son. I thank my committee: Dr. Corliss Outley, Dr. Andrea Ettekal, Dr. Kyle Maurice Woosnam, and Dr. Ledric Sherman. Each has had a significant impact on my life as a student, as a man, as a husband, and as a friend. I can never thank them enough.

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NOMENCLATURE

ACHA	American College Health Association
ACSM	American College of Sports Medicine
AGT	Achievement goal theory
AMOS	Analysis of a Moment Structures
BPN-ES	Basic Psychological Needs in Exercise Scale
BPN-PE	Basic Psychological Needs-Physical Education Scale
BPNT	Basic psychological needs theory
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CFI	Comparative Fit Index
GFI	Goodness of Fit Indices
CI	Confidence interval
IA	Instructional alignment
IFI	Incremental Fit Index
IMI	Intrinsic Motivation Inventory
KMO	Kaiser-Meyer-Olkin
LAPOPECQ	Learning and Performance Orientation in Physical Education Classes Questionnaire
LTPA	Leisure-time physical activity
METS	Metabolic equivalent of task
MVPA	Moderate to vigorous physical activity

NCES	National Center for Education Statistics
NCHA-II	National College Health Assessment II
NCHS	National Center for Health Statistics
NFI	Normal Fit Index
NIRSA	National Intramural and Recreational Sports Association
PAGC	Physical Activity for Americans Guideline Committee
PIA	Physical inactivity
PMCEQ-A	Perceived Motivational Climate in Exercise Questionnaire
RMSEA	Root mean square error of approximation
SDT	Self-determination theory
SED	Socioeconomically disadvantaged
SEM	Structural equation model
SES	Socioeconomic status
SOPARC	System for Observing Play and Recreation in Communities
SPSS	Statistical Package for the Social Sciences
TLI	Tucker Lewis Index
TPB	Theory of planned behavior
TTM	Trans-theoretical stages of changes
USDHHS	U.S. Department of Health and Human Services
WHO	World Health Organization
YRBSS	Youth Risk Behavior Surveillance System

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CHAPTER I

INTRODUCTION

The relationship between physical inactivity (PIA) and sedentary behaviors has been recognized as a leading contributor to the advancement of preventable and chronic diseases, such as all-cause mortality, cardiovascular disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, and depression (Booth et al., 2011). Between 6% and 10% of global deaths per year are attributed to PIA (Ozemek et al., 2019), ranking it globally as the fourth leading risk factor for mortality (World Health Organization [WHO], 2010). Previous studies (Biddle & Asare, 2011; Biddle et al., 2001; Fox, 1999; McMahon et al., 2017; Steptoe & Butler, 1996; Ussher et al., 2007) have concluded that consistent engagement in moderate to vigorous physical activity (MVPA) is positively related to well-being and promotes a higher quality of life. Physical activity is a modifiable risk factor and, like nutrition, levels of physical activity or PIA have either a positive or negative impact on chronic diseases, depending on how they are applied (National Center for Chronic Disease Prevention and Health Promotion, 2018, 2019). Therefore, personal levels of physical activity are of great public concern.

As sedentary lifestyles become more prevalent and people engage in less physical activity, the risk of developing potential health issues increases (Hamilton et al., 2008; Levine et al., 2000; Owen et al., 2009; Owen et al., 2000; Pate et al., 2008). In fact, the WHO identified sedentary lifestyle, a subset of PIA, as the fourth-highest risk factor for mortality worldwide (WHO, 2009). Health issues related to PIA are numerous, but the most critical issues include development of chronic diseases such as heart disease, type 2 diabetes, cancer, and obesity in adults, all of which are generally considered to be preventable. The U.S. Department of Health and Human Services (USDHHS) reported that more than 117 million people had one or more

preventable chronic diseases (USDHHS, 2018), such as heart disease, stroke, cancer, diabetes, respiratory conditions, arthritis, asthma, and obesity.

One reason for less personal physical activity is that work requirements have become less physical in the past 50 years (Church et al., 2011). Because less energy is expended on occupational physical work, greater physical activity efforts should be devoted to leisure-time physical activities (LTPA). However, research has confirmed that energy expenditures have not increased during LTPA, regardless of the type of physical activity required in the work force (Barnekow-Bergkvist et al., 1996; Carlson et al., 2009; Carlson et al., 2010). Sedentary life styles are not restricted to adults; adolescents are also becoming more sedentary in their lifestyle choices (Gordon-Larsen et al., 2004) with the potential for future maladaptive physical activity behaviors.

Problem Statement

Due to high rates of sedentary behaviors, lifestyle choices that do not include sufficient physical activity are becoming a threat to healthy populations globally (Hallal et al., 2012; Knuth & Hallal, 2009). The levels of sedentary lifestyles of the world's population are rising and, as PIA becomes a dominant trend in occupational, social, and cultural behaviors, the threat to global health increases (Barnekow-Bergkvist et al., 1996; Carlson et al., 2009; Carlson et al., 2010). Promoting positive experiences, which are intrinsically motivating for physical activity, is considered a promising strategy to combat PIA.

To elaborate on the connection between behaviors in sedentary lifestyles and levels of physical activity, it is vital to understand that the two are inversely related (Salmon et al., 2003). This means that, as people adopt lifestyle choices that result in increased physical activity, they are less likely to stay sedentary, which is a promising factor in the lifestyle management of the

previously noted chronic diseases (Arena et al., 2017). However, the opposite is also true. The more people choose lifestyles that are sedentary in nature, the less inclined they are to find time and avenues in which to be physically activity. PIA is indeed a global pandemic (Pratt et al., 2020). Research on sedentary lifestyles and PIA is increasingly important in developed countries such as the United States, as the Americas (North and Central America) have been identified as one of the top regions for displaying PIA behaviors (WHO, 2014).

Several factors, including age, gender, socioeconomic status (SES), and education, appear to have correlational links to levels of physical activity and health outcomes (Warburton et al., 2006). While specifically considering age as an influential factor of physical activity, interdisciplinary studies in preventive medicine have shown that decreases in physical activity occur most markedly during adolescence (Sallis, 2000), with girls more likely than boys to decrease in physical activity (Berkey et al., 2003; Corder et al., 2015; Pate et al., 2004). These studies have also found that, during late adolescence, a second dramatic decrease in physical activity may occur due to the transitory nature of lifespan development and increases in personal responsibility that shift toward individuality occurring at the beginning of college or career (Bray & Born, 2004; Jung et al., 2008; Kwan et al., 2012; Pullman et al., 2009). Recognizing marked points of time in the lifespan development timeline that are linked with reduction of physical activity would be an important facet to consider as influential for the development of interventions or modifications of future physical activity behavior. This has been illustrated in studies (Barnekow-Bergkvist et al., 1996; Dennison et al., 1988; Yang et al., 1999) that demonstrated how current physical activity engagement by older adults was influenced by their recreational and extracurricular sport engagement during their adolescent years. This connection of adolescent/adult recreation behavior not only exists in physical activity and recreation and

sport studies but has been shown to remain consistent in prediction of other leisure behaviors, such as creative and intellectual pursuits and socializing activities (Scott & Willits, 1989, 1998). Studies that can assist in determining how physical activity interventions can motivate adolescents to sustain engagement in physical activity pursuits into adulthood are warranted.

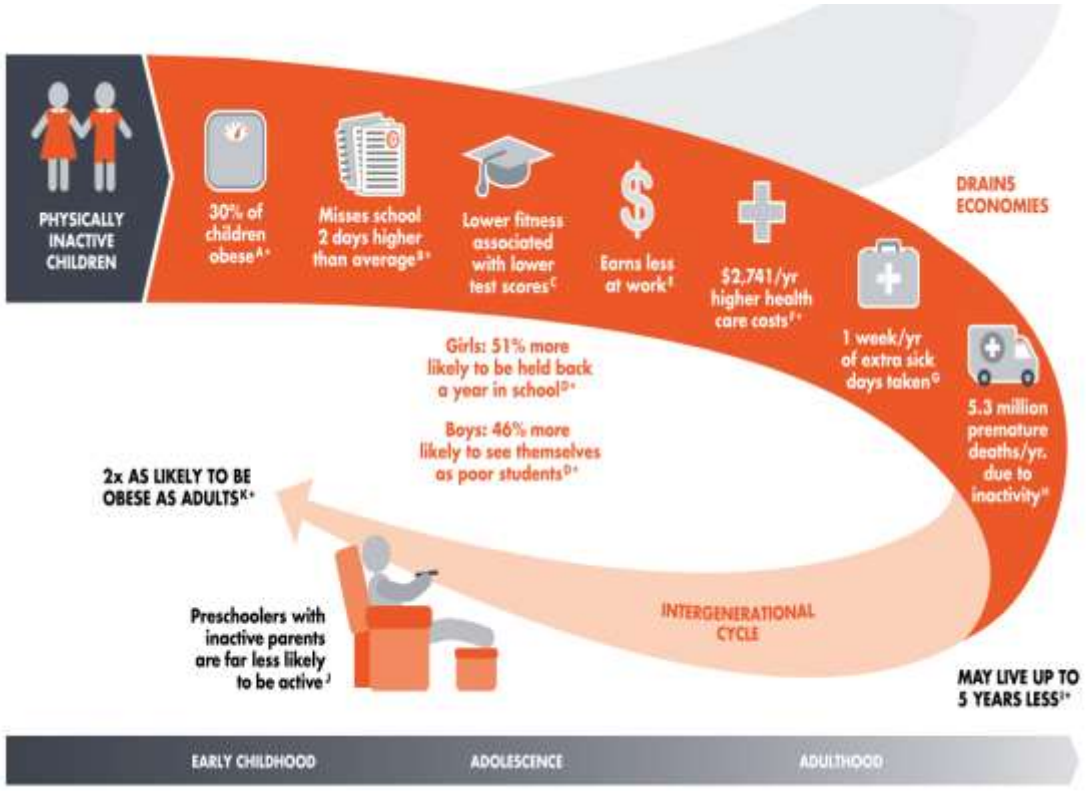
Significance of the Study

Unfortunately, if behaviors are not changed, sedentary lifestyles will likely continue to increase in prevalence. People may continue to engage in less physical activity, thereby increasing the possibility of developing a lifetime of potential chronic health issues, which are modifiable, for both youth and adults (Hamilton et al., 2008; Levine et al., 2000; Owen et al., 2009; Owen et al., 2000; Pate et al., 2008). First, consider the link of PIA with rising obesity levels in children (Dorsey et al., 2011; Ogden & Carroll, 2010; Ogden et al., 2010; Trost et al., 2001); U.S. children's obesity rate has tripled since the 1970s (Fryar et al., 2014). With higher levels of obesity in children, youth are at potentially higher risk for both short-term health consequences, such as psychological comorbidity, cardiovascular risk factors, asthma, and chronic inflammation (Reilly, 2005), and greater potential of obesity in adulthood (Freedman et al., 2007; Singh et al., 2008). This concept of compounding effects is explained and serves as the general purpose behind the Designed to Move promotional campaign (MacCallum et al., 2012). Figures 1 and 2 serve as visual representations of both the cascading detrimental effects of insufficient physical activity and the cascading developmental effects of sufficient physical activity.

Figures 1 and 2 illustrate a rippling effect of how choices can influence the entire lifespan. Compounding effects, costs, and benefits provide a framework for considering the interconnectivity of one's actions. This framework represents the potential outcomes of choices

Figure 1

Compounding Cost of the Physical Inactivity Cycle From Early Childhood to Adulthood

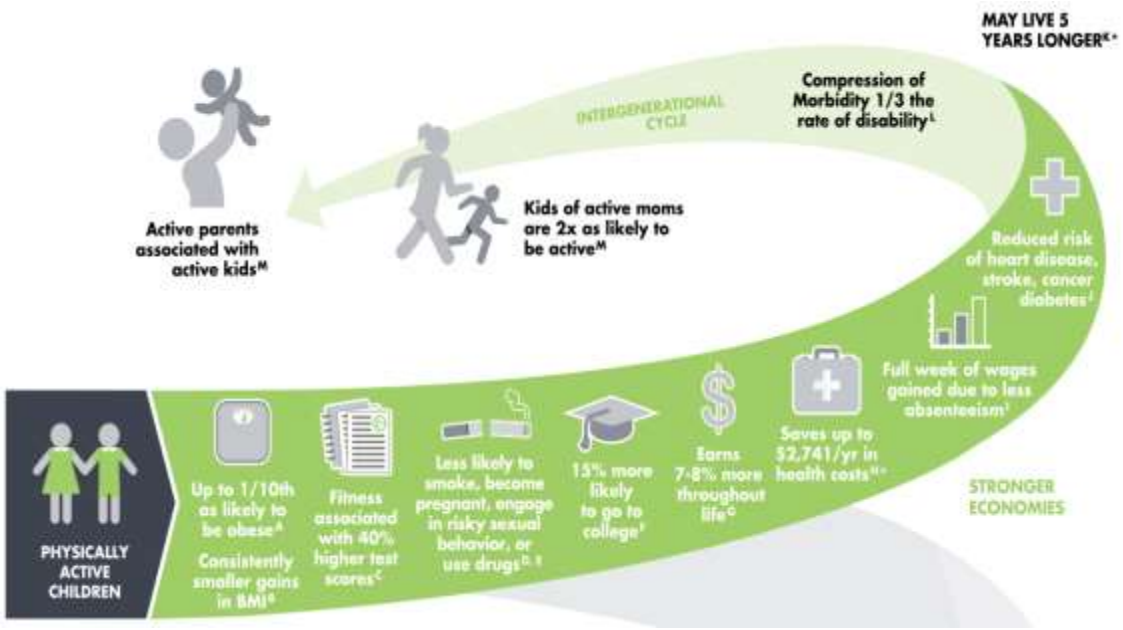


Note. From *Designed to Move: A Physical Activity Action Agenda,* by L. MacCallum, N. Howson, & N. Gopu, 2012, The American College of Sports Medicine, Nike, & The International Council of Sport Science and Physical Education.

from childhood through adulthood that combine and result in healthy or unhealthy lives. The figures are not intended to provide an exhaustive list of activities in which to engage or to avoid; they are presented to illustrate activities that can lead to the desired outcome of an active, healthy adult lifestyle. Nor do the compounding effects imply that merely following the physical activity suggestions will lead to the desired outcomes for all people. The flow of the figures represents the transitional time from youth to adulthood and its importance during a period when levels of physical activity generally decline (Barnekow-Bergkvist et al., 1996; Sallis, 2000). The figures

Figure 2

Compounding Benefits of the Physical Activity Cycle Explained From Early Childhood to Adulthood



Note. From *Designed to Move: A Physical Activity Action Agenda*, by L. MacCallum, N. Howson, & N. Gopu, 2012, The American College of Sports Medicine, Nike, & The International Council of Sport Science and Physical Education.

promote the idea that physical activity engagement is vital and should be habitual at a young age in an effort to combat declining physical activity levels later in life.

A generally accepted belief is that reduction in physical activity begins during adolescence. However, Farooq et al. (2018) reported that in their study of more than 500 participants, not only did their evidence fail to support this long-held belief but indicated that the reduction began earlier. Children as young as age 7 were showing signs of reduction in physical activity. This is an important finding that might have an impact on understanding why people decrease their levels of physical activity.

The results of the Farooq et al. (2018) study illuminated a need to study physical activity reduction across all age groups. Thus, studying physical activity levels of college students would be justified and would identify factors that are potentially causing reduction in physical activity. The desire for greater understanding of the college student population became the source of motivation for the current study regarding how college students are motivated to engage in physical activity. For this study, two statements are at the heart of why physical activity research is important to all populations. First, it is never too late to be physically active and receive health benefits associated with engagement (Duda, 1991; Goetzel et al., 2007). Second, a person's history of engagement in physical activity can have intergenerational effects on children (MacCullam et al., 2012). To clarify, by aiding in establishing and lengthening engagement in physical activity by college students now, compounding effects may have a positive influence on future youth as active parents positively influence active youth in a compounding way, as shown in Figure 2 (MacCallum et al., 2012).

Purpose and Objectives of the Study

In view of the impact of reduced physical activity and increased sedentary behaviors in U.S. college students (Huang et al., 2003; Racette et al., 2008), it is important to study ways to increase physical activity motivation in college students. Colleges and universities have long realized the importance of physical activity in the daily lives of students and offer physical activity courses, recreation programs, and recreation facilities to facilitate greater physical activity participation to promote positive health and wellness outcomes. Numerous interventions and initiatives have focused on addressing how and why (Plotnikoff et al., 2015) college students decide to be physically active. These initiatives have included examining the structured learning environment to facilitate motivation to increase physical activity. Specifically, motivation can be

influenced by intentionally designing the course environment through instructional alignment (IA) practices. IA refers to the arrangement of an instructor's objectives, instructions, and evaluations (Cohen, 1987; Kim et al., 2015). Cohen's (1987) research showed that students who received aligned instruction were four times more likely to achieve desired student learning outcomes than students who received misaligned instruction.

Due to the timing of college, as well as the physical activity assets generally found on a college campus, such as courts, gymnasiums, sidewalks, and recreation centers, college campuses are appropriate settings to conduct physical activity motivational research (Milroy et al., 2015). As with all positive youth development programs, the goal is to give youth the best opportunity for growth and achievement of developmental outcomes, while reducing deficit latent factors.

In particular, the role of motivation is of great interest due to the underlying concept that activities that people find to be intrinsically motivating tend to be activities to which they return repeatedly. Interest in intrinsically motivating activities can continue throughout the lifetime, so the earlier a person adopts an activity, the longer that person could engage in that particular activity. Interest in activities is only the beginning, as the climate in which the activity occurs has substantial effects on future participation. Therefore, the purpose of this study was to investigate the relationship between the motivational climate of a college physical activity course and students' intrinsic motivation to engage in the activity. It was hypothesized that this relationship is mediated by basic psychological needs (i.e., competency, relatedness, autonomy; Deci & Ryan, 2000).

Theoretical Framework

Self-determination theory (SDT) is a popular choice of framework to examine human motivation and to predict behaviors in several life contexts, including the context of physical education (Ntoumanis & Standage, 2009; Standage et al., 2005), which is relevant to this study. SDT is a grand theory, composed of six smaller psychosocial theories. SDT was the overall guiding framework for this study because SDT is differentiated from other behavioral and learning theories, such as the theory of planned behavior (TPB; Ajzen, 1991) and social cognitive theory (Bandura, 1986) in explaining how motivation moves along a continuum from controlled to autonomous (Ryan & Deci, 2017). The concept of locus of control is a central tenet in understanding the application of SDT research on why one might be interested in engaging in an action or what drives one to engage in an action.

Study Rationale

Factors associated with participating in physical activity have been central in numerous studies about human behavior, including studies focused on college students. A knowledge gap exists in the literature regarding how motivational climates influence intrinsic motivation, as well as whether components of basic psychological needs theory (BPNT; autonomy, competency, relatedness) might influence these relationships. At the heart of the study is the attempt to address the idea of how the relationship between motivation climates, both ego and task involving, might be addressed by conceptual variables. If such connections could be made in an attempt to explain the relationships, then future physical activity interventions would be closer to helping participants to reach higher levels of intrinsic motivation by involving the conceptual variables from BPNT of autonomy, competency, and relatedness.

Organization of the Dissertation

This dissertation is structured in a journal format, comprising six chapters. Chapter I introduces the overall research. The chapter provides an overview of the central factors to be studied, identifies gaps in the literature, and outlines the proposed rationale for the study. It introduces the overarching theoretical framework to be used in the study: SDT.

Chapter II is an overview of the literature to understand how physical activity and/or PIA affect college students. The chapter introduces the study population (college students) and information related to how physical activity engagement or PIA engagement can aid in satisfying or thwarting healthful physical activity habits and positive youth development, a noted concern of public health professionals.

Chapter III presents a systematic literature review of physical activity interventions based on motivational climates. This section of the systematic literature review was performed in stages, with the help of a second reviewer, with the intent to collect the maximum number of usable published studies. Stages included screening studies by title, then by abstract, then by the completed study. The study populations of each of these experimental studies were U.S. college students enrolled in university physical activity courses or frequent users of collegiate recreation centers.

The studies reported in Chapters IV and V examined the association between latent variables that arose from the literature as important facets of motivational climate studies (task and ego involvement). In Chapter IV, Study 2 addresses the construct and predictive abilities of a survey measure consisting of the basic psychological needs of autonomy, competency, and relatedness, using confirmatory factor analysis. In Chapter V, Study 3 addresses potential mediated relationships to determine the nature of the relationships among the aggregated scores

produced by the three survey instruments: Abbreviated Perceived Motivation Climate Questionnaire in Physical Education, Basic Psychological Needs in Physical Education, and the Intrinsic Motivation Inventory. Each of the instruments uses a Likert-type scale format; items range in number from 7 to 13. The Chi-square test was used to determine whether the two variables were associated and to what degree. In addition, a mediated model was used to investigate the relationships between the task and ego-involving variables and intrinsic motivation, with the mediating variables of autonomy, competency, and relatedness. Data from each of the observed items were collected and then aggregated to compile a score of each of the latent variables.

Chapter VI presents a summary of the investigations reported in Chapters III, IV, and V. Applications of this new information in the fields of youth development, physical activity, and recreation at the practitioner level are suggested. After acknowledgment of study limitations, research implications for the betterment of the fields of study are presented.

CHAPTER II

REVIEW OF LITERATURE

Literature related to the current study is reviewed in this chapter. First, the importance of physical activity in the field of youth development is presented. Second, the concept of physical activity is formally defined, along with terms that are used in current physical activity research. The review of literature addresses current U.S. youth and adult obesity rates and recommended guidelines to improve physical activity by both groups. Current levels of physical activity among college students are reviewed. The chapter ends with a review of the theoretical framework, SDT, and its subsets of theories that apply to this study. SDT was used to consider how personal motivation is related to future physical activity engagement, as potentially influenced by the educational learning environment.

Importance of Physical Activity to Youth Development

The transition to college aligns with many changes and stressors. One such change is a decrease in physical activity, accompanied by poor dietary choices (American College Health Association [ACHA], 2018; Buckworth & Nigg, 2004). For some students, this marks their first time as the primary decision maker related their well-being (Plotnikoff et al., 2015; Shaw, 2008). Decisions related to self-care, such as what to eat, when to sleep, and when to be active, are important questions for students related to their health and wellness. This period of personal development—emerging adulthood, according to Arnett (2000)—is of great importance to youth development due to its focus on the transition to adulthood through the process of experiences.

Currently, according to the U.S. Department of Labor, Bureau of Labor Statistics (2016), the 2017 American high school graduating class enrolled in college or university programs at a rate of 66.7% (males 61.1%, females 71.7%). According to the National Center for Education

Statistics (NCES; 2011), in 2011 there were 19.9 million enrolled higher education students, which meant that nearly two thirds of the late adolescent and early adulthood population in the United States was completing coursework toward a higher education degree. Due to the presence of large numbers of the target population on college campus, colleges and universities would be a proper setting to study levels of physical activity. The benefits of physical activity go beyond purely physical benefits, as explained in the next section, as such benefits could influence life-altering health behaviors.

Physical Activity: Types and Definitions

The WHO (2020b) defined physical activity as essentially any bodily movement that, when performed, expends energy. The types of activities that fall under this definition of physical activity are based on leisure activities, including sports, exercise, and recreational activities but not occupational labor. Caspersen et al. (1985) defined physical activity as "any bodily movement produced by skeletal muscles that results in energy expenditure" (p. 127). This definition is moderately different in including the use of skeletal muscles to complete physical activity tasks. To clarify, all physical exercise is considered physical activity but not all physical activity is exercise. For example, occupational tasks of physical laborers might include use of skeletal muscles to lift, hammer, or carry materials, resulting in energy expenditure and thereby meeting the requirements of the physical activity definition; however, these examples of performing occupational tasks are not activities included as physical activities in this study. Activities that are included in this study are only those activities that are defined as sport, exercise, or recreational.

Sport is operationally defined as a subset of physical activities with general characteristics of being competitive physical activity, with rules, a sense of play, skill, and

occasionally specific equipment and/or facilities (Coakley, 1993, 2011; Martin & Miller, 1999; Spreitzer & Snyder, 1989; VanderZwaag, 1988). Caspersen et al. (1985) defined *exercise* as a subset of physical activity with additional requirements in that exercise is "planned, structured, and repetitive with a final or an intermediate objective as the improvement or maintenance of physical fitness" (p. 127). Hurd and Anderson (2010) defined *recreational activities* as distinct from other physical activity subsets based on the nature of the activity "that people engage in during their free time, that people enjoy, and that people recognize as having socially redeeming values" (p. 10). Recreational activities can be personal or private but may also be social, physical, or mental in nature. All of these terms relate to one another in similar leisure and athletic experiences but are unique. One commonality among the terms is the measurement tools used in physical activity research.

Definitions in Physical Activity Literature

With the goal of increasing physical activity literacy in the U.S. population, several campaigns have introduced physical activity terms related to how long (duration), how intense (intensity), and how often (frequency) activities should be completed. These terms are vital in understanding how they are used in interventions or treatments related to physical activity. Educational campaigns that use these terms include the series of Healthy People Initiatives in 1990, 2000, 2010, and 2020 (HealthyPeople.gov, 2020) and the Physical Activity Guidelines for 2008 (USDHHS, 2014) and 2018 (USDHHS, 2018). The terms are defined in the next section, followed by explanation of the physical activity campaigns that are designed to increase physical activity literacy in the U.S. population.

Measurement Terms

Duration is concerned with how long a person does a physical activity in one session, *frequency* refers to how often a session is undertaken during a given period, and *intensity* refers to how hard a person works, measured in energy expenditure, during the activity. The form of measurement for each term is equally important in physical activity research. Duration is generally measured in minutes, frequency is measured in days per week, and intensity is measured in metabolic equivalent of task (METS). Duration and frequency measurements are common to most readers; METS is a mathematical calculation that requires further explanation. METS are calculated as the "amount of oxygen consumed while sitting at rest and is equal to 3.5 ml O^2 per kg body weight x min (Jette et al., 1990, p. 555). Simply stated, METS is the amount of oxygen that a person consumes while sitting, relative to how much the person weighs and how much time the person spends in sitting. Therefore, when a person is engaged in an activity that requires more oxygen intake than sitting (e.g., walking up a hill), the METS score will be higher than when sitting.

As physical activity became more widely studied, there were concerns about how to code and apply the METS formula consistently (Ainsworth et al., 1993) for the purposes of comparisons and evaluations, especially when using self-reported and observed physical activity instruments. Ainsworth et al. (1993) created a classification system that would be useful in interdisciplinary studies to provide a consistent measure of energy expenditures in physical activities. This compendium of physical activities provides classification of approximately 476 activities, ranging from sleeping to running. The compendium lists not only exercise-related activities but also recreational and occupational physical activities codes. The first compendium was published in 1993; it has been updated (Ainsworth et al., 2011; Ainsworth et al., 2000) and

expanded to include energy expenditure by youth (Butte et al., 2018; Ridley et al., 2008) and women (Wilcox et al., 2001).

Compendium Codes

The usefulness of the compendium codes stems from their early attempt to give physical activities a standardization for activity assignment in research. Once activities were measured and a METS score was assigned, researchers could organize the activities into a continuum to categorize sedentary activities with a METS score of less than 1.5, light activities with a METS score of 1.6 to 2.9, moderate activities with a METS score of 3.0 to 6.0, to vigorous activities with a METS score of 6.0 and above (Jette et al., 1990; Pate et al., 2008). Therefore, it became common for the physical activity community, numerous research studies, and organizational publications, including those from the Centers for Disease Control and Prevention (CDC), the USDHHS, and the American College of Sports Medicine (ACSM), to adopt the use of the MVPA scale to inform the U.S. population.

Healthy People Campaigns

The Healthy People Initiatives campaigns are science-based, 10-year national objectives for improving the health of all Americans. There have been four iterations of the health promotion campaign, beginning with Healthy People 1990. The purposes of the promotion are to establish benchmarks and monitor progress through 10-year time periods, with the objective to promote community collaboration, to empower people in their decisions to be healthy, and to measure how healthy activities promote health and prevent health issues. Along with a focus on regular engagement in physical activity as a healthy lifestyle, goals of the Healthy People campaign are to attain high-quality, longer lives free of preventable disease, disability, injury, and premature death; achieve health equity; eliminate disparities; improve the health of all

groups; create social and physical environments that promote good health for all; and promote quality of life, healthy development, and healthy behaviors across all life stages (National Center for Health Statistics [NCHS], 2001). To meet the desired physical activity goals set forth in the Healthy People campaigns, physical activity guidelines were created as tangible, easy-to-understand recommendations for various age groups to be shared by all.

Physical Activity Guidelines

To increase physical activity literacy across age groups in the United States, the USDHHS (2014) established a set of guidelines in 2008. The national guidelines for American citizens were developed to make American citizens aware of the need for daily minimum levels of frequency, duration, and intensity of physical activity for youth, adults, and older adults. The physical activity recommendations consisted mainly of aerobic exercise requirements but, for some groups, bone- and muscle-strengthening exercises were also advised. The agency released a second edition of recommendations in 2018. Adults ages 18 to 64 are given guidelines of 150 minutes weekly instead of daily recommendations. Older adults, those ages 65 and above, have the same per-week minute requirements as younger adults but are also recommended to add bone-strengthening exercises to aerobic exercises (USDHHS, 2014, 2018). Both the 2008 and 2018 recommendations advise youth ages 5 to 17 to engage in at least 60 minutes of activity every day.

Unfortunately, only about 3 of every 10 American high school students meet the physical activity guidelines of 60 minutes per day (CDC, National Center for Health Statistics, 2015). Similarly, the WHO (2020b) reported that only 23% of adults globally are regularly compliant with the guidelines. These statistics shed light on the crucial need to understand how people can be influenced to engage in more physical activity daily.

In 2018, the second edition of the guidelines published by the Department (USDHHS, 2018) provided new and adjusted recommendations, including exercise recommendations for previously uncategorized populations. These population subgroups included preschool-age children (3 to 5 years old), women during pregnancy and postpartum, adults with chronic health conditions, and adults with disabilities. The inclusion of these additional populations in the updated guidelines reiterates the importance of regular exercise for all people, regardless of age, gender, or abilities.

Adult and Youth Obesity Rates in the United States

Currently, the CDC collects national data via surveys and interviews to measure the health status of Americans. Two of the data surveillance systems, the Behavioral Risk Factor Surveillance System (BRFSS) and the Youth Risk Behavior Surveillance System (YRBSS), are appropriate data sources for information related to obesity rates for adults and youth. The NCHS data brief encompasses these data, indicating that in 2015-2016, 39.8% of the adult population, or 93.3 million American adults, were reported as obese (Hales et al., 2017). Using a prevalence map of obesity rates, certain trends become visible. Areas in the South (32.4%), followed by the Midwest (32.3%), had the highest occurrence of obesity in 2017, followed by the Northeast (27.7%) and the West (26.1%; CDC, Division of Nutrition, Physical Activity, Overweight, and Obesity, 2017).

Obesity research indicates that obesity does not affect all people in the same way. Within the obesity arena, educational status, gender, age, SES, race, and ethnicity are factors. Ogden et al. (2017) noted that men more than women, younger more than older, more highly educated, those with higher incomes, and Asians more than Whites, African Americans, or Hispanics were less likely to be obese.

First, physical activity affects youth. Fryar et al. (2014) reported that, not only has the obesity rate in youth increased globally but the youth obesity rate in the United States has tripled since the 1970s and currently is reported at 18.5%, representing about 13.7 million American children and adolescents (Ogden et al., 2017). Since 2013, the prevalence of obesity in both youth and adults has begun to level off, with little change. However, for youth, the effects of obesity may become even more severe due to the potential of negatively associated cascading effects (MacCallum et al., 2012). With higher levels of obesity in children and youth, such factors potentially place them at higher risk for short-term health concerns such as potential psychological factors, asthma, chronic inflammation and higher cardiovascular risk (Reilly et al., 2003; Reilly et al., 2005) and greater potential of obesity in adulthood (Freedman et al., 2007; MacCallum et al., 2012; Singh et al., 2008).

Benefits of Physical Activity

A body of knowledge has been produced by researchers (Hambrecht et al., 2003; Helmrich et al., 1994; Høidrup et al., 2001; Laaksonen et al., 2005; Schnohr et al., 2003; Whelton et al., 2002) has identified physical, academic, psychological, and social and community benefits related to regular engagement in physical activity. WHO (2020a) defined *health* as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (para. 1). This triad definition illustrates that, to be considered healthy, one should realize some level of benefits from all three areas. For college students, each of these benefits can have a positive effect on academic and personal success and it is important for students to capture as many benefits as possible.

Physical Benefits

Benefits associated with physical activity are widely recognized as motivating factors for engagement. A simple Google search of benefits of physical activity results in millions of sources that expand on the idea that physical activity is good for the body. One example lists the physiological responses to physical activity, including greater possibility for longer living, control of weight, reduced risk for heart diseases and type 2 diabetes, strengthening of muscles and bone resilience, and increased ability to perform daily activities such as walking and climbing stairs (Beale, 2017). Another recent systematic review of physical benefits of physical activity (Dolezal et al., 2017) concluded that sleep quality and/or duration of sleep were improved by regular physical activity but also reported mixed results regarding the benefit of better sleep quality and/or duration due to regular physical activity engagement by college students.

Academic Benefits

Also associated with physical activity is the interesting link to academic performance. Research by Wald et al. (2014) assessed data collected from the National College Health Assessment II (NCHA-II) and determined that students who engaged in health-promoting behaviors such as physical activity, ate appropriate amounts of fruits and vegetables, and got enough sleep had higher grade point averages (GPAs) than those who did not engage in such healthful activities. However, MVPA had only a modestly higher effect and was the least effective compared to intake of fruits and meeting sleep recommendations. Al-Drees et al. (2016) reported similar results in that college students who maintained regular physical activity tended to have higher GPAs than the rest of the study population; however, the study sample consisted entirely of medical students, with no undergraduate students. Much of the research on links

between academic performance and physical activity has used a study sample of youth and adolescents in K–12 schools (Dwyer et al., 2001; Shephard, 1997; Trudeau & Shephard, 2008). This highlights the need for further study of college students regarding the association between academic performance and physical activity. Each of the cited studies included a cross-sectional design, making causal inference difficult.

Psychological Benefits

After physically related benefits associated with physical activity, psychological benefits of physical activity may the most widely recognized. Benefits of physical activity on mental health in children and adolescents include positive outcomes: lower depression levels, increased self-esteem, and reduced anxiety and stress (Biddle & Asare, 2011), as well as improvement in cognitive functioning (Godman, 2014). Ashdown-Franks et al. (2019) stated that not only is physical activity a protective factor against potential mental illness, it can serve as a treatment, as well. The evidence for physical activity in management of major mental illnesses was emphasized in a concise overview to inform clinical practice and to guide policy.

An assumptive link between physical activity and psychological benefits is not a new idea. Predating Western agricultural and industrial revolutions, Eastern cultures believed in the vital connection of physical activity and mind practices and promoted activities such as Tai Chi and yoga (Manley, 1996). These two sources are only a small representation of a growing field of knowledge with the intent to confirm associations between mind and body. The psychological benefits associated with physical activity are well documented and continue to serve as an enticement for people of all ages to engage in physical activity.

Social Benefits

Within youth development programs, the allure of participation in activities can include both direct and indirect associated benefits that are integral to learning and participation. Such benefits include increased competency, self-esteem, skills, and knowledge; enhanced individual development; improved self-discipline and time management; insight into the multiple roles of adults; and a sense of connectedness, belonging, and feeling valued (Harrington, 2018). The most apparent benefit associated with youth sports participation is increased physical activity by youth. However, beyond merely increased physical activity, social benefits of sports participation might include opportunities to engage in teamwork, working alongside others for a common goal; resiliency and perseverance in the face of challenging events; and an opportunity to forge friendships with both youth and adults (Harrington, 2018), all of which are common developmental principles reported in youth development literature.

These encounters and experiences in sports, as well as many similar positive youth development programs, offer youth opportunities to grow and learn from others. For example, playing soccer is a worldwide endeavor, but the game may be played differently based on cultural influences. Understanding such cultural differences in sport is an avenue for unity and understanding differences in life. This is an example of how physical activity, especially in sport, is an individual asset that can provide social connections and benefits for youths and adults alike.

Community Benefits

Oftedal and Schneider (2013) reported associations been community-level assets such as parks and nonmotorized trails and healthier, more physically active residents. In a nested study, Das and Horton (2012) reported that individuals and communities experienced benefits, with evidence of positive benefits of physical activity such as a sense of purpose, value and social

connectedness, better sleep, reduced levels of stress, and possibly fewer effects on the environment when people used physical activity modes of transportation such as cycling or walking. Community-level benefits are relevant and connected to physical activity, especially in activities such as sport and recreation, to create a sense of community integration (Wankel & Berger, 1990).

Determinants of Physical Activity

Influential factors at the personal, social, economic, and environmental levels that affect health status are known as social determinants of health (WHO, 2017). Similarly, the personal, social, economic, and environmental factors that influence physical activity are known as determinants of physical activity. Much of the early research on why people do or do not engage in regular physical activity was addressed by Dishman et al. (1985); they echoed a similar level of influence but also included the characteristic of (in their terms) exercise. Since this early research in exercise determinants (Dishman et al., 1985), research endeavors have evolved with additional determinant levels: policymaking, biology and genetics, and availability of health services (HealthyPeople.gov, 2020) for a deeper understanding of how health status is influenced. The current study was conducted using the determinants of physical activity suggested by Dishman et al. (1985) in addressing personal and environmental determinants, mainly because the policy-making, biology, and genetics levels that influence people are outside the scope of this research.

Personal Determinants of Physical Activity

There are both psychological and physiological barriers at the personal level of determinants, and each can influence whether a person is motivated, engaged, or engaged in activities. physical activity barriers can include physiological constraints at the personal level.

Physiologically, age and gender have been well studied regarding their association with physical activity behavior.

As people age, they become less physically activity (Barnekow-Bergkvist et al., 1996). This general trend is a worldwide phenomenon. This trend is observed not only in the moderate physical activity category but also in vigorous levels of physical activity engagement. From a gender perspective, males at nearly all stages of life are more active than females (Berkey et al., 2003; Milroy et al., 2015; Pate et al., 2004). From school age to older adulthood, males tend to be more active than females. Researchers van Uffelen et al. (2017) listed several reasons for these gender differences: Females tend to prefer engagement in physical activity for such purposes as improving appearance, spending time with others, meeting friends, or losing weight. They also found that females were more likely to prefer supervised activities with people of the same age and gender, conducted at a fixed time.

Environmental Determinants of Physical Activity

Settings, locations, and access to or availability of resources (e.g., parks) are seen as environmental agents that can either enhance or deter physical activity. Regarding setting, the built environment can not only affect one's ability to engage in physical activity but can also affect the personal motivation to engage in physical activity (Glanz et al., 2008; Sallis et al., 2012). People who have access to safe, inviting neighborhoods with walking paths or similar park elements may be more influenced to engage in physical activity. However, the converse is also true: If one's location is in areas that feel unsafe or do not provide space for physical activity, engagement might be negatively influenced. Whether rural, suburban, or urban, each location type provides challenges to regular physical activity and must be addressed in order to promote increased physical activity by all populations.

Setting as an Influencer of Physical Activity

The physical and cognitive environments where physical activity takes place can influence physical activity behaviors. Access to connective streets, roads, and sidewalks and the presence of criminal activity can affect the ability, intention, and motivation to engage in physical activity (Adams et al., 2011; MacDonald Gibson et al., 2015). That settings have an impact on physical activity is true for youth as well as adults, perhaps more so due to restricted access by youth in terms of transportation, such as bicycles, walking, or buses (Mitchell et al., 2016). Adams et al., (2011) and Sallis and Glanz (2006) described how the community setting, which they called built environment, can promote or obstruct healthful living in terms of access to safe, affordable, accessible, opportunities for physical activity and healthful foods. Booth et al. (2001) summed this issue on influential settings: "Modern society is a complex environment, that appears to support unhealthful patterns of eating and physical activity. These environments have developed over decades and even centuries, and we are just beginning to understand their negative effects on health" (p. S35). The setting that is the focus of this study is the college campus, which generally serves as both a community setting and a school setting.

Community Settings

While individual determinants such as self-discipline, time, and convenience have been associated with physical activity engagement (Deliens et al., 2015), identifying and understanding how social and environment determinates influence physical activity is just as important. Mansfield et al. (2012) studied individual, social, and environmental determinants of physical activity for socioeconomically disadvantaged (SED) minority mothers and determined that community barriers such as program and child care costs exerted a strong influence exist on their physical activity participation. One policy barrier was seen in an access program that was

designed to subsidize recreational facility access cards; however, the program created a cultural dynamic as SED members felt that, by accepting the access cards, they were accepting the social stigma associated with being defined as "poor." Mansfield et al. (2012) also determined that the environmental determinant of location of the recreational facility was a significant barrier if the facility was not close to public transportation. Nelson et al. (2006) studied community settings and found that, in rural working-class and mixed-race urban neighborhoods, youth were more likely to be overweight and that youth in older suburban areas were more likely to be physically active than residents of newer suburbs. Low-SES youth were more likely to be active than mixed-race urban residents, although the difference was not statistically significant.

School Settings

While community settings can influence how and why youth and adults engage in physical activity, school settings have a strong effect on youth motivation for physical activity. Yli-Piipari et al. (2018) studied professional development workshops that were presented to an experimental group of physical education teachers to inform them of methods to increase autonomy (e.g., individual choice or youth voice) to increase participation and physical activity in their classes. The researchers reported that autonomy supported motivational experiences in physical education classes in urban settings and transferred to recreational physical activity in out-of-school settings. These findings highlighted similarities in the setting, especially in school settings such as K–12 physical education courses (De Meester et al., 2017; Fullmer et al., 2018; Gu et al., 2018), extracurricular sports (Bendíková & Nemcek, 2017), and college physical activity courses (Kim et al., 2015), all of which were influential in physical activity motivation.

Over all, the takeaway from the cited studies is that school-initiated programs such as physical education classes and extracurricular activities were a fertile ground for increasing

youth interest in physical activity and in increasing overall physical activity levels. To clarify, the use of normally structured physical education classes that allowed for greater individual choice (autonomy), sometimes referred to as youth voice, was determined to be influential in continued engagement in physical activity outside of the physical education classes (Kim et al., 2015). Conversely, Mehmeti and Halilaj (2018) reported that a stifling environment with little or no autonomy in leisure physical activity choice resulted in lower physical activity levels and increases in youth mental health concerns.

College Students and Physical Activity

The transition from high school made by incoming college students represents an extremely stressful and vulnerable period. Many students are susceptible to increased academic stress, lack of sleep, and higher probability of engaging in risky behaviors such as use of drugs, alcohol, and unhealthful foods (Jones-Palm & Palm, 2005; Staurowsky et al., 2009), and sedentary behaviors associated with use of electronic devices (ACHA, 2018; Buckworth & Nigg, 2004; Castro et al., 2018; Hingson & White, 2014).

The physical activity guidelines issued by the Physical Activity for Americans Guideline Committee (PAGC) provide recommendations in terms of duration and frequency of physical activity depending on the age of the student. This can create issues when attempting to compare physical activity rates between high school and college students. Previously, high school students were assigned to the category *youth and adolescents*, with a recommended daily MVPA of least 60 minutes for ages 6 to 17. The PAGC recommends that, once a youth is 18 years old (now categorized as an adult), the duration should increase to 150 minutes of moderate physical activity and 75 minutes of vigorous physical activity weekly (USDHHS, 2018). Scales such as

the NCHA-II performed by the ACHA, which collects yearly information related to the overall health of college students, are a key source for assessing college student physical activity levels.

The NCHA-II (ACHA, 2018) executive summary highlights that only 47.4% of college students reported accomplishing adequate levels of weekly MVPA and 53.6% of males and 44.6% of female college students reported meeting the recommended physical activity levels. Regarding intensity of exercise engagement, the NCHA-II reported that only 21.7% of all college students reported engaging in moderate cardio or aerobic-intensity activities in the previous 5 to 7 days but there was an increase in vigorous cardio or aerobic intensity by 28.2% of all college students in the previous 3 to 7 days (ACHA, 2018). As reported earlier, 71.7% of recent female high school graduates were enrolled in college or university programs; since 44.6% of females were not meeting recommended physical activity levels on a weekly basis, developing healthy physical activity habits during college years may be even more important for females than for males.

Higher Education Barriers to Physical Activity

Completing a college degree program involves many challenges, assignments, deadlines, and successes and failures (Bailey, 2005). These challenges are not unlike those faced by other youth and adults with family responsibilities, work, and lifestyle choices. Barriers arise that are not only associated with academic success during college but could keep college students from achieving recommended physical activity levels. Such barriers could include primarily unhealthful food choices offered on or near campus, popularity of risky health behaviors (e.g., drinking), overwhelming and time-consuming academic and social responsibilities, development of self and individuality, and large amounts of time spent in sedentary electronic behaviors using computers (Castro et al., 2018).

Healthy Campus 2020

As an evolution of the Health People Initiative, more than 600 higher education professionals (Healthy Campus Coalition) created a list of desired objectives to reach a healthy community, and then developed toolkits for institutions to use, allowing adaptations to recognize the uniqueness of each campus (HealthyPeople.gov, 2020). Currently, the Healthy Campus Coalition is completing review of the 2020 campaign and is making plans for the 2030 version of the campaign. The current 2020 campaign contains objectives for students, faculty, and professional staff in the campus community, along with the resources for collaboration with campus partners and model programs to implement on campus (Appendix A).

Therefore, a comprehensive look at specific physical activity opportunities that are generally found on most college campus is required to identify current opportunities and possible future opportunities that would benefit the campus community in promoting physical activity. For the purposes of this study, the researcher uses the terms *structured*, *semistructured*, or *unstructured* learning to describe opportunities for a college student to engage in physical activity. These opportunities are sometimes available to the entire campus community but may afford limited access to certain groups, such as students who are enrolled in a courses or persons who purchase memberships. In the following paragraphs, each of the terms is operationally defined.

Learning Environments for Physical Activity

In the literature on structured learning environments is the idea that an environment created by someone in an official capacity (a teacher in the case of a physical education class) can have positive or negative influence on how people perceive the requirements of the class. This is defined as a motivational climate. motivational climate is a psychologically influencing

environment within a structured learning environment that uses both instruction and feedback, although in different methods, in an effort to motivate participants toward an outcome (Ames, 1992). An example of how motivation climate is present in physical activity courses can be found in research related to the structured elements: When students felt that their teacher emphasized personal improvement over competition, students felt more competent in skill building (Ntoumanis, 2001).

Structured Learning Physical Activity Opportunities

Activities include academic courses for credit that allow students to learn about a specific activity. Specific physical activity courses might include backpacking, basketball, walking/running, badminton, swimming, or a general lecture course on health. The catalog of course opportunities is limited only by the knowledge, skills, and availability of campus communities. In this study, structured learning opportunities (academic activity courses) served as the source of participant data.

Semistructured Learning Physical Activity Opportunities

Activities include programs and events presented by faculty or staff of an institution that are not considered academic courses. These are learning opportunities that are not part of an academic course and may not have a regularly scheduled place or time for engagement. Popular options in a semistructured learning physical activity setting would be intramural programs, club sports, outdoor adventure trips, living learning communities, and even study abroad trips. Since its origin in 1950, the National Intramural and Recreational Sports Association (NIRSA), the national rules and professional association of campus recreation professionals, has promoted programs on college campuses that have served more than 8.1 million students (NIRSA, 2018) in myriad recreation programs and facilities as a part of educating the whole student. The data from

NIRSA led to the choice of the college student setting as appropriate for this study. Examples of semistructured recreational activities include league play and championship tournaments, both regionally and nationally, which are part of the student development philosophy of intramural and club sports.

Unstructured Learning Physical Activity Opportunities

Activities include a wide and diverse set of offerings. In urban and rural settings, college campuses may offer sidewalks, open space, even park space that is usable for physical activity engagement. General use of campus recreational facilities for "drop-in" recreation, such as pick-up basketball or use of weights, can be unstructured learning physical activity opportunities. Unlike structured and semistructured opportunities, which may or may not have a temporal element such as class time or game time, unstructured physical activity opportunities can take place almost any time because they may not require the presence of others for physical activity engagement. Within each of the levels of physical activity opportunities exists a differentiated presence of the basic psychological needs of autonomy, competency, and relatedness. To clarify, unstructured physical activity provides the greatest availability of autonomy because, when resources are abundant and available, the participant has the choice of when and how to be physically active. Structured and semistructured activities are constricted with elements of time and place that may limit a sense of autonomy.

During the study, opportunities that are found on a college campus are discussed regarding how they promote and encourage regular physical activity engagement. Sources of such opportunities include interventions that target the campus community, including educational courses that teach and assess physical activity abilities. The study focused on how

the campus community uses facilities and programs outside of the classroom to promote healthy living through engagement in regular physical activity.

Theoretical Framework

In studying people's motivation to physical activity engagement, it would be prudent first to consider how behavioral theories have been applied in motivational research. For practitioners and researchers alike, a level of understanding of how people are motivated is central to the idea of behavior modification.

Behavioral Theories Used to Explain Motivation

A recent study by Knittle et al. (2018) consolidated previous studies in a systematic review and identified three main determinants of motivation: intentions, stages of changes, and autonomous motivation. Each of the three determinants was linked to competing behavioral theories in an effort to explain how motivation is influenced. It is then necessary to consider the three associated theories and their facets related to motivation. The theories discussed in this study are the TPB/reasoned action, trans-theoretical stages of changes (TTM), and SDT.

Knittle et al. (2018) considered how TPB (Ajzen, 1991) and its previous work, the theory of reasoned action (Fishbein & Ajzen, 1980), influence future behavior because of thoughts and beliefs about having a successful outcome from the chosen action. TPB is a popular choice for theory testing; it has been one of the most widely tested models in terms of the factors that influence health-related behaviors, including physical activity (Armitage, 2005; McEachan et al., 2011). The use of thoughts and beliefs about an outcome would be categorized as an extrinsic factor and, as such, is the opposite motivation factor from that to be discussed in this study. A limitation with TPB is its connection to time. TPB assumes that behavior is the result of a linear decision-making process and does not consider that it can change over time (Ajzen, 1991).

Another time limitation of TPB is that the time period between "intent" and "behavioral action" is not addressed adequately by the theory.

Continuing with personal-level theories, stage changes theories such as Prochaska and DiClemente's (1983, 1986) TTM attempt to explain people's action through a series of changes within stages. The stages of change in the TTM model include precontemplation, contemplation, determination, action, relapse, and maintenance. In addition to the TTM, the health action process approach uses structured processes to predict and explain human behavior change. According to the TTM, people move through a series of stages, beginning with precontemplation, and attempt to move toward the end of the spectrum, which is maintenance in a bilateral flow. The concept of bilateral is used in the sense that a person may move along the continuum of stages at any one time in either direction; once a person moves beyond initial precontemplation, or knowing that a certain behavior, such as PIA, is harmful, they cannot unlearn that information. Therefore, at this point, the person would move throughout the remaining stages of thinking about making a change. Limitations of stage of change models include the unclear sense of time in which a person moves through stages, as well as a lack of regard for contextual social factors such as income and SES that could influence the ability to change the behavior (Boston University School of Public Health, 2019).

Theory of Self-Determination

The basis for Deci and Ryan's (1985) SDT includes overarching psychological needs constructs of autonomy, relatedness, and competency as they contribute to influencing motivation. Unlike Prochaska and DiClemente's model, SDT is not designed to promote progression from one stage to the next; instead, it is categorical, based on the perceived locus of control. Deci and Ryan posited that, in meeting or not meeting psychological needs, the idea of

motivation exists at one of three levels: amotivation, external motivation, and internal motivation. The higher the met needs, the more positive the person might feel about engaging in a certain activity and the g greater the ability to change from one motivational level to another. While not linked as a progression in TTM, a hierarchy exists in which when the locus of control, and by association, psychological needs are met, movement within the hierarchy is possible from amotivation to external motivation and finally to intrinsic motivation. Ryan and Deci (2000b) noted that activities that are primarily intrinsic in nature (or more autonomous in control) have the greatest potential for predicting future engagement. Therefore, particularly in the current study, it would seem important to create and adapt physical activity interventions and programs to move student's motivation from extrinsic to intrinsic.

Continuum of Motivation According to SDT

According to Deci and Ryan (2000a), motivational factors that can influence a person to engage in a behavior fall along a continuum of internalization: amotivation to extrinsic motivation, and intrinsic motivation. These constructs are fully explained in organismic integration theory (Ryan & Deci, 2017). Amotivation is defined as a state in which the person is not motivated to complete or undergo a task. Extrinsic motivation is defined as the use of external forces such as rewards (e.g., money) to motivate a person to engage in the task. Intrinsic motivation is a motivational force that comes from within the person's desire to complete a task for the pure reason of the task itself. Because amotivation is the absence of motivation, it is not discussed further in this study. However, definitions and explanations of internal and external motivation are discussed regarding how each affects motivation to engage in a task or behavior. The differences between intrinsic and extrinsic motivating factors may not necessarily originate from outside of the person.

Extrinsic Motivation

Extrinsic motivation occurs due to outside sources. Ryan and Deci (2017) noted that extrinsic motivation influences behavior because of a desire to garner "external reward, societal approval, avoidance of punishment, or attainment of a valued outcome" (p. 14). An extrinsic factor might be seen in a person who identifies as an athlete and understands the need to care for and strengthen the body to compete. Events such as weight training and physical conditioning may not be a scenario in which the self-identified athlete is intrinsically motivated to engage but the athlete has internalized these social requirements and feels required to complete the task as part of their identity. When a person's identity is strongly connected to that person's athletic nature, challenges in a recreational setting, such as softball or basketball, can create scenarios of anxiety as the person feels that they must perform at higher level than others based on their athletic identity. While the game or sport may have originally been motivated intrinsically, the motivation is now external to some degree.

Intrinsic Motivation

Intrinsic motivation is the proposed end of the internalized continuum. Ryan and Deci (2017) defined intrinsic motivation as the "primary propensity of some organism, especially mammals, to develop through activity to play, explore and manipulate things and in doing so, to expand their competencies and capacities" (p. 123). Of the three levels or stages of motivation, Deci and Ryan (1985), as well as Bendíková and Nemček (2017), claimed that intrinsic motivation is the best predictor of future behavior or future engagement in a task. A leisure example of intrinsic motivation may be the decision to read a book. A person who chooses to read does so in the hope of enjoying the activity itself. If one is not forced to read the book (e.g., class assignment), one is intrinsically motivated. Another physical activity example is playing

sports. Sports, unlike exercise, tend to have more intrinsic motivation for participation (Kilpatrick et al., 2005).

Basic Psychological Needs Theory

SDT posits that "inherent in such pursuits are satisfaction in feeling competency, autonomy, and relatedness" (Ryan & Deci, 2017, p. 5). In this study, the major theory of SDT, specifically the mini theory of BPNT, was applied to understand how the structured educational learning environment, along with motivational climate influence (e.g., task, ego, caring), meet the psychological needs of competency, autonomy, and relatedness. To explain the connection between how the structured learning environment is related to meeting basic psychological needs, a conceptual model for Studies 2 and 3 is presented, including the desired outcome of internal motivation, due to the relationship between the two constructs.

Conceptual Model

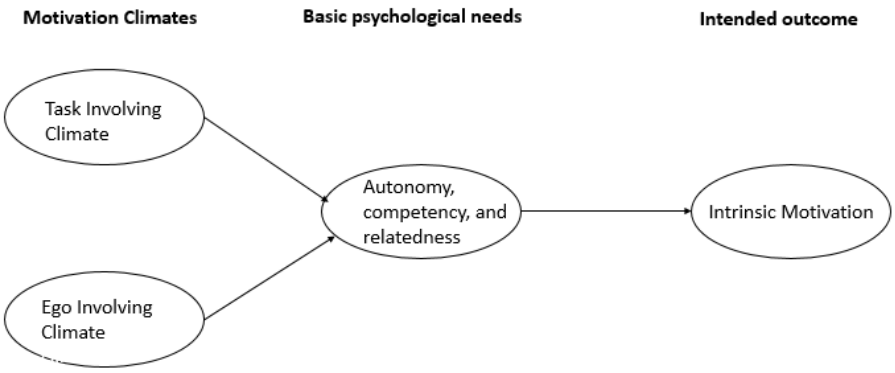
The conceptual model (Figure 3) illustrates how the desired outcomes of increased motivation and/or engagement are obtained based on whether the motivational climate satisfies (task involvement and caring) or thwarts (ego involvement) the basic psychological needs (autonomy, competency, and relatedness).

Appropriateness of the Framework

SDT is an appropriate framework for this study because the theory has a focal point on intrinsic factors, unlike the TPB/reasoned action, which focuses on extrinsic factors (intentions and outcomes). Ryan and Deci (2017) posited that individual human development is marked by curiosity, action, and a desire to be a social being. In such an organism, a desire for higher order is prominent in that people have a desire to learn,

Figure 3

Conceptual Model Illustrating the Relationship Between Motivational Climate Influences and the Three Basic Psychological Needs—Autonomy, Competency, and Relatedness—and Desired Outcomes



take interest in, become master of, and explore the world around them (Ryan & Deci, 2017). Unlike social cognitive theory (Bandura, 1986), which is a theory based on how one learns about a specific task, SDT central tenets are directly interested in how one is motivated to engage, rather than how one learns to engage.

Understanding motivations behind college student physical activity engagement is vital in preparation for intervention design and affecting behavior change. Research as shown that college students tend to engage in physical activity due primarily to external factors: friends, family opinions, and mass media marketing for the desired look of a person within their age range (Fletcher, 2016). This is an example of an extrinsic motivation factor influencing behavior. However, intrinsic motivational factors have been shown to be associated with longer engagement in physical activity (Ryan & Deci, 2017; Teixeira et al., 2012). Therefore, understanding how motivational climate influences college students' motivation to participate in physical activity would be useful in preparing interventions with the goal of increasing intrinsic

motivation, thus potentially fostering future physical activity engagement, instead of promoting activities that are extrinsically motivated.

CHAPTER III

STUDY 1: A SYSTEMATIC LITERATURE REVIEW OF MOTIVATIONAL CLIMATES INTERVENTIONS ON U.S. UNIVERSITY STUDENTS' PHYSICAL ACTIVITY

Introduction

The evolution of thought about how and why we act or react as humans has ranged from a foundational concept of physiological response and drive theories to a more organismic concept of behavior (Deci & Ryan, 1985). Deci and Ryan (1985) conducted a historical examination and reviewed the timeline and evolution of theories that had been used to describe and explain the forces and reasons behind people's actions; they concluded that human behavior can be described on a continuum of stimuli ranging from "mechanistic to organismic" (p. 3). A mechanistic perspective of human behavior may consider how a stimulus could play a role in pushing humans into action (Deci & Ryan, 1985). For example, Freud (1949) took the mechanistic perspective that stimuli that may affect behavior, resulting in the physiological drives, such as sex, hunger, thirst, or pain avoidance. To avoid hunger, a person is driven to action to find or make food. The encapsulating idea is that physiological responses to the body create the need for action. However, the opposing end of the motivation continuum suggests that a theory of human behavior can be driven by organismic stimulus, such as the need to satisfy one's sense of autonomy, competency, or relatedness, described by Ryan and Deci (2017) as part of core basic psychological needs in their theory of self-determination. This paper examines organismic interventions used in physical activity settings in which the framework of the intervention is formed using an external influence called *motivational climate* to determine whether motivational climates can influence intrinsic motivation. Before describing the effects of

motivational climate interventions, it should be noted why the college student population is of interest in this study.

Problem Statement

Research by Telama et al. (2005) demonstrated that physical activity engagement appears to decrease with age, including youth as they move from high school to college. Research by Bray and Born (2004) and Kimball et al. (2009) reported significant physical activity declines in first-year college students. Apart from these studies, many physical activity studies have been conducted using youth in a structured secondary school setting such as physical education classes, sports, and afterschool programs (Erdvik et al., 2014; Hirsch & Wong, 2005; Mitchell, 1996; Ntoumanis & Biddle, 1999; Ntoumanis & Standage, 2009). However, research is lacking regarding how college students are motivated to be physically active based on the design of structured learning environments.

Theory of Self-Determination

The usefulness of SDT makes it a quite a popular choice of framework when examining both human motivation and predictions of behaviors. SDT can be used in understanding motivation in several life contexts, but this study focused primarily on the context of physical education (Ntoumanis & Standage, 2009; Standage et al., 2005). SDT, as a grand theory, is composed of six smaller psychosocial theories. SDT can be differentiated from behavioral theories such as the theory of planned behavior (Ajzen, 1991) and social cognitive theory (Bandura, 1986) as SDT attempts to answer how motivation moves within, among, and along a continuum based on the locus of control. The range of the continuum is from controlled to autonomous (Ryan & Deci, 2017). The concept of locus of control is a central tenet and may help to explain why one might be interested in engaging in an action or what drives one to

engage in an action. The prime focus for using Ryan and Deci's (2017) theory of SDT is that, when activities are primarily intrinsic in nature (or more autonomous in control), those activities have the greatest potential for predicting future engagement. Physical activity experimental research, along with institutions that promote physical activity, could incorporate the tenets of SDT (autonomy, competency, and relatedness) in the planning phases of their activities in the hope of promoting more intrinsically motivating environments.

Importance of College-Age Population

Age is an influential factor of physical activity, as previous health and preventive medicine studies have shown. Research has also shown that physical activity decreases with age; remarkably, most of the decline occurs during adolescence (Sallis, 2000). Continuing to age without appropriate amounts of daily physical activity can lead to a lifetime of potential chronic health issues, all of which are modifiable (Hamilton et al., 2008; Levine et al., 2000; Owen et al., 2009; Owen et al., 2000; Pate et al., 2008) and it is never too late to receive the benefits of physical activity (Duda, 1991; Goetzel et al., 2007). Another facet of diminishing physical activity level is that girls are more likely than boys to decrease physical activity as they age (Berkey et al., 2003; Corder et al., 2015; Pate et al., 2004). Because college and career often take place during a transitory time during lifespan development (Bray & Born, 2004; Jung et al., 2008; Kwan et al., 2012; Pullman et al., 2009), additional factors, such as increasing personal responsibility, can hinder the desire to be physically active in ways that may conflict with time or money. Therefore, it is important to acknowledge such points of time throughout lifespan development, as such physiological and psychological knowledge about youth would be beneficial in creating and developing interventions that might modify future physical activity behavior in youth and young adults. It has been suggested in other studies (Barnekow-Bergkvist

et al., 1996; Dennison et al., 1988; Yang et al., 1999) that current physical activity engagement in older adults was influenced by the type and frequency of physical activity events in which they engaged as adolescents. To connect the previous work with the current study, research to understand how motivation, specifically perceived motivational climate, is important to the science of youth development and physical activities.

Motivational Climates

Motivational climates are the intentional or unintentional psychological environment created by someone in a leadership or authoritative position for the purposes of training, instruction, and feedback (Ames, 1992). The concept of motivational climate began with educational research in achievement, later named achievement goal theory (Ames, 1992) and achievement motivation (Nicholls, 1984, 1989). The nomenclature representing similar ideas of a motivating climate were called mastery or performance (Ames, 1992) or task involving and ego involving (Nicholls, 1989). Both of these approaches were formulated to capture the essence of how the environmental setting may affect the ability to learn and replicate a skill, as well as interest regarding the skill. *Mastery and task involving* are described as climates in which the ultimate goal and end result of the experience is to improve the ability to perform a skill. For example, in a mastery/task-involving motivational climate, a teacher or coach may promote individualistic improvement by keeping track of differences from one skill test to the next and using the results as motivation for further improvement. Performance/ego-involving climates contrast in nature by promoting an environment in which, instead of personal improvement, the goal of the skill development is to improve in such a way as to become more proficient than others in a given skill. Performance/ego-involving climates are synonymous with competition as the main tool used to judge skill improvement.

Motivational Climate Interventions

Throughout much of the recent literature, individual physical activity worldwide has been described as deficient in meeting current recommended guidelines (Knuth & Hallal, 2009). However, using data from the most recent CDC study on Americans (CDC, 2018), it appears that, while adults are making healthful improvements in physical activity, youth rates remain mostly unchanged (CDC, 2018). Since most youth, adolescents, and college-age individuals are still matriculating in school, an investigation into how physical activity courses could influence intrinsic motivation with the aim of encouraging college students to continue to engage in current and future physical activity would be beneficial in getting more youth to meet daily physical activity guidelines. The purpose of creating a motivational climate is to influence engagement within structured learning environments. Psychological influences are created by a teacher or coach using activities (i.e., curriculum-based lessons or practice scenarios) in an effort to instruct and provide feedback with the goal of motivating students and/or athletes regarding a specific desired task (Ames, 1992). In this study, the learning environment was a college physical activity course at a large public southwestern U.S. institution.

Research Question

After reviewing the literature on physical activity levels of college students, the effects that the transition to college can engender, and the gap of literature investigating their relationships with intrinsic motivation, an opportunity for further study was clear. Therefore, the purpose of this study was to review systematically and appraise the literature to identify the experimental studies that reviewed the relationships between motivational climate and intrinsic motivation, with a specific intention to determine effectiveness. This study was also an attempt to identify research gaps and avenues in need of further development.

Methods

"A methodologically sound systematic review is characterized by transparency, replicability, and a clear inclusion criterion" (Belur et al., 2018, p. 1). Systemic literature reviews are often a quite popular format to choose as a method to review, synthesize, and investigate the literature on specific topics. Systematic literature reviews originated in health care research (Chalmers et al., 2002; Munn, Peters, et al., 2018) but have evolved to include a range of disciplines, including many in the social sciences (Munn, Stern, et al., 2018). However, juxtaposition to systematic literature reviews is an ever more popular method of choosing a scoping review format when the structure of a systematic literature reviews is does not address the research question satisfactorily. Understanding the intent and abilities of the two types of literature review will provide evidence on why the systematic literature review method was chosen for this study.

Comparisons and Contrasts of Review Method Formats

Both the systematic and scoping reviews are centered on the ability to deduce information from large amounts of data presented in published manuscripts. Each review method provides a map on how to conduct and analyze information. However, each format is different in the focus on the type of literature that is reviewed. For example, systematic literature reviews focus on identifying evidence related to a specific research question (Munn, Peters, et al., 2018), such as in the case of Smith et al. (2017), in which the study reviewed how the built environment affected physical activity and active transport and resulted in new findings related to health equity. The evidence in the review suggested that "walkable communities, quality of parks and playgrounds, and by providing appropriate active transport options (walking, bicycling, etc.) was likely to generate positive impacts on activity in children and adults" (p. 17). On the other hand,

scoping reviews are focused, as their name implies, on understanding the scope of certain literature. Instead of trying to answer specific questions and providing evidence, a scoping review analyzes the scope of a field, looking for gaps in treatment of a given topic (Munn, Peters, et al., 2018).

Criteria for Each Review Method Format

Munn, Peters, et al. (2018) suggested additional criteria to delineate the differences between systematic and scoping reviews. Systematic reviews include the following indications: uncover international evidence, confirm current practices or identify new practices, identify and inform areas for future research, identify and investigate conflicting results, and produce statements to guide decision making. The criteria for scoping review indications include identify the types of available evidence in a given field, clarify key concepts/definitions, examine how research is conducted on a certain topic, identify key characteristics or factors related to concept, use a precursor to a systematic review, and identify and analyze knowledge gaps (Munn, Peters, et al., 2018).

Substantiation for Systematic Literature Review Format in This Study

The systematic review methodology of choice for this investigation was determined to be the PIECES format. PIECES (planning, identifying, evaluating, collecting and combining, explaining, and summarizing) is a step-process approach that is conducted in an iterative manner instead of on a linear path (Foster & Jewell, 2017). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines suggest a 27-point checklist and flow diagram (Moher et al., 2009) that was used to guide the analysis and synthesis of research materials.

The methods used for this systematic review are detailed below. Major steps are (a) a database search to identify relevant articles, (b) development of inclusionary and exclusionary

criteria to select articles, (c) data extraction to identify study characteristics from retrieved articles, and (d) data synthesis of all article characteristics. The acronym PICO is used herein to address the research question: Participants (P) were college students who were undertaking some form of physical activity; the intervention (I) was determined by using motivational climates' task-involving or ego-involving methods; comparisons (C) of the two climate methods were made, and the outcome (O) shows how these interventions affect intrinsic motivation.

Database Search

Data collection was initiated with the intent to address the research question, first by identifying the elements that influenced the motivational climate in general, positively and/or negatively, followed by identifying elements of the motivational climate that were positively associated with meeting the basic psychological needs of autonomy, competency, and relatedness. With the help of a research librarian, an inclusive search of peer-reviewed literature was conducted, using such databases as Academic Search Ultimate, CINAHL Complete, Education Full Text (H. W. Wilson), ERIC, PsycARTICLES, Psychology, PubMED, Behavioral Sciences Collection, and MEDLINE. A second search was conducted to ensure that gray literature was included, with the intent of reaching saturation on the topic. Search terms used in the database and gray literature searches were *motivational climate, elements, characteristics, perceived motivational climate, physical activity, classroom, autonomy, competency, relatedness, and perceived motivational climate.*

Inclusion and Exclusion Criteria

As part of transparency and repeatability of the study, protocols for determining inclusion or exclusion of studies in the systematic review are described here. A priori decisions were made

to determine the appropriate criteria for search results. Three inclusion criteria and five exclusion criteria were applied.

Inclusion Criteria

1. The studies provided relevant data on factors that influence motivational climate, specifically in collegiate physical activity courses in the United States but not in K–12 settings.

2. The time frame was 2008–2020, based on the first U.S. guidelines being established in 2008. This 12-year range was chosen to identify trends in the literature.

3. The studies were experimental in nature, such as inventions, to provide some form of measurement of potential change in or by a person in a physical activity course setting.

Exclusion Criteria

1. Literature that was published in a non-English language was excluded. While this exclusion could be a basis for bias, the extensive English language literature about the U.S. population was assumed to provide a sufficient sample of studies.

2. Articles that could not be evaluated because they were written as reviews/commentary pieces, non-peer-reviewed articles or lacking data sets (quantitatively or qualitatively) were excluded.

3. Studies that examined motivational climates other than physical activity courses for college students were excluded.

4. Studies published before the collection of the U.S. physical activity guidelines data in 2000 but later published in 2008 were excluded.

5. Associative, relational, correlational, or other nonexperimental studies on motivational climate were excluded in recognition of an assumed a gap in literature on how college students are affected by perceived motivational climates in physical activity settings.

Screening Process

A three-tiered screening process was used to identify appropriate literature sources for the review. First, inclusion and exclusion criteria were applied to guide retrieval of relevant studies based on study title and abstract. Second, full articles were evaluated for fit with the inclusionary criteria that might not be included in the title and/or abstract. Irrelevant titles, duplicates, and narrative/commentary pieces were excluded; studies that addressed the study population and motivational terms were kept. Third, a thorough review of the references/citations of retrieved articles was applied to identify articles that might have been missed in the initial search.

Data Extraction Process

As transparency, replicability, and clear inclusion criteria (Belur et al., 2018) are the goals for a successful systematic review, a vital part of such transparency and replicability is to ensure that validity and reliability are present in the methods of the reviewed articles. Two reviewers (the researcher and a research librarian) independently performed title/abstract screening on the same set of manuscripts during the initial screening process. While the librarian's research skills were vital in the search, the librarian was not a content expert, so the researcher explained the study purpose, design, and focus to the librarian. Terms such as *motivational climate*, *task involving*, and *ego involving* were discussed at length via video calls. Due to the limited literature on motivational climate, the potential for misinterpretation in screening can be seen in the interrater agreement on the 74 articles. Disagreements were factual, such as failure to identify study sample, language, or setting in the original review, or they were due to interpretational differences, such as understanding the distinction between motivational climate and motivation. Disagreements were resolved in favor of the researcher as the content expert.

Because more than one reviewer was involved in the synthesis and analyses of studies, an interrater reliability coefficient was calculated. The purpose of the interrater reliability formula is to represent the "extent to which the data collected by collector or raters assign the same score to the same variable" (McHugh, 2012, p. 276). Generally, the agreement rate is determined by percentage, calculated by the number of agreements divided by the total number of scores. However, Cohen (1960) disagreed with the use of percentage agreement because "a certain amount of agreement is to be expected by chance" (p. 38). Therefore, Cohen introduced his correction to the problem by use of a kappa statistic. Comparable to the use of a correlation coefficient, Cohen's kappa ranges from -1 to +1. The two reviewers in this study calculated the interrater agreement statistics at the title/abstract and full text review levels. Cohen's (1968) kappa was .20 (none to slight agreement) for title/abstract review and .67 (substantial agreement) for full text review. The same two reviewers were also engaged in the final stage of screening to confirm eligibility and finalize the selection of studies to be included.

Data Synthesis

Protocol coding for study features, or a priori coding (Saldaña, 2015), for the purpose of establishing the importance of characteristics of studies (e.g., purpose of study, population, study design, intervention details) was conducted, and data of importance and significance to the study were entered into the coding protocol system and categorized by similarity of study aims and investigated factors. This initial coding analysis of data was the first step in identifying themes in the four studies that met inclusion criteria.

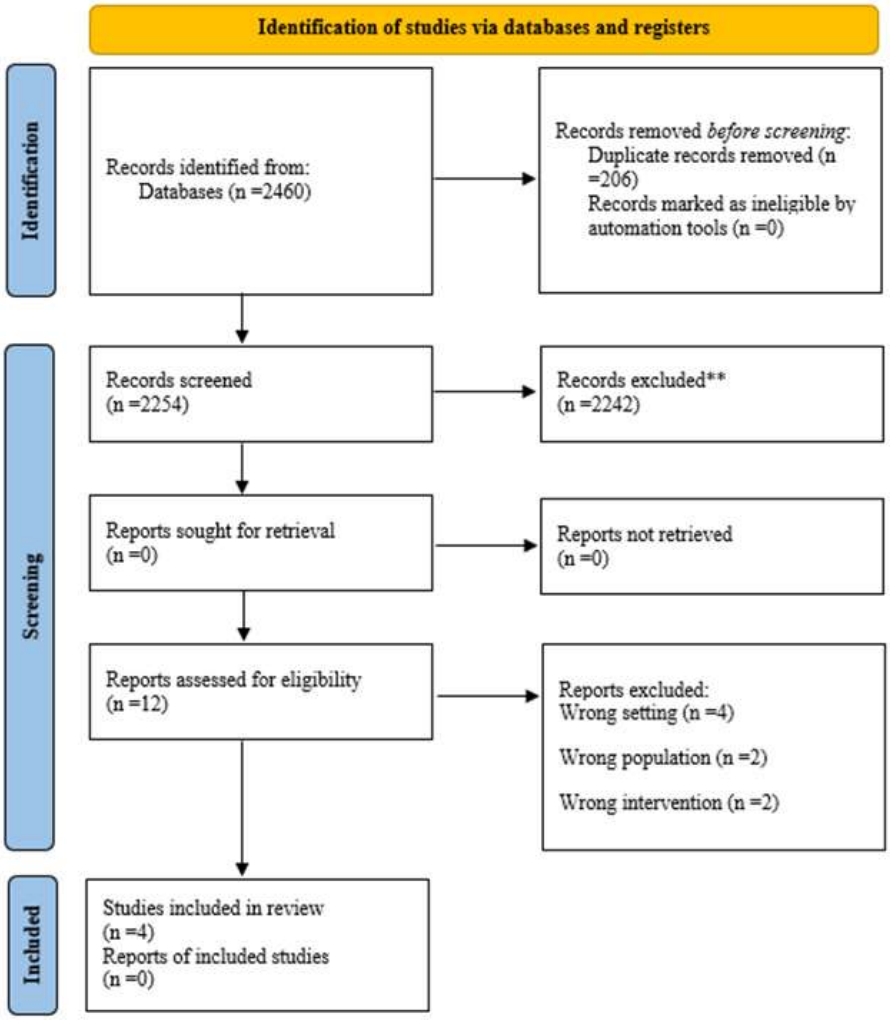
Results

The study was designed to determine the effectiveness of motivational climate interventions on intrinsic motivation for physical activity in college students via meta-analysis.

The search for relevant literature first produced 2,254 journal articles, presentations, book reviews, and white papers. Applying the screening criteria resulted in four studies for review. Figure 4 is a flowchart of that process, presented in PRISMA format.

Figure 4

Path Flow of the Systematic Literature Review



A research librarian was invited to serve as one of the reviewers of abstracts and full text articles. Using more than one reviewer is a suggested and common practice in systematic

literature reviews, as it provides additional rigor by minimizing selection bias and human error in the manuscript assessment at data analysis stages (Charrois, 2015; Stoll et al., 2019).

Table 1 presents basic descriptions of the four studies included in the review in terms of intervention, duration, physical activity treatment chosen for the setting, study

Table 1

Study Characteristics of the Studies Included for Analysis

Authors	Duration	Physical activity treatment	Outcome measures[a]	Setting	*N*	Physiological variables	Psychological variables
Hogue et al., 2019	2 hours	Juggling	2	physical activity instructional course	37	Salivary cortisol responses	Perceived motivational climate, affect, self-esteem, stress/shame
Dewar et al., 2013	Not defined	Speed agility ladder	1	physical activity instructional course	120	Time of completion of task (posttest only)	Perceived motivational climate, emotions, perceived performance (posttest only)
Brown & Fry, 2015	6 weeks	General facility use	1	Staff training	282	n/a	Perceived motivational climate
Hogue et al., 2013	2 hours	Juggling	2	physical activity instructional course	107	Salivary cortisol responses	Perceived motivational climate, cognitive anxiety, somatic anxiety, self-confidence, enjoyment, effort

[a]1 = self-reported, 2 = combination.

sample, and outcome measures. A significant facet of the current study was that each one of the included studies had been conducted as an experiment, although with different outcome variables, thus limiting the ability to measure effectiveness. The focus of each of the studies was to measure the influence of motivational climate interaction on physiological and psychological outcome variables: enjoyment, effort, cognitive anxiety, somatic anxiety, self-confidence, stress, shame, intent to continue, excitement, happiness, positive member behavior, positive affect, self-esteem, humiliation, embarrassment, social evaluation, and proudness. The variables *intention to continue* (two studies) and *excitement* (two studies) are reported to show potential effectiveness of the motivational climate intervention.

Study Characteristics

Participants

In summary, the physical activity interventions in the four studies reached 541 participants. Each participant was enrolled as a college student at the time of the study. Females accounted for 56% (n = 302) of the sample, males 44% (n = 239). Mean ages were 20.34 years (SD = 2.48; Hogue et al., 2019), 20.26 years (SD = 1.56; Dewar et al., 2013), 20.71 years (SD = 3.35) for females and 20.62 years (SD = 3.94) for males (Brown & Fry, 2015), and 19.89 years (SD = 1.80; Hogue et al., 2013). Samples ranged in size from 57 to 282.

Physical Activity Treatment

Three studies used a specific predetermined physical activity as the intervention treatment. Hogue et al. (2013) and Hogue et al. (2019) used juggling as the experimental treatment for both studies, while Dewar et al. (2013) used a speed ladder drill in multiple physical activity courses, each with a different physical activity focus. In the Dewar et al. (2013) study, participants were enrolled in physical activity courses, including rugby, soccer, and

hockey. The Brown and Fry (2015) study used a format that differed from those of the other studies by not conducting an experiment with a single specific physical activity, but instead using students' presence and exposure to the members and staff at the recreational facility as their measure of physical activity.

Outcomes

The original intent of this study was to perform a meta-analysis review of motivational climate interventions on college students in a physical activity setting. It was not possible to conduct the meta-analysis because the four studies did not address a common outcome variable. The characteristics that banded the studies were that each was experimental in nature, used college students as the study population, and included motivational climate practices during the intervention. In all four studies, results were gathered for specific psychological variables that varied significantly in type, offering little overlap to study. However, the variables of intention to continue and excitement were present in two studies (Hogue et al., 2013; Hogue et al., 2019), so these two variables were analyzed for effectiveness. All other psychological outcomes with significant results are reported in terms of physiological and psychological outcomes.

Physiological Results

Both studies by Hogue et al. (2013) and Hogue et al. (2019) reported significant physiological results. The studies were similar in protocol and procedure, as the physical activity treatment was a 30-minute juggling learning and practice session. This juggling activity was chosen as the protocol in the 2013 study and, based on its validation in measurement, was used again in the 2019 study. To determine whether physical activity in various motivational climates was impactful, the salivary tests were used to measure levels of cortisol and a soluble receptor (sTNFαRII) six times before, during, and after the juggling manipulation. Cortisol, the body's

stress hormone, can be a predictor of good health. Cortisol increases heart rate and blood pressure as an adaptation to the environment. For a short time, these bodily reactions are not harmful; increased frequency of stress and cortisol production can lead to chronic illness and other comorbidity factors (Lee et al., 2015).

In the first Hogue et al. study (2013), there was a significant interaction in Time x Climate between the caring/task-involving group and the ego-involving group: There were higher levels of salivary cortisol response in the ego-involving group post CM compared to the caring/task-involving group. The caring/task-involving group showed a significant *decrease* in salivary cortisol levels post intervention compared to baseline, while the ego-involving showed a significant *increase* in salivary cortisol post intervention compared to baseline. In the second facet of the physiological test, the soluble receptor (sTNFαRII) was measured at the same six time points. There was a significant interaction between Time x Climate, as the caring/task-involving group showed higher levels of soluble receptors (sTNFαRII) than the ego-involving group.

In the second Hogue et al. study (2019), there was a significant interaction in Time x Climate as both groups changed significantly from baseline to final time points. A nearly inverse correlation appeared as the ego-involving group showed *increased* cortisol levels and the caring/task-involving group showed *decreased* levels during the intervention. Group differences in the soluble receptor (sTNFαRII) were found between groups in increased levels post intervention.

Psychological Results

Each of the four studies included some measure of a psychological variable. Study variables included perceived motivational climate, state cognitive stress, affect, self-esteem,

stress/shame, emotions, perceived performance (pretest only), cognitive anxiety, somatic anxiety, self-confidence, enjoyment, and effort. From these variables, an assortment of inferences could be studied to determine whether any inferences could be made using motivational climate climates as an intervention method in an effort to increase intrinsic motivation in physical activity.

Each of the studies demonstrated some degree of positive association between the perception of motivational climate and some outcome variables. Within each of the instruments used to measure psychological outcomes, a significant main effect was found in relation to climate. Again, because few variables overlapped from study to study, it is difficult to report findings in groupings; instead, they are reported individually.

In the first Hogue et al. study (2013; $N = 107$, 61 females, 46 males), ego-involving groups reported higher levels of cognitive stress and caring/task-involving groups reported higher coping levels. Males reported higher levels of control and competence and females reported higher levels of threat and challenge. Regarding Affect, the caring/task-involved groups reported more positive affect and less negative affect during the intervention, compared to the ego-involving group. Regarding Self-Esteem, the caring/task-involving group reported higher levels of social and performance self-esteem, compared to ego-involving group. Regarding Stress and Shame, the ego-involving groups reported higher levels of humiliation, embarrassment, stress, and social evaluation, compared to the caring/task-involving groups. Regarding Climate, the caring/task-involving groups reported a higher level of pride in their accomplishments, greater interest to continue juggling, and higher levels of excitement to continue juggling, compared to the ego-involving groups.

Brown and Fry (2015) examined psychological results of an intervention at a college recreational fitness facility. The intent of the study was to examine the perceptions of motivational climate in college students after the manipulation of staff training in task-involving/caring practices. Unlike the other studies in this review, this study did not directly manipulate the sample experimentally. Instead, the staff (full-time professional staff and part-time college student staff) receive staff-mandated training. The intent of the study was to determine whether perceptions of a task-involving climate could be detected by the user. The researches were also interested in whether a member's behavior could be affected by a task-involving climate. Results for the sample of 282 (168 female, 114 male) indicated that staff who engaged in particular task-involving behaviors were more likely to engage in those same behaviors. When members perceived a high task-involving and low ego-involving climate, they were more likely to engage in positive, supportive behaviors with each other. Their perceptions of staff behaviors predicted their perceptions of the climate and members' positive behaviors. Perceptions of an ego-involving climate negatively predicted members' behaviors. A unique factor for the Dewar et al. (2013) study was use of a control group, in addition to the task-involving and ego-involving groups. Significant differences occurred both between the experimental groups and with the control group. For example, the variable of perceived performance (a measure of how a study participant perceived the attempt at the utility speed ladder drill) showed nonsignificant differences between experimental groups but significant differences from the control group. Regarding pre-competition excitement, the ego-involving group reported higher levels of excitement and anxiety than the task-involving group. Men reported higher levels of excitement than women.

The Hogue et al. second study (2019; $N = 57$, 28 females and 29 males) measured the variables of cognitive stress, affect, and social and performance self-esteem. The ego-involving group reported greater cognitive stress during the intervention, as measured by perceived threat. The caring/task-involving group reported greater coping, as measured by perceived control and competence. Males reported greater control and competence and females reported higher levels of threat and challenge. The caring/task-involving group reported more positive affect and less negative affect during the intervention, compared to the ego-involving group. The caring/task-involving group reported significantly higher levels of social and performance self-esteem, compared to the ego-involving group. The caring/task-involving group reported significantly higher levels of social and performance self-esteem, compared to the ego-involving group. The ego-involving group reported higher levels of feeling more humiliated, embarrassed, stressed, and socially evaluated than the caring/task-involving group. Females reported experiencing significantly more humiliation than males in the ego-involving group. The caring/task-involving group reported being significantly prouder of their accomplishments during the juggling intervention, greater interest in continuing to juggle in the future, and excitement to continue juggling, compared to the ego-involving group.

Methodological Features

Similar methodological approaches were used in the four studies to examine the effects of motivational climate on college students in physical activity. Two studies (Hogue et al., 2013; Hogue et al., 2019) combined self-reported measurement scores and observed scores and two studies (Brown & Fry, 2015; Dewar et al., 2013) used only self-reported survey scores to measure psychological effect.

Hogue et al. (2013) and Hogue et al. (2019) used a survey for self-reported measures of psychological effects of the experiment. They also collected saliva samples to examine how the same motivational climate intervention affected bodily responses, specifically cortisol levels. Dewar et al. (2013) used a speed agility ladder in multiple physical activity courses as the treatment, measuring psychological effects via a survey. Brown and Fry (2015) used an uncommon approach by performing staff training for full-time and student employees at a recreation center on how to create positive task-involving climates and then measured the perceptions of changes noted over a 6-weeks period as reported by the users of the facility (non-employee college students).

Duration

The duration of the intervention experiments provided three distinct answers. Methods used by Hogue et al. (2013) and Hogue et al. (2019) called for 2 hours for the full experiment. Dewar et al. (2013) did not define the duration of their intervention. The nature of the use of the speed drill ladder as part of physical activity course suggests that this intervention was short. Brown and Fry (2015) experimented with staff training for up to 6 weeks before post testing recreational center users regarding their perceptions. Each of these studies was cross-sectional regarding the studied psychological variables studied; collection of the physiological variable of salivary cortisol levels occurred across six time points. No longitudinal approaches were used to examine how these interventions affected study variables with longer time spans. To do so could be a beneficial approach to consider in future research.

Effectiveness

The purpose of this study was to perform a meta-analysis of motivational climate interventions on intrinsic motivation and to determine whether the interventions were effective.

No studies met these criteria to conduct a meta-analysis. In fact, only the four studies reported herein included a motivational climate intervention with college students. Only two of the studies (Hogue et al., 2013; Hogue et al., 2019) possessed enough study variables to allow comparison. The other two studies (Brown & Fry, 2015; Dewar 2013) were thus excluded from comparisons of effectiveness.

For the outcome variable "intention to continue," Hogue et al. reported in both studies the following effect sizes: $\eta^2 = .19$ (2013) and $\eta^2 = .35$ (2019). Effect sizes for eta squared, according to Cohen (1988, p. 368) are "small .01, medium, .06, and large, .14." Therefore, both of these results can be classified as large effects. However, the differences between the two studies are quite large, as well. Both of these studies used similar procedures but sample sizes were different: 107 (2013) and 32 (2019). The 2019 study reported nearly twice the reported effect size of the 2013 study. Therefore, use of a weighted mean could be beneficial to understanding which of the two studies, very similar in procedures and application, was more effective. Using the formula (effect size x sample size/sum of samples) allows for comparison of the two results. Results showed that the 2013 study reported a higher weighted mean effect size of .15, compared to .08 in the 2019 study.

The outcomes variable "excitement" was measured in both Hogue et al. studies (2013, 2019): $\eta 2 = .10$ (2013) and $\eta 2 = .36$ (2019). According to Cohen's (1988) guidelines, the 2013 study would be classified as having a medium effect and the 2019 study would be classified as having a large effect. Using the weighted mean to compare the results, the effect size in both studies was .08.

Limitations

The first limitation of the study is the small sample size of studies that qualified for this analysis. From more than 2,000 screened studies, only four met criteria for analysis. Conclusions drawn from only four studies could be misleading about the effectiveness of the intervention method. This small number of studies indicates a need for further research on the topic. College student populations outside of the United States might provide more evidence to advance the science of motivational climates and their psychological effectiveness in physical activity. All but one of the studies carried out an intervention that lasted for a single session. Only Brown and Fry study used an intervention of more than one session (6 weeks).

Regardless of the experimental method, each study measured motivational climates and outcome variables in a cross-sectional nature. There were no longitudinal approaches to these measures. Also, the Brown and Fry study used an unusual approach by assessing college students but not directly subjecting them to the treatment (staff training). A lack of qualified reviewers for this study leads to the potential for having missed studies that could have provided information about the topic in question. Future research to explore the relationship between motivational climates and intrinsic motivation in college students would be beneficial in terms of understanding human behavior. Addressing potential causal units that interact with the motivational climate and intrinsic motivation relationship could provide useful information on why there is such a strong relationship between the two constructs, motivational climate and intrinsic motivation.

Discussion

The purpose of this study was to determine whether motivational climate interventions were successful in influencing intrinsic motivation in college students regarding physical

activity. The reviewed studies did not produce an answer to that question because none of the studies attempted to measure intrinsic motivation. At best, three of the four studies (Dewar et al., 2013; Hogue et al., 2013; Hogue et al., 2019) shared a related format in which they attempted to measure the influence of motivational climate on a positive psychological outcome. For Hogue et al. (2013), the positive psychology outcomes were enjoyment and excitement. Hogue et al. (2019) followed a similar format but measured feelings of pride, interest, and excitement. The variables of interest to Dewar et al. (2013) were happiness and excitement. The positive outcome associated with the Brown and Fry (2015) study focused on members' positive behaviors, in that, after seeing others promote positive behavior, one might promote similar positive behaviors.

To relate the findings of this study to the framework of SDT, the predictor variable used in each study—motivational climate—was positively related to at least one psychological variable. These findings provide evidence that the structured learning environment used to influence engagement that Nicholls (1989) and Ames (1992) proposed is indeed impactful on learning. The SDT is then found to be a useful theory when examining physical activity research regarding understanding and potentially predicting human behavior in the physical activity context.

Each of the analyzed studies was conducted using a pretest-posttest method, with generally a short time span between the initial test, the introduction of the treatment, and the posttest. Because of the cross-sectional nature of the studies, it is difficult to determine whether any of these findings relate to previous research, such as that by Bray and Born (2004) and Kimball et al. (2009), which determined that the first year of college had a negative impact on the frequency of physical activity engagement. A one-time measurement of the relationship between psychological variables and the structured environment that Nicholls (1989) posited to

be important to influence engagement does not provide enough evidence that the treatment would be influential toward future engagement in physical activity.

In previous research (Erdvik et al., 2014; Hirsch & Wong, 2005; Mitchell, 1996; Ntoumanis & Biddle, 1999; Ntoumanis & Standage, 2009), the setting was K–15 after-school and community programs to assess the links between setting and physical activity engagement. However, in the current study, new evidence is reported to suggest that the college environment is a valid and needed setting to study physical activity, as well. The literature related to the connection between age and its effects on physical activity is also of interest in this study. People generally decrease physical activity levels as they age (Sallis, 2000); however, Barnekow-Bergkvist et al. (1996), Dennison et al. (1988), and Yang et al. (1999) promoted the idea that physical activity levels in older adults were greatly influenced by their physical activity levels as a youth. By combining the results of age-related studies, it is noticeable that time plays an important part in an individual's level of physical activity. Therefore, future research should consider longer interventions, including the difficult lifelong longitudinal method of research, to determine whether physical activity levels of youth actually influence physical activity levels as one ages.

In each of these studies, the caring/task-involving climate was significantly different in terms of positively influencing the above outcomes when compared to the ego-involving climates. While it is not prudent to generate an overall effect score from these studies, inferences can be made. Each of the studies reported a positive relationship between the caring/task climate and psychological variables. This provides some evidence similar to that in the Raedeke (2007) study, which reported a positive relationship between positive affect and enjoyment when exercising. The relationships studied on each of the psychological variables provided evidence

that physical activity, when performed in a positive climate, can provide some positive individual benefits, especially health benefits suggested by prior studies (Duda, 1991; Goetzel et al., 2007) but if sufficient physical activity is not obtained, the modified health risk factors become more likely (Hamilton et al., 2008; Levine et al., 2000; Owen et al., 2009; Owen et al., 2000; Pate et al., 2004).

Research on factors that influence physical activity (Bray & Born, 2004; Jung et al., 2008; Kwan et al., 2012; Pullman et al., 2009) cannot be addressed by the results of this study. Again, cross-sectional studies are limited in their inferences about continued engagement of an activity due to their temporal aspects and their capacity to capture effects only in a moment in time. While factors addressed in studies consider the part that gender plays affecting physical activity (Berkey et al., 2003; Corder et al., 2015; Pate et al., 2004), cross-sectional studies can only comment on the level of physical activity at the time of testing. So, if females are less physically active generally, as well as more likely to become less physically active as they age, the current studies do not provide evidence that their interventions would promote lasting change.

The results of the experiments may lead educators and practitioners to incorporate task involving and caring methods into their best practices for youth development and educational programming. Part of this dissertation discussed the compounding nature of positive developmental programming throughout the life span. If positive developmental programming can occur with physical activity education, then compounding the effects may be one answer to how to get more people, both youth and adults, to achieve and sustain appropriate levels of physical activity throughout life.

References, Study 1

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1922/CDH_2120VandenBroucke08

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(3), 261–271. https://doi.org/10.1037/0022-0663.84.3.261

Bandura, A. (1986). *Social foundations of thought and action.* Prentice-Hall.

Barnekow-Bergkvist, M., Hedberg, G., Janlert, U., & Jansson, E. (1996). Physical activity pattern in men and women at the ages of 16 and 34 and development of physical activity from adolescence to adulthood. *Scandinavian Journal of Medicine & Science in Sports, 6*(6), 359–370. https://doi.org/10.1111/j.1600-0838.1996.tb00108.x

Belur, J., Tompson, L., Thornton, A., & Simon, M. (2018). Interrater reliability in systematic review methodology: exploring variation in coder decision-making. *Sociological Methods & Research.* https://doi.org/10.1177/0049124118799372

Berkey, C. S., Rockett, H. R. H., Gillman, M. W., & Colditz, G. A. (2003). One-year changes in activity and in inactivity among 10- to 15-year-old boys and girls: Relationship to change in body mass index. *Pediatrics, 111*(4), 836–843. https://doi.org/10.1542/peds.111.4.836

Bray, S. R., & Born, H. A. (2004). Transition to university and vigorous physical activity: Implications for health and psychological well-being. *Journal of American College Health*, *52*(4), 181–188. https://doi.org/10.3200/JACH.52.4.181-188

Brown, T. C., & Fry, M. D. (2015). Effects of an intervention with a university recreation center staff to foster a caring, task-involving climate. *Journal of Clinical Sport Psychology, 9*(1), 41-58. https://doi.org/10.1123/jcsp.2014-0007

Centers for Disease Control and Prevention. (2018). *Trends in meeting the 2008 physical activity guidelines, 2008–2017.* https://www.cdc.gov/physicalactivity/downloads/trends-in-the-prevalence-of-physical-activity-508.pdf

Chalmers, I., Hedges, L. V., & Cooper, H. (2002). A brief history of research synthesis. *Evaluation & the Health Professions, 25*(1), 12-37. https://doi.org/10.1177%2F0163278702025001003

Charrois, T. L. (2015). Systematic reviews: What do you need to know to get started? *Canadian Journal of Hospital Pharmacy*, *68*(2), 144. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4414076/

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*(1), 37-46. https://doi.org/10.1177%2F001316446002000104

Cohen, J. (1968). Weighted kappa: Nominal scale agreement provision for scaled disagreement or partial credit. *Psychological Bulletin, 70*(4), 213–220. https://doi.org/10.1037/h0026256

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.) Erlbaum.

Corder, K., Sharp, S. J., Atkin, A. J., Griffin, S. J., Jones, A. P., Ekelund, U., & van Sluijs, E. M. F. (2015). Change in objectively measured physical activity during the transition to adolescence. *British Journal of Sports Medicine, 49*(11), 730–736. https://doi.org/10.1136/bjsports-2013-093190

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer

Dennison, B. A., Straus, J. H., Mellits, E. D., & Charney, E. (1988). Childhood physical fitness tests: Predictor of adult physical activity levels. *Pediatrics, 82*(3), 324–330. PMID:3405661

Dewar, A. J., Kavussanu, M., & Ring, C. (2013). The effects of achievement goals on emotions and performance in a competitive agility task. *Sport, Exercise, and Performance Psychology, 2*(4), 250–264. https://doi.org/10.1037/a0032291

Duda, J. L. (1991). Motivating older adults for physical activity: It's never too late. *Journal of Physical Education, Recreation & Dance, 62*(7), 44–48. https://doi.org/10.1080/07303084.1991.10604001

Erdvik, I. B., Øverby, N. C., & Haugen, T. (2014). Students' self-determined motivation in physical education and intention to be physically active after graduation: The role of perceived competence and identity. *Journal of Physical Education and Sport*, *14*(2), 232–241. https://doi.org/10.7752/jpes.2014.02035

Foster, M. J., & Jewell, S. T. (2017). *Assembling the PIECES of a systematic review: A guide for librarians*. Rowman & Littlefield.

Freud, S. (1949). *A general introduction to psych-analysis*. Perma Giants.

Goetzel, R. Z., Reynolds, K., Breslow, L., Roper, W. L., Shechter, D., Stapleton, D. C., Lapin, P. J., & McGinnis, J. M. (2007). Health promotion in later life: It's never too late. *American Journal of Health Promotion, 21*(4), 1–8. https://doi.org/10.4278/0890-1171-21.4.tahp-1

Hamilton, M. T., Healy, G. N., Dunstan, D. W., Zderic, T. W., & Owen, N. (2008). Too little exercise and too much sitting: Inactivity physiology and the need for new recommendations on sedentary behavior. *Current Cardiovascular Risk Reports, 2*(4), 292–298. https://doi.org/10.1007/s12170-008-0054-8

Hirsch, B. J., & Wong, V. (2005). After-school programs. In D. L. DuBois & M. J. Karcher (Eds.), *Handbook of youth mentoring* (pp. 364–375). Sage.

Hogue, C. M., Fry, M. D., & Fry, A. C. (2019). The protective impact of learning to juggle in a caring, task-involving climate versus an ego-involving climate on participants' inflammation, cortisol, and psychological responses. *International Journal of Sport and Exercise Psychology*, 1-18. https://doi.org/10.1080/1612197X.2019.1696868

Hogue, C. M., Fry, M. D., Fry, A. C., & Pressman, S. D. (2013). The influence of a motivational climate intervention on participants' salivary cortisol and psychological responses. *Journal of Sport and Exercise Psychology, 35*(1), 85-97. https://doi.org/10.1123/jsep.35.1.85

Jung, M. E., Bray, S. R., & Ginis, K. A. M. (2008). Behavior change and the Freshman 15: Tracking physical activity and dietary patterns in 1st-year university women. *Journal of American College Health*, *56*(5), 523–530. https://doi.org/10.3200/JACH.56.5.523-530

Kimball, J., Jenkins, J., & Wallhead, T. (2009). Influence of high school physical education on university students' physical activity. *European Physical Education Review*, *15*(2), 249–267. https://doi.org/10.1177/1356336X09345226

Knuth, A. G., & Hallal, P. C. (2009). Temporal trends in physical activity: Asystematic review. *Journal of Physical Activity and Health*, *6*(5), 548–559. https://doi.org/10.1123/jpah.6.5.548

Kwan, M. Y., Cairney, J., Faulkner, G. E., & Pullenayegum, E. E. (2012). Physical activity and other health-risk behaviors during the transition into early adulthood: A longitudinal cohort study. *American Journal of Preventive Medicine, 42*(1), 14–20. https://doi.org/10.1016/j.amepre.2011.08.026

Lee, D. Y., Kim, E., & Choi, M. H. (2015). Technical and clinical aspects of cortisol as a biochemical marker of chronic stress. *BMB Reports, 48*(4), 209–216. https://doi.org/10.5483/bmbrep.2015.48.4.275

Levine, J. A., Schleusner, S. J., & Jensen, M. D. (2000). Energy expenditure of nonexercise activity. *American Journal of Clinical Nutrition, 72*(6), 1451–1454. https://doi.org/10.1093/ajcn/72.6.1451

McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica, 22*(3), 276–282. PMID:23092060

Mitchell, S. A. (1996). Relationships between perceived learning environment and intrinsic motivation in middle school physical education. *Journal of Teaching in Physical Education*, *15*(3), 369–383. https://doi.org/10.1123/jtpe.15.3.369

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Group, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Physical Therapy*, *89*(9), 873–880. https://doi.org/10.1371/journal.pmed.1000097

Munn, Z., Peters, M. D., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, *18*(1), 1-7. https://www.researchgate.net/deref/https%3A%2F%2Fbmcmedresmethodol.biomedcentral.com%2Farticles%2F10.1186%2Fs12874-018-0611-x

Munn, Z., Stern, C., Aromataris, E., Lockwood, C., & Jordan, Z. (2018). What kind of systematic review should I conduct? A proposed typology and guidance for systematic reviewers in the medical and health sciences. *BMC Medical Research Methodology,* 18(1), Article 5.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*(3), 328–346. https://doi.org/10.1037/0033-295X.91.3.328

Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Harvard University Press.

Ntoumanis, N., & Biddle, S. J. H. (1999). A review of motivational climate in physical activity. *Journal of Sports Sciences*, *17*(8), 643–665. https://doi.org/10.1080/026404199365678

Ntoumanis, N., & Standage, M. (2009). Motivation in physical education classes: A self-determination theory perspective. *Theory and Research in Education*, *7*(2), 194–202. https://doi.org/10.1177/1477878509104324

Owen, N., Bauman, A., & Brown, W. (2009). Too much sitting: A novel and important predictor of chronic disease risk? *British Journal of Sports Medicine, 43*(2), 81-83. http://dx.doi.org/10.1136/bjsm.2008.055269

Owen, N., Leslie, E., Salmon, J., & Fotheringham, M. J. (2000). Environmental determinants of physical activity and sedentary behavior. *Exercise Sport Science Reviews, 28*(4), 153-158. PMID:11064848

Pate, R. R., O'neill, J. R., & Lobelo, F. (2008). The evolving definition of "sedentary." *Exercise and Sport Sciences Reviews*, *36*(4), 173–178. https://doi.org/10.1097/JES.0b013e3181877d1a

Pate, R. R., Pfeiffer, K. A., Trost, S. G., Ziegler, P., & Dowda, M. (2004). Physical activity among children attending preschools. *Pediatrics, 114*(5), 1258–1263. https://doi.org/10.1542/peds.2003-1088-L

Pullman, A. W., Masters, R. C., Zalot, L. C., Carde, L. E., Saraiva, M. M., Dam, Y. Y., Simmpson, J. A. R, & Duncan, A. M. (2009). Effect of the transition from high school to university on anthropometric and lifestyle variables in males. *Applied Physiology, Nutrition, and Metabolism, 34*(2), 162–171. https://doi.org/10.1139/H09-007

Raedeke, T. D. (2007). The relationship between enjoyment and affective responses to exercise. *Journal of Applied Sport Psychology, 19*(1), 105-115. https://doi.org/10.1080/10413200601113638

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness.* Guilford.

Saldaña, J. (2015). *The coding manual for qualitative researchers* (3rd ed.). Sage.

Sallis, J. F. (2000). Age-related decline in physical activity: A synthesis of human and animal studies. *Medicine and Science in Sports and Exercise, 32*(9), 1598–1600. https://doi.org/10.1097/00005768-200009000-00012

Smith, M., Hosking, J., Woodward, A., Witten, K., MacMillan, A., Field, A., Baas, P., & Mackie, H. (2017). Systematic literature review of built environment effects on physical activity and active transport–an update and new findings on health equity. *International Journal of Behavioral Nutrition and Physical Activity*, *14*(1), 1-27. https://doi.org/10.1186/s12966-017-0613-9

Stoll, C. R., Izadi, S., Fowler, S., Green, P., Suls, J., & Colditz, G. A. (2019). The value of a second reviewer for study selection in systematic reviews. *Research Synthesis Methods*, *10*(4), 539-545. https://pubmed.ncbi.nlm.nih.gov/31272125/

Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, *75*(3), 411–433. https://doi.org/10.1348/000709904X22359

Telama, R., Yang, X., Viikari, J., Välimäki, I., Wanne, O., & Raitakari, O. (2005). Physical activity from childhood to adulthood: a 21-year tracking study. *American Journal of Preventive Medicine*, *28*(3), 267–273. https://doi.org/10.1016/j.amepre.2004.12.003

Yang, X., Telama, R., Leino, M., & Viikari, J. (1999). Factors explaining the physical activity of young adults: the importance of early socialization. *Scandinavian Journal of Medicine & Science in Sports, 9*(2), 120–127. https://doi.org/10.1111/j.1600-0838.1999.tb00220.x

CHAPTER IV

STUDY 2: EXAMINING THE CONSTRUCT AND PREDICTIVE VALIDITY OF AN ENGLISH LANGUAGE TRANSLATED VERSION OF THE BASIC PSYCHOLOGICAL NEEDS-PHYSICAL EDUCATION SCALE FOR USE IN A UNIVERSITY PHYSICAL ACTIVITY COURSE

This study was designed to determine whether a specific survey instrument, in questionnaire format, can capture psychological responses related to the basic psychological needs of autonomy, competency, and relatedness. The research aim for Study 2 is to examine the construct validity of the Basic Psychological Needs-Physical Education (BPN-PE) instrument.

Psychometric Theory

With any attempt to examine the construct and predictive validity of a measurement instrument, understanding the basis for psychometric (test) theory is necessary. Psychometric theory is an undertaking of a mathematical approach to use quantitative responses on a test to provide insight about a desired attribute (McDonald, 1999). A common approach, applied in this study, is to use ordered-category items (McDonald, 1999) to obtain a combined mathematical score for the underlying attribute. This attribute can also be called a construct. However, when testing, the chance for measurement error is possible; in fact, the chance for error is considerable higher in the social and behavior sciences than in the natural sciences (Raykov & Marcoulides, 2011). As a way to improve measurement and to reduce error, Spearman initially proposed the idea that would later become classical test theory (McDonald, 1999). Classical test theory is a simplistic equation that, for any given test score, is composed of both a “true score” and “error” (Raykov & Marcoulides, 2011), $X = T + E$. However, there is a problem with this equation in

social and behavior studies. In social sciences, the “true score” is unattainable in a quantitative manner. It is impossible to get the true score each time a test is given due to random chance and error. Therefore, the “true score” is an equivalent upon which inferences can be made when the given score and the error are added into the equation. In this study, latent constructs of autonomy, competency, and relatedness were created from each set of four observed items in the BPN-PE instrument. With the aggregate scores from these items, statistical techniques such as regression and confirmatory factor analysis could be applied to provide quantitative scores to make inferences about relationships. The methods section provides details of how these techniques were applied in an effort to address the research question.

Types of Data Collection in Physical Activity Research Studies

Experimentation consists of treatment that is given to a study participant and measurement of outcomes in a post-treatment review. Physical activity studies often use the human body as the prime source for testing treatments. This is a common approach in the field of kinesiology, or the study of the art and science of human movement (Oglesby et al., 2017). In kinesiology, direct measurements of bodily movement or energy expenditure are important in understanding a person’s activity level. For example, to ensure precise measurement of activity, researchers can use direct calorimetry to learn how much energy was expended in the form of heat during an activity (Kenny et al., 2017; Ndahimana & Kim, 2017). Other examples of direct measurement methods include the use of motion detection devices, sometime called accelerometers (Qi et al., 2015), and doubly labeled water (Campbell et al., 2016; Chomistek et al., 2017; Westerterp, 2017). Doubly labeled water experiments use water from which hydrogen and oxygen have been removed and to which traceable elements have been added (Schoeller &

van Santen, 1982). This allows the researcher to measure the depletion of traceable elements through physical activity for a precise measure of metabolic rates.

Surveys and Questionnaires

Another useful methodology in physical activity studies is the use of surveys and questionnaires. Surveys and questionnaires are commonly referred to as producing self-reported data; they can focus on collecting behavioral, psychological, and physical information from a study participant. Researchers conduct data collection using methods that include asking study participants to answer a series of questions about a topic of interest. Surveying participants with questionnaires is an inexpensive, timely, and efficient way to obtain data from a large number of participants (MacLeod, 2018). Examples include a short instrument offering a Likert-type scale. The instrument can be administered in person, via telephone or computer, or in personal interviews. For example, Beaudoin et al. (2018) administered a questionnaire to evaluate 1,001 students' interests and satisfaction in instructional physical activity courses. In addition to quantitative data, surveys and questionnaires quite often provide open space that encourages responses to qualitative questions.

Observations

Observations can be passive or active. Passive observation involves observation of study participants in a natural setting (e.g., people in a park). Active observation occurs when study participants know that they are being observed, in either a natural setting or a contrived setting, such as students in a class counting the number of sit-ups performed in a defined amount of time. A very common passive observation instrument in the leisure and recreation field is the System for Observing Play and Recreation in Communities (SOPARC; McKenzie et al., 2006). SOPARC guides observational scans of park property to collect data on levels of physical

activity, including but not limited to demographic data (e.g., gender, activity type, estimated age).

Existing Resources

Sometimes called secondary data sources, existing sources are very useful in physical activity studies. Examples include annual, biannual, or 10-year reports from organizations such as the CDC, WHO, or the NCHA-II (Ridner et al., 2016). These sources provide data that are useful for assessment and research in an effort to understand the subject of physical activity. The sources, especially reports from the CDC and WHO, can be used to influence political policy in ways that affect great numbers of people. With information such as the number of youths who are not meeting physical activity guidelines from the USDHHS, researchers may determine reasons for low levels of compliance. Guthold et al. (2018) and Whitt-Glover et al. (2009) used existing data to form opinions on how disparities in age and gender were related to insufficient levels of physical activity.

Theory of Self-Determination: Overview

Deci and Ryan's (1985) SDT is based on the psychological needs of autonomy, relatedness, and competency. The theoretical foundation is centered on the contribution of these basic psychological needs in influencing motivation to act. Motivation to act is related to the source of the motivation, which is called the perceived locus of control, along a spectrum from amotivation to intrinsic motivation. Deci and Ryan posited that motivation can be identified at three levels: amotivation, external motivation, and internal motivation. The higher the met needs, the more the person is engaged in the activity.

Ryan and Deci (2000) concluded the best predictor of continued future engagement in an activity is the extent to which the motivation is primarily intrinsic in nature. An intrinsically

motivated activity offers feelings of autonomous control. Therefore, it would appear to be vital for physical activity educators or anyone who works in physical activity settings to focus on moving motivation from strictly extrinsic (e.g., fear of punishment) to more intrinsic (e.g., a rewarding style of learning). One way for educators, coaches, and program administrators to create an intrinsically rewarding learning environment is by meeting the basic psychological needs of participants, described by Deci and Ryan as autonomy, competency, and relatedness. Several survey instruments have been developed to measure the extent to which a learning environment, or motivational climate, is intrinsically motivating.

The original Perceived Motivational Climate in Sport instrument (Selfriz et al., 1992), is a 40-item, Likert-type scale instrument that evolved into the Abbreviated Perceived Motivational Climate in Exercise Questionnaire (Moore et al., 2015) a 17-item scale instrument. Other scales include the Learning and Performance Orientation in Physical Education Classes Questionnaire (LAPOPECQ; Papaioannou, 1994). However, much of the work related to the relationship of motivational climate to intrinsic motivation has centered on various evolutions of the Perceived Motivational Climate in Sport by Selfriz et al. (1992). For example, several studies (Goudas, 1998; Goudas & Biddle, 1994; Kavussanu & Roberts, 1996; Moore et al., 2015; Sproule et al., 2007) included either the original or the evolved version of this scale. Next is the review and assessment of one such instrument, the Basic Psychological Needs in Physical Education Scale (BPN-PES).

Development of the BPN-PES

The BPN-NES is the original scale used by Vlachopoulos and Michailidou (2006) to measure the extent to which students' psychological needs were fulfilled during engagement in exercise. However, the physical education school setting provides an environment that differs

from the environment for which the BPNES was originally developed. In many exercise settings, the participant may be able to choose from a variety of physical activity exercises or the context in which to perform them. In contrast, the student in the regulated school setting is less able to choose the activity (Vlachopoulos et al., 2011). However, the original BPNES provided justification in terms of validity and reliability as an instrument as it reported adequate psychometric properties of internal reliability with an acceptable factorial variability and internal reliability of α =.80 to .84, competence values between .80 and .86, and relatedness values between .88 and .92 (Vlachopoulos et al., 2011).

This distinction led to the current adaptation of the scale: the BPN-PE. The BPN-PE, developed by Vlachopoulos et al. (2011), is intended to assess the extent to which a student's psychological needs are met in a physical education setting. Using three sets of students (elementary, middle, and high school), the instruments provided nine acceptable alphas ranging from .84 to .92 (needs of autonomy, competency, and relatedness times levels of schools = nine alphas). Because of high internal consistency of both the original and the modified versions of the scale, the BPN-PE has been translated into languages worldwide. Heckmann (2013), Cagas and Chasandra (2014), Sánchez-Oliva et al. (2018), Santurio and Río (2018), and Huhtiniemi et al. (2019) validated that each language version of the BPN-PE (German, Filipino, English, Spanish, Finnish) demonstrated high internal consistency in addition to a clear three-factor structure comparable to that of the original BPNES by Vlachopoulos et al. (2011). Studies by Cid et al. (2016), Granero-Gallegos et al. (2019), and Trigueros et al. (2019) provided similar evidence that the study of basic psychological needs is a valued tool in understanding and potentially predicting how the school environment can positively influence physical activity. Still more studies, while they did not use the BPN-PE specifically, addressed the topic of basic

psychological needs in the physical education environment and provided evidence of the strong predictive relationship between basic psychological needs and physical activity or positive views of physical activity (Erturan-İlker, 2018; Franco & Coterón, 2017; Leo et al., 2020; van Aart et al., 2017).

The BPN-PE was originally developed in the Greek language. As an element of many scientific studies that may be published and compared in more than one language, the use of translation and back translation is a common practice. Translation is the one-way transfer of content from one language to another. Back translation is the process of returning content back to the original language as a way to check for context and understanding. Back translation allows for independent review of material in an attempt to increase rigor in the methods. However, this study did not complete a translation because the instrument had already been translated to English. The first English language use of BPN-PE was conducted by Sánchez-Oliva et al. (2018) in study that was similar in design to previous BPN-PE experiments, focusing on K–12 students.

The purpose of the current study was to measure validation and reliability standards of the BPN-PE with a study population of English-language college students. The modified scale—labeled BPN-PE–comprises 12 items using a Likert-type scale and divided into three subscales—autonomy, competence, and relatedness—with four items per subscale. Due to the lack of reliability and validity evidence in the English language, as well as its lack of use with a different study population, a confirmatory factor analysis of the scale was needed to determine its validity and reliability of use.

Research Question

The current study was designed to determine whether the BPN-PE scale, in English language format, is a tool that collects valid and reliable information related to the study population. The following research question was proposed: In examining the psychological needs constructs of autonomy, competency, and relatedness, does the BPN-PE measure contain construct, as well as the ability to collect reliable data about the latent constructs?

Methods

Participants

Participants were 252 college students enrolled in at least one physical activity course at a southwestern university. Approval of the study design by the Texas A&M University Institutional Review Board was granted before the researcher contacted instructors of physical activity courses. Initially, recruitment of participants was to be delimited to those who were currently enrolled and present on class rosters of selected physical activity classes during the fall 2020 semester. However, due to global pandemic health concerns, face-to-face meetings to recruit study participants was not possible. Therefore, recruitment was expanded to include all currently enrolled students in any course at Texas A&M University whose email address was included in the university's mailing list. Emails were sent three times to addresses in this mailing list. The researcher also contacted student professional groups in college academic departments in an effort to locate students who were currently enrolled in a physical activity course or had been enrolled in the past.

Instrument

The BPNES is the original scale used by Vlachopoulos and Michailidou (2006) to measure the extent to which students' psychological needs were fulfilled during engagement in

exercise. The adaption of the BPNES, the BPN-PE, was used in the current study to measure the extent to which students' psychological needs were met during a physical education course. The BPN-PE was originally developed in the Greek language and only one study (Sánchez-Oliva et al., 2018) has been attempted to validate the scale in the English language (at the K–12 level). The BPN-PE contains 12 items, divided into three subscales—autonomy, competence, and relatedness—with four items in each subscale. A confirmatory factor analysis of the English language version of the BPN-PE is needed to measure its validity and reliability.

Reliability of the BPN-PE

To assess the reliability of the BPN-PE to collect representative data of the BPN constructs, internal consistency was needed to provide evidence of reliability. A very common way to measure internal consistency is to compute Cronbach's alpha when using a unidimensional scale (e.g., one construct, such as autonomy). In addition to Cronbach's alpha, composite reliability (CR) and the average variance extracted (AVE) from each variable are better ways to test for scale reliability (Peterson & Kim, 2013) . CR and AVE center on the variance from true score to observed score and the variance between them (Brunner & Süß, 2005). Each of the three tests was conducted to address the question concerning scale reliability and its ability to collect reliable data on a study population. Cronbach's alpha is a widely used test statistics and is often reported. However, Cronbach's alpha has become criticized due to issues of it being a lower bound and hence underestimating true reliability (Peterson & Kim, 2013). As a secondary test, composite reliability and AVE are then used to provide additional evidence of reliability of the BPN-PE.

Data Analysis

To address the research question about the usability of the BPN-PE instrument, several test were conducted. Descriptive statistics included frequencies of categorical descriptors of the study population, including age, race/ethnicity, gender, academic classification, and parental academic history. To test the measurement model of the instrument, confirmatory factor analysis was conducted to determine factor loadings of designated items on certain factors. Appropriate factor loading scores are calculated to then removed from analysis if they do not meet the .50 cutoff (Hair et al., 2019). Two approaches were taken to examine reliability of the BPN-PE instrument. Reliability was first tested for internal consistency by calculating Cronbach's alpha, followed by testing for composite reliability and the average variance extracted from each variable. Validity was tested by addressing convergent and discriminant validity.

Data analysis was conducted using two statistical programs: Statistical Package for the Social Sciences (SPSS) and Analysis of a Moment Structures (AMOS), version 27.0 of each. The study procedures required several statistical techniques in an attempt to understand the data and what the data represent. Descriptive statistics were gathered to produce an overview of the participants. Even though the BPN-PE was validated in previous studies, the samples were different from the sample in the current study.

A bivariate analysis of all items was conducted using Pearson's correlation coefficient. The higher the number is to 1 or .1, the stronger the relationship. The BPN-PE is composed of three factors: autonomy, competency, and relatedness. The autonomy factor is addressed in items B3, B6, B9, B12. The competency factor is addressed in items B1, B4, B7, B10. The relatedness factor is addressed in items B2, B5, B8, B11. Next, a confirmatory factor analysis is used first to

determine acceptability of the factor loadings on the latent constructs. Appropriate factor loading levels are generally considered at or above .50 (Hair et al., 2019).

The BPN-PE measures three factors: autonomy, competency, and relatedness. Confirmatory factor analysis (CFA) was conducted to measure the strength of association between the items and the respective latent variables. A measurement model of the CFA provides model fit information as evidence of how closely the model fits the data. Model fit indices are reported to address the appropriateness of the suggested model fit.

To test for reliability, Cronbach's alpha was calculated to measure internal consistency, seeking alphas of .70 or greater among the variables in a set of items (Cortina, 1993). Composite reliability and the average variance extracted from each variable were also used for testing reliability as they both are centered on the variance from true score to observed score and the variance between them (Brunner & Süß, 2005).

To test for the validity of the BPN-PE, convergent and discriminant validity tests were conducted. Convergent validity indicates the degree to which two measures capture a mutual construct (Carlson & Herman, 2010). Convergent validities as seen in Table 2, are similar to Cronbach's alpha uses a preferred cutoff above $r = 0.70$, and those correlations below $r = 0.50$ should be removed (Carlson & Herman, 2010).

Results

Participants

This section summarizes the descriptive statistics of the sample: age, race/ethnicity, gender, academic classification, and parental academic history. As appropriate, means, medians, modes, and standard deviations are reported. The age category item was open-ended, asking respondents to enter their age numerically. Ages ranged from 18 to 59 years (females 20.77 years

[*SD* = 3.50], males 22.21 years [*SD* = 5.33], no gender specified 20.25 years [*SD* = 2.63]). Regarding race/ethnicity, the largest category was White/Caucasian (171), followed by Hispanic or Latinx of any race (48), Asian Only (14), Black Only/2+ (5), N/A (5), two or more races excluding Black and Hispanic (5) and international (2). The race and ethnicity categories matched those ethnicity categories used by Texas A&M University on its student entry application.

The sample included 176 females, 61 males, and 4 students who did not specify. Undergraduate students were the majority of the sample (*n* = 241, 96%). Freshman classification was the largest category (*n* = 77), followed by junior (*n* = 59), senior (*n* = 53), and sophomore (*n* = 52); 2 respondents did not recall their classification at the time of completing the physical activity and 2 did not respond to the item. Seven graduate students responded. The sample included 23 (9%) first-generation students and 224 (89%) students who parents had attended college; 5 students (2%) did not respond to this item.

Correlation Matrix

Table 2 presents the mean score, standard deviation, and Pearson correlation for each of the 12 items of the BPN-PE scale. Mean scores ranged from 3.00 for Item B12 to 4.29 for Item B3. Pearson's correlations were significant for each item, ranging from 0.77 to 0.188.

Confirmatory Factor Analysis

The purpose of confirmatory factor analysis is to measure a theoretical model of a proposed relationship between variables. The fit indices evaluating the adequacy of the model were as follows: $\chi 2$ (49, N = 252) = 126.94, $p < .001$; $\chi 2/df = 2.591$; GFI = .92, CFI = .94, TLI = .92, IFI = .94, NFI = .91, RMSEA = .08 CI [.06, .10], $p < .001$. Figure 5 shows the relationship

Table 2

Mean, Standard Deviation, and Pearson's Correlations for Each Item of the Basic Psychological Needs-Physical Education Scale ($N = 252$)

Item	Mean	*SD*	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
B1	4.09	0.9	.368**	.357**	.561**	.249**	.303**	.528**	.267**	.257**	.490**	.263**	.229**
B2	4.18	0.9		.381**	.310**	.567**	.440**	.403**	.444**	.285**	.381**	.491**	.214**
B3	4.29	0.9			.260**	.300**	.264**	.283**	.296**	.188**	.258**	.297**	.242**
B4	3.63	1.0				.273**	.301**	.773**	.265**	.266**	.575**	.288**	.348**
B5	3.10	1.1					.395**	.324**	.620**	.399**	.362**	.655**	.310**
B6	4.07	0.9						.398**	.303**	.368**	.404**	.377**	.240**
B7	3.55	1.0							.368**	.375**	.672**	.366**	.359**
B8	3.37	1.1								.437**	.428**	.685**	.336**
B9	3.31	1.0									.446**	.473**	.453**
B10	3.70	1.0										.384**	.348**
B11	3.09	1.2											.454**
B12	3.00	1.1											

***p* < .001 (two-tailed).

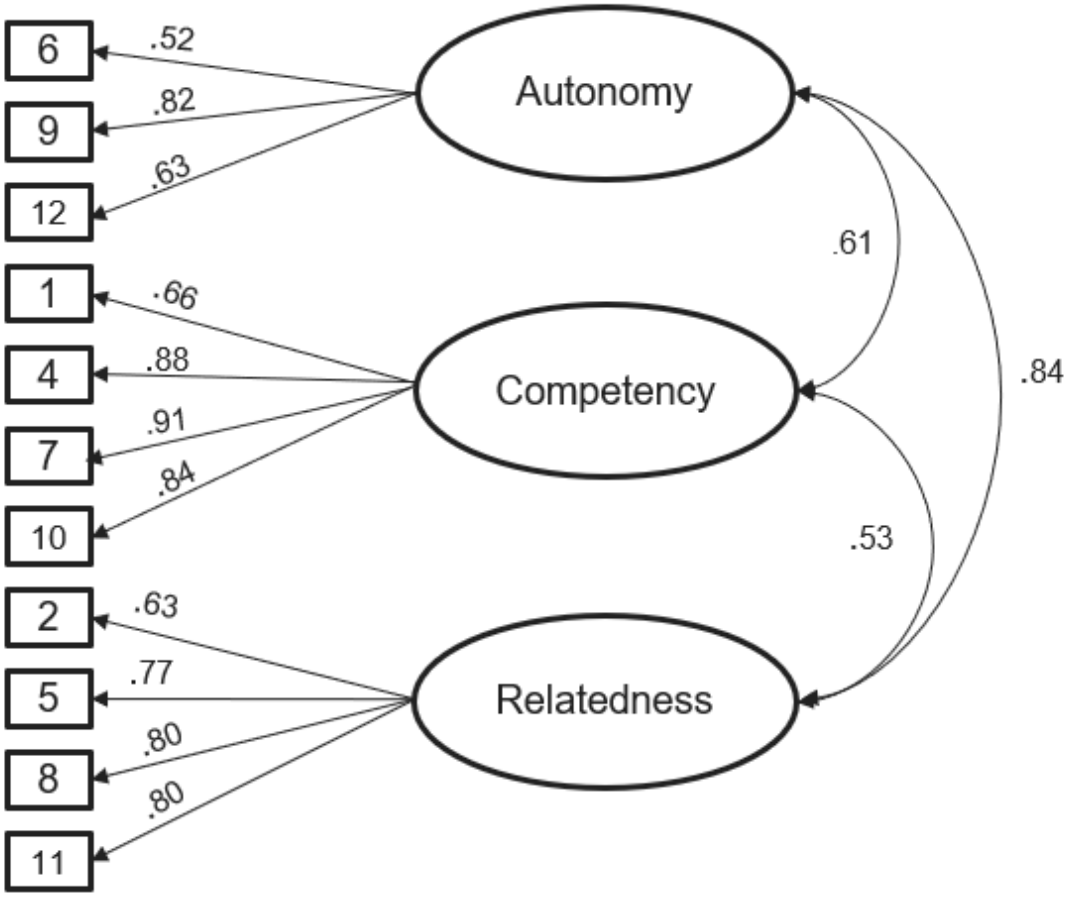
between the latent variables regressed on the items and the standardized regression weight for each item. One item, B3, did not meet the .050 factor loading cutoff suggested by Hair et al. (2019) and was removed from further analysis. After reviewing the model fit indices, two latent variable residuals were allowed to covary to approach a better model fit. Allowing the residuals to covary was chosen from a strictly mathematical approach to improving model fit.

Cronbach's alpha was reviewed to determine whether the BPN-PE met the level of acceptability of .70 or greater. The result was .90 for all 12 items, with subscale alphas of .70 for Autonomy, .89 for Competency, and .84 for Relatedness. However, caution is advised in drawing inferences, since the subscales contained only four items each. Composite reliability and

average variance extracted were calculated. Figure 5 presents the factor loadings. Table 3 presents the composite reliability and average variance extracted from each of the items on each latent factor. The range for composite reliability from the lowest to the highest was .70 to .92. For AVE, the range from lowest to highest was .66 to .82.

Figure 5

Confirmatory Factor Analysis of the Results for the Basic Psychological Needs-Physical Education Scale



Note. Ellipses represent latent factors, rectangles represent measured items.

Table 3

Composite Reliability and Average Variance Extracted

Constructs and Indicators	Factor Loadings	*t*-statistic	Composite Reliability	AVE
Autonomy			0.7	0.66
I feel that the way PE is taught is the way I would like to	0.52	n/a		
I feel that the way classes are taught is a true expression of who I am	0.82	8.82		
I feel like the activities we are doing have been chosen by me	0.63	6.716		
Competency			0.92	0.82
I feel that I improve even in the tasks considered difficult by most of the students	0.66	11.086		
I feel I perform correctly even the tasks considered difficult by most of the students	0.88	16.913		
I feel I do very well even in the tasks considered difficult by most of the students	0.91	17.648		
I am able to succeed even in the lessons considered difficult by most of the students	0.84	n/a		
Relatedness			0.87	0.75
I feel that I improve even in the tasks considered difficult by most of the students	0.63	9.328		
I feel like I have a close bond with my classmates	0.77	11.28		
I feel like a valued member of a group of close friends	0.80	14.157		
I feel like I belong to a large group of close friends	0.80	n/a		

Note: AVE = average variance extracted; BPN-PE Scale: 1 = *Strongly Disagree* to 5 = *Strongly Agree*. n/a = In AMOS, one loading has to be fixed to 1; hence, *t*-value cannot be calculated for this item.

After achieving appropriate model fit from the measurement model, reliability and validity were assessed due to the importance of the generalizability of social science research to larger populations. Validity was assessed using both convergent and discriminant validity.

Convergent validity is assessed by examining the relationships between the observed items and the underlying latent construct. The factor loadings for each of the observed items, the *t*-statistic, and the AVE are presented as evidence of convergent validity (Anderson & Gerbing, 1988). These results are presented in Table 3. All factor loadings were statistically significant, with loadings above .50 and with *t*-statistics ranging from 6.88 to 16.61.

Discriminant validity refers to the level of uniqueness between factors of a model. Each observed item should load on one factor only. Cambell and Fiske (1959) suggested the mulitrait-mulimethod technique as a way of accessing discriminant validity. This technique is performed by measuring the constructs in multiple ways. In this study, a comparison between the square root of AVE for each constructs was measured against the correlations of the latent factors. These findings are presented in Table 4.

Table 4

Correlations and Average Variance Extracted

	Mean	*SD*	Autonomy	Competency	Relatedness
Autonomy	3.89	0.69	**0.81**		
Competency	3.76	0.79	0.508**	**0.91**	
Relatedness	3.21	0.93	0.539**	0.451**	**0.87**

Note: The bold diagonal elements are the square root of each average variance extracted.
**p ,01 (2-tailed).

Discussion

The results support the BPN-PE as an acceptable measure to capture reliable data for the psychological constructs of autonomy, competency, and relatedness. Previous studies also provided justification that this measure is acceptable for the purposes of BPN data collection (Cagas & Chasandra, 2014; Cid et al., 2016; Granero-Gallegos et al., 2019; Heckmann, 2013; Huhtiniemi et al., 2019; Sánchez-Oliva et al., 2019; Santurio & Río, 2018; Trigueros et al., 2019; Vlacholpoulos et al., 2011). The quantifiable degrees of relationships examined in this study support the ideas of classical test theory. Because a true score is unattainable, the observed and potential error are combined and inferences can be made (McDonald, 1999). In statistical tests,

such as regression and factor analysis, the closer the number is to +1 or -1, the stronger the relationship. Because this is highly unlikely, some of the difference between the score includes the error or disturbance, as presented in classical test theory.

The descriptive information about study populations indicated a mean age of 20.77 years for females, 22.21 years for males, and 20.25 years for participants who did not provide gender information. The close proximity of ages results in a homogeneous study population according to age. The remaining descriptive information indicated skewed and heterogeneous groups. Race and ethnicity of study participants were predominantly White; combined participants of color made up 32% of the sample. More participants were female. The academic classification of participants was led by freshman; other classifications were similar in frequency.

The correlation matrix and CFA indicate appropriateness, with all items significant and loading on their respective factors above cutoff values. One item was removed from the autonomy due to low factor loading, improving the model fit. Results of the model fit for college students are consistent with previous research on this scale as used with K–12 students in physical education classes.

The BPN-PE scale results indicated that all three factors achieved acceptability in terms of reliability and validity (Hair et al., 2015; Peterson & Kim, 2013) as shown in values of CR, AVE, and convergent and discriminant validity. The reliability and validity of the instrument were similar to those reported in other physical activity and sport studies (Cagas & Chasandra, 2014; Cid et al., 2016; Granero-Gallegos et al., 2019; Heckmann, 2013; Huhtiniemi et al., 2019; Sánchez-Oliva et al., 2019; Santurio & Río, 2018; Trigueros et al., 2019; Vlacholpoulos et al., 2011). Each of the three constructs of autonomy, competency, and relatedness met the generally accepted cutoff values of Cohen's alpha of .70. These results are aligned with those reported in

other studies, as many researchers have concluded that autonomy is a strong predictor of intrinsic motivation related to an activity (Conti, 2000; Griffin, 2016; Meng & Ma, 2015). Guay et al. (2001) suggested that autonomy and intrinsic motivation are strongly associated and that each may play a mediated role in a causal chain on an outcome variable. This suggests that further studies should be undertaken to determine whether autonomy or intrinsic motivation is the stronger predictor of the other. If the constructs are interchangeable, it will be difficult to determine which causes change first.

Conclusion

This study is the first to use this instrument with college students. Comparing the results of the current study with previous use of the instrument should engender confidence that the instrument collected reliable data about college students' basic psychological needs in physical education courses (Black & Deci, 2000; Williams et al., 1997). Therefore, using the BPN-PE scale in an English language format with college students seems to be in concurrence with previous studies (Cagas & Chasandra, 2014; Cid et al., 2016; Granero-Gallegos et al., 2019; Heckmann, 2013; Huhtiniemi et al., 2019; Sanchez-Oliva et al., 2019; Santurio & Río, 2018; Trigueros et al., 2019; Vlacholpoulos et al., 2011), even though the samples were of different ages. Future research on this topic could consider using the BPN-PE to measure effects of an intervention.

Future Research

The study sample size was too small for the demographic variables of age, gender, ethnicity, academic classification, or parental academic history to be considered as part of the evaluation of the BPN-PE measure. Therefore, future research would be valuable in understanding group differences as related to the measure in terms of invariance measurement.

This information could be beneficial in determining whether there are group differences and whether any of those differences could capture reliable data from this subpopulation. Because previous studies (Cagas & Chasandra, 2014; Heckmann, 2013; Huhtiniemi et al., 2019; Sánchez-Oliva et al., 2019; Santurio & Río, 2018) were conducted in various languages (German, Filipino, English, Spanish, Finnish), group differences in race and ethnicity might not be as strong as differences in age (Barnekow-Bergkvist et al., 1996; Sallis, 2000) or gender (Berkey et al., 2003; Corder et al., 2015; Pate et al., 2004), as each of these subpopulations has been shown to be influential to physical activity.

Limitations

The overrepresentation of some groups in the sample could limit generalizability of these findings in terms of how to influence future teaching of physical activity courses. For example, the sample consisted of 70% females; according to the NCES (2020), the national average is 56% females. The race/ethnicity distribution was similar to the national average (171 White/Caucasian, 81 other). The study did not consider how the demographic variables of age, gender, ethnicity, academic classification, or parental academic history were affected by participants' perceptions of basic psychological needs being met or thwarted in the college physical activity course. This information could be beneficial in determining whether there are group differences and whether any of those differences might capture reliable data from this subpopulation.

References, Study 2

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411. https://psycnet.apa.org/record/1989-14190-001

Barnekow-Bergkvist, M., Hedberg, G., Janlert, U., & Jansson, E. (1996). Physical activity pattern in men and women at the ages of 16 and 34 and development of physical activity from adolescence to adulthood. *Scandinavian Journal of Medicine & Science in Sports*, *6*(6), 359–370. https://doi.org/10.1111/j.1600-0838.1996.tb00108.x

Beaudoin, C., Parker, T., Tiemersma, K., & Lewis, C. (2018). Evaluating university physical activity courses from student and instructor perspectives. *Journal of Physical Education, Recreation & Dance, 89*(1), 7-11. https://doi.org/10.1080/07303084.2017.1390508

Berkey, C. S., Rockett, H. R. H., Gillman, M. W., & Colditz, G. A. (2003). One-year changes in activity and in inactivity among 10- to 15-year-old boys and girls: Relationship to change in body mass index. *Pediatrics*, *111*(4), 836–843. https://doi.org/10.1542/peds.111.4.836

Black, A. E., & Deci, E. L. (2000). The effects of instructor's autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education, 84*, 740-756. https://psycnet.apa.org/doi/10.1002/1098-237X(200011)84:6%3C740::AID-SCE4%3E3.0.CO;2-3

Brunner, M., & Süß, H.-M. (2005). Analyzing the reliability of multidimensional measures: An example from intelligence research. *Educational and Psychological Measurement, 65*(2), 227-240. https://doi.org/10.1177/0013164404268669

Cagas, J., & Chasandra, M. (2014). The Basic Psychological Needs in Physical Education Scale in Filipino: An exploratory factor analysis. *Philippine Journal of Psychology, 47*(1). https://www.pap.org.ph/philippine-journal-psychology-pjp

Campbell, N., Gaston, A., Gray, C., Rush, E., Maddison, R., & Prapavessis, H. (2016). The Short Questionnaire to Assess Health-Enhancing (SQUASH) physical activity in adolescents: A validation using doubly labeled water. *Journal of Physical Activity and Health, 13*(2), 154-158. https://doi.org/10.1123/jpah.2015-0031

Carlson, K. D., & Herdman, A. O. (2012). Understanding the impact of convergent validity on research results. *Organizational Research Methods*, *15*(1), 17-32. https://psycnet.apa.org/record/2011-30197-002

Chomistek, A. K., Yuan, C., Matthews, C. E., Troiano, R. P., Bowles, H. R., Rood, J., Barnett, J. B., Willett, W. C., Rimm, E. B., & Bassett, D. R, Jr.. (2017). Physical activity assessment with the ActiGraph GT3X and doubly labeled water. *Medicine and Science in Sports and Exercise, 49*(9), 1935-1944. https://doi.org/10.1249/MSS.0000000000001299

Cid, L., Lettnin, C., Stobäus, C., Monteiro, D., Davoglio, T., & Moutão, J. (2016). Cross-cultural validation of the Basic Psychological Needs in Physical Education Scale between Portugal and Brazil samples. *Spanish Journal of Psychology*, *19*(1), 1-10. https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1017%2Fsjp.2016.6

Conti, R. (2000). College goals: Do self-determined and carefully considered goals predict intrinsic motivation, academic performance, and adjustment during the first semester? *Social Psychology of Education*, *4*(2), 189-211.

Corder, K., Sharp, S. J., Atkin, A. J., Griffin, S. J., Jones, A. P., Ekelund, U., & van Sluijs, E. M. F. (2015). Change in objectively measured physical activity during the transition to adolescence. *British Journal of Sports Medicine*, *49*(11), 730–736. https://doi.org/10.1136/bjsports-2013-093190

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, *78*(1), 98-104. https://doi.org/10.1037/0021-9010.78.1.98

Deci, E. L., & Ryan, R. M. (1985). The General Causality Orientations Scale: Self-determination in personality. *Journal of Research in Personality*, *19*(2), 109-134. https://doi.org/10.1016/0092-6566(85)90023-6

Erturan-İlker, G., Yu, C., Alemdaroglu, U., & Köklü, Y. (2018). Basic psychological needs and self-determined motivation in physical education to predict health-related fitness level. *Journal of Sport and Health Research, 10*(1), 91-100.

Franco, E., & Coterón, J. (2017). The effects of a physical education intervention to support the satisfaction of basic psychological needs on the motivation and intentions to be physically active. *Journal of Human Kinetics*, *59*, 5-15. https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1515%2Fhukin-2017-0143

Goudas, M. (1998). Motivational climate and intrinsic motivation of young basketball players. *Perceptual and Motor Skills, 86*(1), 323-327. https://doi.org/10.2466/pms.1998.86.1.323

Goudas, M., & Biddle, S. (1994). Perceived motivational climate and intrinsic motivation in school physical education classes. *European Journal of Psychology of Education, 9(*3), 241-250. https://www.jstor.org/stable/23420249

Granero-Gallegos, A., Ruiz-Montero, P. J., Baena-Extremera, A., & Martínez-Molina, M. (2019). Effects of motivation, basic psychological needs, and teaching competence on disruptive behaviours in secondary school physical education students. *International Journal of Environmental Research and Public Health*, *16*(23), 4828. https://dx.doi.org/10.3390%2Fijerph16234828

Griffin, B. W. (2016). Perceived autonomy support, intrinsic motivation, and student ratings of instruction. *Studies in Educational Evaluation*, *51*, 116-125. https://doi.org/10.1016/j.stueduc.2016.10.007

Guay, F., Boggiano, A. K., & Vallerand, R. J. (2001). Autonomy support, intrinsic motivation, and perceived competence: Conceptual and empirical linkages. *Personality and Social Psychology Bulletin, 27*(6), 643-650. https://psycnet.apa.org/record/2001-06735-001

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: A pooled analysis of 358 population-based surveys with 1.9 million participants. *Lancet Global Health*, *6*(10), e1077-e1086. https://doi.org/10.1016/S2214-109X(18)30357-7

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Heckmann, P. (2013). *Adaptation and validation of the German version of the Basic Psychological Needs in Physical Education Scale*. (Master's thesis, University of Jyväskylä). https://jyx.jyu.fi/bitstream/handle/123456789/41468/URN:NBN:fi:jyu-201305161685.pdf?sequence=1

Huhtiniemi, M., Sääkslahti, A., Watt, A., & Jaakkola, T. (2019). Associations among basic psychological needs, motivation and enjoyment within Finnish physical education students. *Journal of Sports Science & Medicine, 18*(2), 239-247. PMID:31191093

IBM. (2020). *KMO and Bartlett's test*. https://www.ibm.com/support/knowledgecenter/SSLVMB_26.0.0/statistics_casestudies_project_ddita/spss/tutorials/fac_telco_kmo_01.html

Kavussanu, M., & Roberts, G. C. (1996). Motivation in physical activity contexts: The relationship of perceived motivational climate to intrinsic motivation and self-efficacy. *Journal of Sport and Exercise Psychology, 18*(3), 264-280. https://doi.org/10.1123/JSEP.18.3.264

Kenny, G. P., Notley, S. R., & Gagnon, D. (2017). Direct calorimetry: A brief historical review of its use in the study of human metabolism and thermoregulation. *European Journal of Applied Physiology, 117*(9), 1765-1785. https://doi.org/10.1007/s00421-017-3670-5

Lavrakas, P. (Ed.). (2008). *Encyclopedia of survey research methods* (1st ed.). Sage.

Leo, F. M., Mouratidis, A., Pulido, J. J., López-Gajardo, M. A., & Sánchez-Oliva, D. (2020). Perceived teachers' behavior and students' engagement in physical education: the mediating role of basic psychological needs and self-determined motivation. *Physical Education and Sport Pedagogy*, 1-18. https://doi.org/10.1080/17408989.2020.1850667

McDonald, R. P. (1999). *Test theory: A unified approach.* Erlbaum.

Macleod, M. R. (2018). The reproducibility opportunity. *Nature Human Behaviour, 2*(9), 616-617.

McKenzie, T. L., Cohen, D. A., Sehgal, A., Williamson, S., & Golinelli, D. (2006). System for Observing Play and Recreation in Communities (SOPARC): Reliability and feasibility measures. *Journal of Physical Activity and Health, 3*(S1), S208-S222. PMID:20976027

Meng, L., & Ma, Q. (2015). Live as we choose: The role of autonomy support in facilitating intrinsic motivation. *International Journal of Psychophysiology*, *98*(3), 441-447. https://doi.org/10.1016/j.ijpsycho.2015.08.009

Moore, E. W. G., Brown, T. C., & Fry, M. D. (2015). Psychometric properties of the abbreviated perceived motivational climate in exercise questionnaire. *Measurement in Physical Education and Exercise Science, 19*(4), 186-199. https://psycnet.apa.org/doi/10.1080/1091367X.2015.1072819

National Center for Education Statistics. (2020). *Undergraduate enrollment.* https://nces.ed.gov/programs/coe/indicator_cha.asp

Ndahimana, D., & Kim, E. K. (2017). Measurement methods for physical activity and energy expenditure: A review. *Clinical Nutrition Research, 6*(2), 68-80. https://doi.org/10.7762/cnr.2017.6.2.68

Oglesby, C. A., Henige, K., McLaughlin, D. W., & Stillwell, B. (2017). *Foundations of kinesiology*. Jones & Bartlett Learning.

Papaioannou, A. (1994). The development of a questionnaire measuring physical education classes' achievement orientations. *Research Quarterly for Exercise and Sport, 65*, 11-20. https://doi.org/10.1080/02701367.1994.10762203

Pate, R. R., Pfeiffer, K. A., Trost, S. G., Ziegler, P., & Dowda, M. (2004). Physical activity among children attending preschools. *Pediatrics*, *114*(5), 1258-1263. https://doi.org/10.1542/peds.2003-1088-L

Peterson, R. A., & Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. *Journal of Applied Psychology*, *98*(1), 194-198. https://psycnet.apa.org/doi/10.1037/a0030767

Qi, J., Yang, P., Fan, D., & Deng, Z. (2015, October). *A survey of physical activity monitoring and assessment using internet of things technology*. Paper presented at the 13th IEEE International Conference on Pervasive Intelligence and Computing. Liverpool, UK.

Raykov, T., & Marcoulides, G. A. (2012). *A first course in structural equation modeling*. Routledge.

Ridner, S. L., Newton, K. S., Staten, R. R., Crawford, T. N., & Hall, L. A. (2016). Predictors of well-being among college students. *Journal of American College Health, 64*(2), 116-124. https://doi.org/10.1080/07448481.2015.1085057

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54-67. https://doi.org/10.1006/ceps.1999.1020

Sánchez-Oliva, D., Kinnafick, F.-E., Smith, N., & Stenling, A. (2018). Assessing perceived need support and need satisfaction in physical education: Adaptation and validation with English students. *Measurement in Physical Education and Exercise Science*, *22*(4), 332-342. https://doi.org/10.1080/1091367X.2018.1461627

Santurio, J. M., & Río, J. F. (2018). Spanish version of the Scale of Basic Psychological Needs in Physical Education. *International Journal of Medicine and Sciences of Physical Activity and Sports, 18*(69), 119-133.

Schoeller, D. A., & van Santen, E. (1982). Measurement of energy expenditure in humans by doubly labelled water. *Journal of Applied Physiology, 53*(4), 955-959. https://doi.org/10.1152/jappl.1982.53.4.955

Selfriz, J. J., Duda, J. L., & Chi, L. (1992). The relationship of perceived motivational climate to intrinsic motivation and beliefs about success in basketball. *Journal of Sport and Exercise Psychology, 14*(4), 375-391.

Sproule, J., Wang, C. J., Morgan, K., McNeill, M., & McMorris, T. (2007). Effects of motivational climate in Singaporean physical education lessons on intrinsic motivation and physical activity intention. *Personality and Individual Differences, 43*(5), 1037-1049.

Trigueros, R., Mínguez, L. A., González-Bernal, J. J., Aguilar-Parra, J. M., Padilla, D., & Álvarez, J. F. (2019). Validation of the Satisfaction Scale of Basic Psychological Needs in Physical Education with the incorporation of the novelty in the Spanish context. *Sustainability*, *11*(22), 6250. https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.3390%2Fsu11226250

van Aart, I., Hartman, E., Elferink-Gemser, M., Mombarg, R., & Visscher, C. (2017). Relations among basic psychological needs, PE-motivation and fundamental movement skills in 9–12-year-old boys and girls in Physical Education. *Physical Education and Sport Pedagogy*, *22*(1), 15-34. https://psycnet.apa.org/doi/10.1080/17408989.2015.1112776

Vlachopoulos, S. P., Katartzi, E. S., & Kontou, M. G. (2011). The Basic Psychological Needs in Physical Education Scale. *Journal of Teaching in Physical Education, 30*(3), 263-280. https://doi.org/10.1123/jtpe.30.3.263

Vlachopoulos, S. P., & Michailidou, S. (2006). Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science, 10*(3), 179-201. https://doi.org/10.1207/s15327841mpee1003_4

Westerterp, K. R. (2017). Doubly labelled water assessment of energy expenditure: Principle, practice, and promise. *European Journal of Applied Physiology, 117*(7), 1277-1285. https://doi.org/10.1007/s00421-017-3641-x

Whitt-Glover, M. C., Taylor, W. C., Floyd, M. F., Yore, M. M., Yancey, A. K., & Matthews, C. E. (2009). Disparities in physical activity and sedentary behaviors among US children and adolescents: Prevalence, correlates, and intervention implications. *Journal of Public Health Policy*, *30*(1), S309-S334. https://doi.org/10.1057/jphp.2008.46

Williams, G. C., Saizow, R., Ross, L., & Deci, E. L. (1997). Motivation underlying career choice for internal medicine and surgery. *Social Science and Medicine, 45*(11)*,* 1705-1713. https://psycnet.apa.org/doi/10.1016/S0277-9536(97)00103-2

CHAPTER V

STUDY 3: MEDIATING THE RELATIONSHIP OF MOTIVATIONAL CLIMATE TO INTRINSIC MOTIVATION IN COLLEGIATE PHYSICAL ACTIVITY COURSES

Regardless of the clear link between regular physical activity and healthy lifestyles, PIA remains a valid health concern for many Americans. For adolescents of both genders in Grades 9–12, the data reports are not positive. Federal physical activity guidelines for adolescents have included reports that the number of youths meeting the guidelines decreased from 28.7% in 2011 to 26.1% in 2017 (HealthyPeople.gov, 2017). This means that as few as 1 in 5 American high school students are meeting the prescribed 60 minutes per day of moderate to vigorous physical activity (National Center for Chronic Disease Prevention and Health Promotion, 2018). For adults, data trends show that, from 2008 through 2017, the percentage of U.S. adults who met guidelines for light to moderate physical activity increased from 43.5% to 54.1%, for moderate to vigorous physical activity from 28.4% to 37.0%), and for aerobic and muscle strengthening physical activity from 18.2% to 24.3% (HealthyPeople.gov, 2017). Regardless of grouping, such as age or gender, physical activity can benefit everyone and should be promoted in all aspects of daily living. One who regularly engages in physical activity generally tends to be less prone to sedentary behaviors (Arena et al., 2017).

One way to keep people engaged in activities is to look at past experiences. Past positive experiences of high school students have been positively correlated to physical activity engagement during college years (Hildebrand & Johnson, 2001). Therefore, the concept of promoting positive experiences as a strategy to increase physical activity levels by college students in a motivational climate should be studied further. To do so, it is necessary to conduct a

rigorous investigation to determine whether educational elements may contribute to the motivational climate that motivates students to stay physically active.

The college student population might be receptive to changes in personal health behaviors. One factor that may prove to be beneficial in changing college students' behavior is the availability of recreational resources throughout the campus, as well as the opportunity to register for physical activity courses taught by physical activity faculty.

Literature Review

Youth Development in Physical Activity Settings

In the field of positive youth development, a subfield of positive psychology, a common theme in the literature is the concept of developmental thriving or thwarting. To clarify, human development is not a static state. People are either progressing in development or they are regressing, what Ryan and Deci (2017) called *active development*. It is important to investigate how motivational climate might contribute to creating a thriving environment. In terms of physical activity by college students, this could lead to fuller understanding of how to execute a physical activity learning environment to meet basic psychological needs, with the goal of increasing intrinsic motivation to completion of course tasks.

Within the physical activity realm of youth development, many of the interactions between nonparental adults and youth take place in interventions or community programs such as martial arts, dance, gymnastics, and sports. Caring youth-adult interactions (Council, 2002; Lerner et al., 2010; Zeldin et al., 2016), also called supportive youth-adult partnerships, are highly associated with mediated program quality in youth development settings. When caring adults are involved with youth in a direct way as part of an organized youth development program, developmental outcomes are highly possible. Ullrich-French et al. (2012) reported on

youth-adult social connections with low-income youth who were participating in a physical activity-based positive youth development program. They found that social competence, physical competence, physical self-worth, and global self-worth increased significantly during the program. These findings illustrate how intrapersonal views of self and others can be influenced by interactions between adults and youth. As a goal, all youth development programs, including those in physical activity settings, are enhanced when caring adults are partnered and engaged with youth. This is the premise of this study; understanding this association is vital to understanding how this partnership contributes to intrinsic motivation in physical activity tasks.

Fry and Hogue (2018) studied the psychological benefits accrued in a caring climate and determined that, when youth perceive a caring climate, they experience higher levels of fun, devote higher levels of effort, experience intrinsic motivation, have improved relationships with coaches, show better sportsperson-like values and behaviors, and have better psychological well-being. These findings are aligned with those of previous studies (Fraser-Thomas et al., 2005; Holt, 2016; Jones et al., 2011) on prosocial values and confidence/competence developed in coach-athlete interactions in a sport setting. Better understanding of motivational climates and their associations between psychological processes, including needs and motivation, is warranted.

Motivational climate is a psychological environment, created by a teacher or coach, in which activities such as lessons include instruction and feedback in an effort to motivate students toward a specific goal within a training session (Ames, 1992b). The instructor is responsible to facilitate a structured environment that creates and encourages engaging activities for students, with the purpose of learning a specific task. Considerable research related to this idea has been conducted to establish goal achievement settings and achievement goal theory (AGT; Ames,

1992a; Nicholls, 1984, 1989). AGT proposes that the perspective or goals of an individual in an achievement-focused setting is derived from inherent dispositional and situational factors (Dweck & Leggett, 1988; Nicholls, 1989). Along with individually set goals within the context, structured elements that are created and controlled by the teacher or coach will have an effect on which of these two perspectives is dominant in the mind of the individual (Dweck & Leggett, 1988). Hogue et al. (2018) concluded that the influence of structured elements, with additions to the concepts of positive relationships adoption and reward structure (i.e., task involved or ego involved) reliably predicted students' motivational answers. An example of student motivational answers included whether they had had a positive experience that ultimately promoted a continued interest in sport and physical activity (Braithwaite et al., 2011; Hogue et al., 2017; Hogue et al., 2018). With this information, educators and practitioners can adapt the learning environment to promote positive relationships among peers, as well as with the teacher, coach, or program administrator.

Various Nomenclature of Motivational Climates

It should be noted that, in social science publications related to AGT research, authors have used various terms that, when compared, are quite similar in capturing the essence of how structured learning environments influence motivation to engage and interact or even whether or not to engage in an activity (Kavussanu & Roberts, 1996; Solmon, 1996). A review of each of these terms and its conceptual definitions is presented.

Ames (1992a, 1992b), in using the term *motivational climate* to describe the structural elements in an educational environment, adopted the terms *mastery* and *performance* related to achievement. Ames described a mastery-focused environment as one in which "individuals are oriented toward developing new skills, trying to understand their work, improving their level of

competence, or achieving a sense of mastery based on self-referenced standards" (1992a, p. 162). In essence, in a focused environment, assessment of learning is clearly marked by changes within or by the individual. Examples include changes in learning between pretest and posttest. Mastery-focused environments might also be found in assessing changes in ability to perform a certain task after receiving instruction and time to practice. In contrast, performance goal environments are focused on ability and a self-view of abilities (Ames, 1992a), as evidenced by comparison to others. Achieving a goal in a performance environment can occur by surpassing established standards. Ames (1992a) placed importance on public recognition of a person's ability in comparison to that of peers. Ames's (1992a) last observation facet related to performance goal environments is that learning is viewed only to achieve a different desired goal.

Dweck and Leggett's (1988) approach to capturing the motivational environment included the terms *performance goals* and *learning goals*. These are similar in their attempts to explain how the environment affects behaviors and learning related to a participant as the treatment of the terms *performance* (performance) and *mastery* (learning) by Ames. Dweck and Leggett reported that "underlying personality variables can translate into dynamic motivational processes to produce major patterns of cognition, affect, and behavior" (1988, p. 271). In other words, a person's inherent tendencies are only one variable in how a person is motivated for a task.

The terms *task involvement* and *ego involvement* were defined as "related to the achievement motivation phenomenon within a psychological state, in the structured learning environment" (Nicholls, 1989, p. 212). One's perspective of the motivational climate has a direct effect on behavior. Nicholls noted that these terms are achievement based because the

"individuals' purpose is to develop or demonstrate high rather than low ability" (p. 212). For the purpose of this study, the terms *task* and *ego involvement* were chosen due to their relationship with Nicholls's definition, including levels of achievement, which can be either high or low. Because the focus of this study was to understand the relationship between motivational climate and intrinsic motivation, potentially mediated by the basic psychological needs of autonomy, competency, and relatedness, degrees of relationships are important.

Motivational Climates and Intrinsic Motivation

Detailed understanding of how *task* and *ego involvement* are used to describe structured learning is needed to determine how climate can affect student or participant motivation. Task involvement occurs when the focus by a participant is wholly on the task at hand (such as learning a new skill) for its own sake. Learning is the end result, not a path to something external to the task (Nicholls, 1984, 1989). Ego involvement, on the other hand, is wholly focused on external factors, such as a preoccupation (Nicholls, 1989) to show superiority over others. The difference between the two involvement states speaks to how preoccupation is influential in the desired goals in a certain task. For example, a task-oriented climate in physical activity might include students being asked to perform a sport skill as a class. A task-involved climate would involve a student who is more occupied with completing the task and looking for feedback related to his or her progress in learning, with a special emphasis on effort and improvement. However, in an ego-involved climate, student learning of the same skill in a group setting might be more focused on a goal to feel superior by accomplishing the task with relative ease and showing competence or performing the skill with hesitation due to not wanting to seem incompetent to others because of a climate that ranks students on normative criteria, such as time, frequency, or repetitions.

Hastie et al. (2013) conducted research on effects of autonomy-supportive climates (ASC) in a review of 27 studies in which it was concluded that those climates offered self-directed opportunities that led to increases in skill attainment, physical activity, and perceived competence. Findings showed that enjoyment and effort were positively related to a task-involving climate but that an ego-involving climate was not related to any of the intrinsic motivation factors. This knowledge could be useful in understanding how curriculum and assessment of physical activity are conducted.

Duda (1989) used the climate of high school sports to determine relationships between the two goal orientations of task involvement and ego involvement and outcomes of sport participation. Duda concluded that skill mastery and personal improvement (task-involved orientation) were positively related to the ideas of cooperation, enhancement of self-esteem, perseverance, and good citizenship. In contrast, an ego-involvement orientation positively predicted sports involvement would enhance social status. İlker and Hülya (2019) found that, when students received feedback from the teacher (knowledge of performance feedback scale), they saw tangible results from their performance. The perceived mastery climate positively predicted enjoyment, concentration, and intrinsic motivation. Rokka et al. (2019) used a dance intervention for middle school girls to study the relationship between motivational climate and intrinsic motivation and reported that "enjoyment and effort have a positive statistic relation with a task involving climate" (p. 649).

Motivational Climates and Basic Psychological Needs

The link between motivational climates and meeting basic psychological needs is highly relational. Bryan and Solmon (2007, 2012) promoted the idea that teachers and instructors should provide numerous options related to being physically active in the spirit of providing

autonomy. This follows the ideas that have been espoused by research within SDT (Ryan & Deci, 2000, 2017; Teixeira et al., 2012; Vallerand et al., 2008).

Alesi et al. (2019) reported that higher levels of basic psychological needs were associated with higher task-involving comates, while competitive climates (ego involving) were more likely to generate anxiety, reduce satisfaction, and decrease psychological well-being. Garcia-Gonzalez et al. (2019) also reported that task climates were positively associated with psychological needs satisfaction and that ego climates were positively related to psychological frustration. Cid et al., (2019) reported that satisfaction of basic psychological needs, especially competency, was influenced by the motivational climate.

Basic Psychological Needs and Intrinsic Motivation

Huhtiniemi et al. (2019) and Jaakkola et al. (2019) studied the relationships between enjoyment and the basic psychological needs of autonomy, competency, and relatedness. Both studies reported positive associations between each of the needs and enjoyment. Huhtiniemi et al. (2019) also reported direct associations between competency and enjoyment. Jaakkola et al. (2019) suggested that, meeting basic psychological needs not only promoted positive outcomes; when competency and relatedness met, they were negatively associated with anxiety. This suggests that students who felt competent and related to peers and teachers were less anxious about physical education.

Trigueros et al. (2019) studied how autonomy-supportive practices and self-determination motivation might be related to health-related lifestyles of eating habits and physical activity. The findings suggested that autonomy-supportive practices positively predicted both the satisfaction of psychological needs and perceived locus of control. Trigueros et al. (2019) reported that self-determined motivation positively predicted healthful eating habits and the practice of physical

activity and negatively predicted unhealthful eating habits. Each of these studies provides evidence that meeting the three psychological needs is vital for feelings of self-determinations but there may be differences in which need is more influential than the others. To add to the evidence, Deci and Ryan (2010) posited the idea that autonomy was one of the most importance social needs when trying to explain the process of motivation. While autonomy seems to be the larger factor in motivation findings, there is not enough evidence to say that one factor is more important to fulfilling psychological needs than competency and relatedness. As part of this study, direct effects were examined to determine whether differences between needs influenced intrinsic motivation.

Conceptual Model

The purpose of this study was to test a model of factors affecting intrinsic motivation for physical activity among college-age students. The study explored the relationships among basic psychological needs (autonomy, competency, and relatedness), motivational climate, and intrinsic motivation through a structural equation model (SEM; Figure 6).

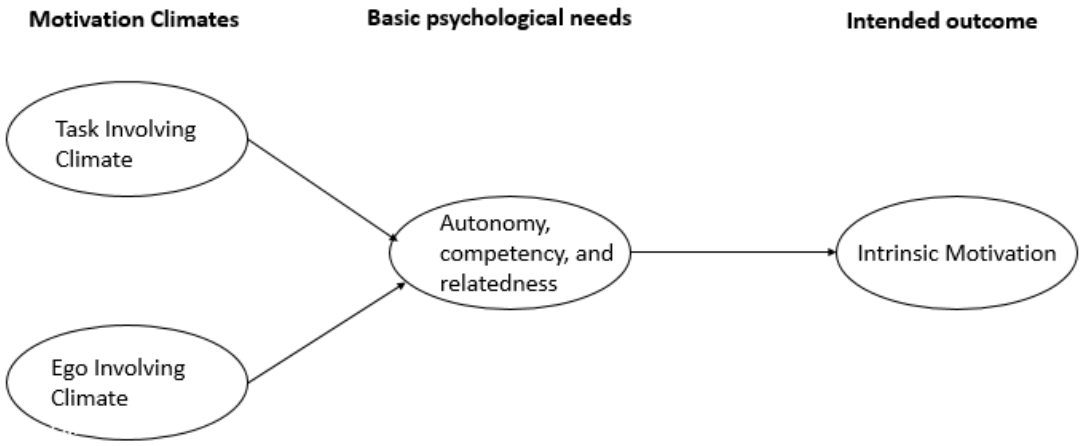
Research Questions

This study examined the following research questions regarding the relationship between task and ego motivational climates and intrinsic motivation, potentially mediated by the basic psychological needs of autonomy, competency, and relatedness, in a collegiate physical activity course.

1. Does the construct of autonomy mediate the relationship between perceived motivational climates and intrinsic motivation in the context of a collegiate physical activity course?

Figure 6

Conceptual Mediation Model Illustrating the Proposed Relationships Between Motivational Climates, the Three Basic Psychological Needs (Autonomy, Competency, and Relatedness), and Intrinsic Motivation Related to the Specific Physical Activity



2. Does the construct of competency mediate the relationship between perceived motivational climates and intrinsic motivation in the context of a collegiate physical activity course?

3. Does the construct of relatedness mediate the relationship between perceived motivational climates and intrinsic motivation in the context of a collegiate physical activity course?

Plan of Analysis

Mediation

Baron and Kenny (1986) proposed that four conditions or steps must occur before testing for mediation: (a) the predictor variable directly affects the outcome variable, (b) the predictor variable directly affects the mediator variable, (c) the mediator variable directly affects the outcome variable, and (d) for full mediation to occur, the relationship between predictor and outcome variable should become zero. Also, because full mediation is difficult, if not entirely

impossible, in the social sciences due to the high possibility of psychological variables correlating to some level, partial mediation is possible when all direct and indirect paths are significant (Baron & Kenny, 1986).

Therefore, mediation testing begins by testing the direct effects to determine whether the paths are significant. If so, then the indirect effects are tested to measure the level of mediation, either partially or full. For six factors (task involving, ego involving, autonomy, competency, relatedness, and intrinsic motivation), 11 indirect tests with 11 hypotheses are needed, followed by six indirect tests with six additional hypotheses, totaling 17 tests and 17 hypotheses for mediation analysis

Hypothesis

It was hypothesized in this study that the basic psychological needs of autonomy, competency, and relatedness would have a positive and direct influence on the relationship between motivational climates and intrinsic motivation, potentially mediating the relationship. Theoretically, the observed variable of gender may negatively moderate the strength of the relationship between task-involving and intrinsic motivation, while age, race, academic classification, and parental academic history may not moderate the relationship between task and intrinsic motivation.

Mediation Hypotheses

H1. A positive and direct relationship exists between task involving and intrinsic motivation.

H2. A negative and direct relationship exists between ego involving and intrinsic motivation.

H3. A positive and direct relationship exists between task involving and autonomy.

H4. A positive and direct relationship exists between task involving and competency.

H5. A positive and direct relationship exists between task involving and relatedness.

H6. A negative and direct relationship exists between ego involving and autonomy.

H7. A negative and direct relationship exists between ego involving and competency.

H8. A negative and direct relationship exists between ego involving and relatedness.

H9. A positive and direct relationship exists between autonomy and intrinsic motivation.

H10. A positive and direct relationship exists between competency and intrinsic motivation.

H11. A positive and direct relationship exists between relatedness and intrinsic motivation.

H12. A positive relationship between task-involving and intrinsic motivation is significantly mediated by autonomy.

H13. A negative relationship between ego-involving and intrinsic motivation is not significantly mediated by autonomy.

H14. A positive relationship between task-involving and intrinsic motivation is significantly mediated by competency.

H15. A negative relationship between ego-involving and intrinsic motivation is not significantly mediated by competency.

H16. A positive relationship between task-involving and intrinsic motivation is significantly mediated by relatedness.

H17. A negative relationship between ego-involving and intrinsic motivation is not significantly mediated by relatedness.

Methods

Participants

Participants were 252 college students enrolled in at least one physical activity course at a southwestern university. Institutional Review Board approval was received before contacting the instructors of physical activity courses. Initially, the recruitment of participants was to be limited to those who were currently enrolled and present on class rosters of selected physical activity classes during the fall 2020 semester. However, due to global pandemic health concerns, face-to-face meeting and recruiting of study participants was not possible. Because of the evolved recruiting strategy, it was determined that current students who might have had a physical activity course at some point in their collegiate careers would be acceptable, as well. Therefore, recruitment was expanded to include all currently enrolled students in any course at Texas A&M University whose email was listed in the university's global student mailing list. The researcher also contacted student professional groups in various academic departments in an effort to locate students who might be likely to have had a physical activity class in the past or were currently enrolled to meet academic major requirements. Three campus wide emails, direct emails from the researcher, and promotion by activity instructors were the final methods of recruitment.

Measures

The focus of this study was to understand how the basic psychological needs constructs of autonomy, competency, and relatedness were related to perceived motivational climate and intrinsic motivation. To address this relationship, a mediation study was used to determine whether the latent constructs of autonomy, competency, and relatedness mediated the previous relationship. Demographic questions and three survey instruments were administered: (a) an abbreviated version of the Perceived Motivational Climate in Exercise Questionnaire (PMCEQ-

A), (b) the BPN-PE, and (c) the Intrinsic Motivation Inventory. Each was used to collect data to measure the relationships and strength of associations among the constructs.

Instruments

The PMCEQ-A is a 12-question instrument with Likert-type response choices ranging from *strongly disagree* to *strongly agree*. The PMCEQ-A has demonstrated strong psychometric properties of internal reliability on a repeated basis in use with youth and college student populations (Breske et al., 2017; Hogue et al., 2018). This instrument is, as its name suggests, an abbreviated version of the original instrument, the Perceived Motivational Climate in Exercise Questionnaire, created by Huddleston et al. (2012); the original version contains 40 items. In the first study using the abbreviated format, Moore et al. (2015) involved a population similar to the one targeted in the current study: enrolled college students enrolled in a physical activity course. The PMCEQ-A has acceptable factorial variability and internal reliability, $\alpha = .77$ (Moore et al., 2015).

The Basic Psychological Needs in Exercise Scale (BPNES) is the original scale used by Vlachopoulos and Michailidou (2006) to assess the extent to which students' psychological needs were fulfilled during engagement in exercise. An updated version of this instrument was needed to study psychological needs in the physical education setting. This resulted in adaptation to devise the BPN-PE. The BPN-PE measures the extent to which a student's psychological needs are met during a physical education course. The BPN-PE, like its precursor, was originally developed in the Greek language. To date, only Sánchez-Oliva et al. (2018) has attempted to validate the scale in the English language. The BPN-PE consists of 12 items divided into three subscales to assess autonomy, competence, and relatedness. The items on the BPN-PE offer Likert-type responses choices, ranging from *strongly disagree* to *strongly agree.* Adequate

reliability and validity evidence have been provided for the original BPNES scale (Vlachopoulos, 2007, 2008; Vlachopoulos & Karavani, 2009; Vlachopoulos & Neikou, 2007); the adapted English version has yet to be validated.

The Intrinsic Motivation Inventory (IMI) is a multidimensional device designed to measure participants' personal experiences and emotional states related to a target activity. It has been used in several experiments related to intrinsic motivation and self-regulation (Deci et al., 1994; Plant & Ryan, 1985; Ryan, 1982; Ryan et al., 1983; Ryan et al., 1990; Ryan et al., 1991). The IMI is multifaceted in that its goal is to assess participants' (a) interest and enjoyment, (b) perceived competence, (c) effort, (d) value/usefulness, (e) felt pressure and tension, and (f) perceived choice while performing a given activity, forming six subscale scores. However, the overall measure was designed for the interest/enjoyment subscale to be considered a self-report measure of intrinsic motivation. The interest/enjoyment subscale is comprised of seven items with Likert-type response choices ranging from *not at all true* to *very true*. The subscale has recorded reliability to measure intrinsic motivation at $\alpha = .91$ (Ostrow & Heffernan, 2018). Recently, Ostrow and Heffernan (2018), Gottfried (2019), and Rokka et al. (2019) used the IMI in studies related to learning tasks, computational thinking, and effects of dance intervention among middle school girls.

Demographics

Demographic measures included age, race/ethnicity (White/Caucasian, Black/African American, Asian/Pacific Islander, Hispanic/Mexican/Latino, Multiracial, Biracial, don't know, and other), gender (male, female, trans, N/A), college classification (freshman, sophomore, junior, senior), and generational status (first-generation student or not). These demographic

parameters were chosen to match the application and student record data that the university uses for all prospective and current student reports.

Data Analysis

Data analysis was conducted using two statistical programs: Statistical Package for the Social Sciences (SPSS) and Analysis of a Moment Structures (AMOS), both version 27.0. This study's procedures required several statistical techniques in an attempt to understand the data and what they represent. Descriptive statistics were gathered and displayed for an overview of the study participants. SEM was used as the overall statistical technique but also included mediation of variables in an attempt to explain relationships between perceived motivational climate and intrinsic motivation. The next section explains the six steps used for analysis of the SEM.

For mediation to be present, four steps must occur (Baron & Kenny, 1986). First step is that the causal variable must be correlated with the outcome variable. Second, the causal variable must be correlated with the mediator variable. Third, the mediator variable must how a direct effect on the outcome variable. Fourth, a reduction of the direct effect on the X-Y path. For full mediation, the direct effect on the X-Y path would be zero, this is highly unlikely in the social sciences because psychological variables quite often correlate together (Field, 2013). Therefore, a series of direct effect test, indirect test, and total effects test were conducted to determine if some level of mediation was present between the variables of autonomy, competency, and relatedness. The following is a list of the series of test that were conducted.

First examined were the direct effects of task involving on autonomy, task involving on competency, and task involving on relatedness. Next examined were the direct effects of ego involving on autonomy, ego involving on competency, and ego involving on relatedness. Finally examined were the direct effects of task involving on intrinsic motivation, ego involving on

intrinsic motivation, autonomy on intrinsic motivation, competency on intrinsic motivation, and relatedness on intrinsic motivation. If the tests confirm that direct effects are present in the model, autonomy, competency, and relatedness can be examined as potential mediators between the motivational climate variables and intrinsic motivation. The next section explains the six steps used for analysis of a structural equation model.

Steps taken in SEM analysis included model specification, identification, model fit, model respecification, interpretation. Guided by the literature review, as well as theory, a model was created to visually represent the hypothesized relationships among variables. SEM is an umbrella term that can describe various statistical techniques, the crux of which is the use of a path analysis to study both measured and latent variables. To clarify, the technique of path analysis can be applied only to measurement between observed variables; the SEM can include latent variables. Next, models must be identified to determine whether the model in question contains enough observed data to estimate the parameters of the model (Curran, 2017). Models can be under identified, just identified, or overidentified (Kenny et al., 2017). Maximum likelihood is the default estimation for model fit for the SEM.

To evaluate the model fit, commonly reported fit indices were used. Model chi-square (χ^2), standardized chi-square (χ^2/df), goodness of fit indices (GFI), comparative fit index (CFI), Tucker Lewis Index (TLI), incremental fit index (IFI), normed fit index (NFI), and root mean square error of approximation (RMSEA) are reported with each model analysis. The next step is respecification. After initial analysis of model fit, the use of modification indices is considered for the purpose of increasing model fit. It is important to consider that these modification indices are strictly arithmetically suggested and should not be interpreted solely without theoretical justification. In the last step, the model is interpreted and conclusions may be drawn as to how

the model may influence future research and implementation in professional practice. Data interpretation is detailed in the discussion section. When the measurement model has reached an acceptable fit, then the structural model can be tested. Finally, the interpretation of the model is performed and results are presented. Conclusions may be drawn as to how the model may influence future research and implementation in professional practice. Data interpretation is discussed in detail in the discussion section.

Results

Participants

Descriptive statistics of the sample included age, race/ethnicity, gender, academic classification, and parental academic history (Table 5). As appropriate, means, medians, modes, and standard deviations are reported. The age category item was open ended, asking respondents to enter their age numerically. Ages ranged from 18 to 59 years (females 20.77 years [*SD* = 3.50], males 22.21 years [*SD* = 5.33], and no gender specified 20.25 years [*SD* = 2.63]). Regarding race/ethnicity, the largest category was White/Caucasian (171), followed by Hispanic or Latinx of any race (48), Asian Only (14), Black Only/2+ (5), N/A (5), two or more races excluding Black and Hispanic (5), and international (2). The race/ethnicity categories matched those used by Texas A&M University in its student entry application.

The sample included 176 females, 61 males, and 4 students who did not specify gender. Undergraduate students were the majority of the sample (*n* = 241, 96%). The freshman classification was the largest category (*n* = 77), followed by junior (*n* = 59), senior (*n* = 53), and sophomore (*n* = 52); 2 respondents did not recall their classification at the time of completing the physical activity and 2 did not respond to the item. Seven graduate students responded. The

Table 5

Descriptive Summary of Study Participants

Characteristic and Category		*n*	%
Gender	(*N* = 252)		
	Female	182	72.22
	Male	65	25.79
	Prefer not to Answer	5	1.98
Age	(*N* = 241, mean age = 21.12 years)		
	18-20	117	48.55
	21-23	104	43.15
	Above 23	20	8.30
	Prefer not to Answer	11	4.56
Race/Ethnicity (*N* = 252)			
	Asian Only	14	5.56
	Black Only / 2+	5	1.98
	Hispanic or Latinx of any race	48	19.05
	International	2	0.79
	White/Caucasian	171	67.86
	2 or more excluding Black and Hispanic	5	1.98
	Prefer not to answer	7	2.78
Academic Classification	(*N* = 252)		
	Freshman	77	30.56
	Sophomore	52	20.63
	Junior	59	23.41
	Senior	53	21.03
	Grad student	7	2.78
	Don't remember	2	0.79
	Prefer not to answer	2	0.79
Parents Academic History	(*N* = 252)		
	Parents did NOT attend college	23	9.13
	Parents Some college	224	88.89
	Prefer not to answer	5	1.98

sample included 23 (9%) first-generation students and 224 (89%) students whose parents had attended college; 5 students (2%) did not respond to this item.

Measurement Model

Within the SEM framework, a two-step approach to model building was used, as previously conducted by Anderson and Gerbing (1988). Anderson and Gerbing (1988) presented the case for this approach because, conceptually, the measurement model and the structural model analyze the data with different outcomes in mind (Ribeiro et al., 2017). The job of the measurement model is to assess the relationship of the observed variables to some underlying construct. The relationship is quantified as a calculation using the linear regression equation. In the equation, X is the predictor variable, Y is the dependent variable, b is the slope of the line, and a is the y intercept, or where the Y value is when X is equal to zero (Field, 2013). The numerical output is called a factor loading. In the standardized format, the range of the factor loadings can vary from -1 to +1 (Field, 2013), where being closer to the ends of the continuum indicates a stronger relationship. If an observed item possesses a low relationship with the latent construct, this is called a factor loading; the item could be removed from further analysis to potentially improve model fit. Table 6 presents the measurement model results.

Reliability and Validity

After achieving appropriate model fit from the measurement model, reliability and validity are assessed due to the importance of generalizability of social science research to larger populations. Validity is assessed using both convergent and discriminant validity, followed by composite reliability and AVE for all variables to assess reliability. Ribeiro et al. (2017) suggested that reliability values for CR and AVE should exceed .70 and .50, respectively. Presented in Table 6 are the values for CR and AVE. The range for CR was .64 to .95; the range for AVE was .61 to .81.

Table 6

Measurement Model Results

Factor Constructs and Indicators	Loadings	Composite *t*-statistic	Reliability	AVE
Task Involving[a]			0.66	0.46
The teacher(s) encourage students to help each other	0.635	n/a[c]		
The teacher(s) emphasize always trying your best	0.672	6.88***		
The focus is to keep improving on each exercise/skill each class	0.581	7.05***		
Ego Involving[a]			0.68	0.70
The teacher(s) give most of his/her attention to only a few students	0.708	8.35***		
Students feel embarrassed if they don't know how to perform an exercise/skill	0.594	7.66***		
The teacher(s) make it clear who he/she thinks are the most fit and/or most skilled students	0.811	n/a[c]		
Autonomy[a]			0.64	0.61
We do things that are of interest to me	0.652	n/a[c]		
I feel that the way PE is taught is the way I would like to	0.555	8.02***		
I feel that the way classes are taught is a true expression of who I am	0.621	8.82***		
Competency[a]			0.90	0.81
I feel that I improve even in the tasks considered difficult by most of the students	0.686	n/a[c]		
I feel I perform correctly even the tasks considered difficult by most of the students	0.829	11.27***		
I feel I do very well even in the tasks considered difficult by most of the students	0.854	11.58***		
I am able to succeed even in the lessons considered difficult by most of the students	0.873	11.89***		
Relatedness[a]			0.84	0.80
I feel like I have a close bond with my classmates	0.82	n/a[c]		
I feel like a valued member of a group of close friends	0.829	9.23***		
I feel like I belong to a large group of close friends	0.757	9.27***		

Table 6 (Continued)

Factor Constructs and Indicators	Loadings	Composite *t*	Reliability	AVE
Intrinsic Motivation[b]			0.95	0.71
I enjoyed doing this activity very much	0.816	n/a[c]		
This activity was fun to do	0.875	16.61***		
I thought this was a boring activity (Recoded)	0.819	13.49***		
I thought this activity was quite enjoyable	0.79	13.10***		
While I was doing this activity, I was thinking about how much I enjoyed it	0.745	12.34***		

Note: CR = composite reliability; AVE = average variance extracted.

[a]Scale: 1 = *Strongly Disagree* to 5 = *Strongly Agree* for https://psycnet.apa.org/record/2011-03901-004 and Basic Psychological Needs-Physical Education Scale and Basic Psychological Needs-Physical Education Scale [b]Scale: 1 = *Not true at all* to 7 *Very true* for the Intrinsic Motivation Inventory. [c]In AMOS, one loading has to be fixed to 1; hence, *t*-value cannot be calculated for this item.

***$p < .001$ (one-tailed).

The next step is to analyze the structural model. The measurement model differs from the structural model by testing the relationships between the latent constructs instead of each individual observed item. This second step in the model building and analysis considers the theoretical path or causation between other latent constructs as its primary function.

To assess both the measurement model and structural model, this study used the software package Amos 27.0. The measurement model began with six factors and 31 items. The task-involving factor was composed of six items; the ego-involving factor was composed of six factors; the factors of autonomy, competency, and relatedness were each composed of four factors; and intrinsic motivation was composed of seven factors. Analysis began by using maximum likelihood to calculate model estimates and to determine the factor loadings of each item. The initial model fit was unacceptable; therefore, model adjustments were made by

removing items with low factor loadings (generally .50 below, but some loadings under .60 were also removed). Some error variances were covaried for improve of model fit. Finally, model fit was deemed acceptable with the following indices. Model fit was acceptable (Hu & Bentler, 1999; Schumacker & Lomax, 2004), χ^2 (168) = 303.846, $p < 0.001$; $\chi^2/df = 1.809$, CFI = .949, TLI = .931, IFI =.951, NFI =.896, RMSEA = .057 CI [.046, .067], $p < .001$.

Structural Model

For mediation to be determined, the direct and indirect effects must be measured. The structural model was formed displaying two predictor variables (task and ego involving), three mediator variables (autonomy, competency, and relatedness), and one outcome variable (intrinsic motivation). Single-headed arrows signified direct paths between factors and double-headed arrows signified covariance between the two predictor variables. Some error variances were also allowed to covary for improved model fit. Model fit was acceptable (Hu & Bentler, 1999; Schumacker & Lomax, 2004), χ^2 (171) = 344.498, $p < 0.001$; $\chi^2/df = 2.015$, CFI = .936, TLI = .913, IFI =.937, NFI =.882, RMSEA = .064 CI [.054, .073], $p < .001$.

First, the direct effect paths between each pair of factors were analyzed. Table 7 displays the standardized direct effects estimates between the factors. Seven of eight direct effect paths from a predictor variable (task or ego involving) were significant, at the .05 CI level, in the direct path with either a mediator or the outcome variable IMI. Table 8 displays the correlations and average variance extracted. Table 9 displays intrinsic motivation variance explained by latent variables. Table 10 displays the mediation hypothesis with indirect, direct, and total effects.

Next, the three direct effect paths from the mediators (autonomy, competency, and relatedness) to the outcome variable (intrinsic motivation) were assessed. The paths from autonomy and competency did not produce significant direct effects; relatedness produced a

Table 7

Fit Indices of the Measurement and Structural Model

Fit Indices	Measurement Model	Structural Model
$\chi 2$	303.85	334.50
df	168	171
$\chi 2$/df	1.810	2.015
p-value	.001	.001
CFI	.95	.94
TLI	.93	.91
IFI	.95	.94
NFI	.90	.88
RMSEA	.057	.064

Note: CFI = Comparative Fit Index, TLI = Tucker Lewis Index, IFI = Incremental Fit Index, NFI = Normal Fit Index, RMSEA = Root mean square error of approximation.

significant negative path. Therefore, the only two paths that were significant from the predictors through the mediating variable to the outcome variable were task involving→relatedness→ intrinsic motivation, and ego involving→relatedness→intrinsic motivation. The lone nonsignificant path was from the predictor (ego involving) to intrinsic motivation.

Discussion

The purpose of this study was to examine a theoretical causal chain in which the basic psychological needs of autonomy, competency, and relatedness might serve as mediators for the relationship between motivational climates and intrinsic motivation. The initial model was based on theoretical hypotheses derived from the review of literature on motivational climates and their relationship to intrinsic motivation. Guay et al. (2001) proposed a strong link in the

Table 8

Correlations and Average Variance Extracted

Variable	Mean	*SD*	Task	Ego	Auto	Comp	Relat	Im
Task-involving climate	4.51	0.55	**0.63**					
Ego-involving climate	2.24	0.76	-0.11	**0.71**				
Autonomy	3.67	0.68	.387**	-0.05	**0.61**			
Competency	3.74	0.82	.216**	-0.03	.563**	**0.69**		
Relatedness	3.43	0.87	.287**	-0.06	.626**	.474**	**0.80**	
Intrinsic motivation	4.90	0.68	.364**	0.01	.540**	.397**	.323**	**0.65**

Note: The bold diagonal elements are the square roots of each AVE; construct correlations are shown off-diagonal. Auto = ##, Comp = ##, Relat = ##, Im = ##.

**$p < .01$ (two-tailed).

Table 9

Intrinsic Motivation Variance Explained by Latent Variables

Predictor	Outcome	Explained Pearson's *R*	R^2	Variance (%)
Task	IM	0.364	0.132	13.250
Ego	IM	0.013	0.000	0.016
Autonomy	IM	0.540	0.292	29.160
Competency	IM	0.397	0.158	15.761
Relatedness	IM	0.323	0.104	10.433

Table 10

Mediation Hypothesis With Indirect, Direct, and Total Effects

Hypothesized Relationship		Supported?	Direct Effects	Indirect Effects	Total Effects
H1	Task involving → Intrinsic Motivation	Y	0.71	0.71	0.71
H2	Ego involving → Intrinsic Motivation (neg)	N	0.18	0.19	
H3	Task involving → Autonomy	Y	1.32	1.32	1.32
H4	Task involving → Competency	Y	0.80	0.80	0.80
H5	Task involving → Relatedness	Y	0.86	0.86	0.86
H6	Ego involving → Autonomy (neg)	N	0.38	0.38	
H7	Ego involving → Competency (neg)	N	0.33	0.33	
H8	Ego involving → Relatedness (neg)	N	0.38	0.38	
H9	Autonomy → Intrinsic Motivation	N	0.33	0.33	
H10	Competency → Intrinsic Motivation	N	0.04	0.04	
H11	Relatedness → Intrinsic Motivation	N	0.33	0.33	
H12	Task involving → Autonomy → Intrinsic Motivation	N		0.43	1.14
H13	Ego involving → Autonomy → Intrinsic Motivation	N		0.13	0.31
H14	Task involving → Competency → Intrinsic Motivation	N		-0.033	0.67
H15	Ego involving → Competency → Intrinsic Motivation	N		-0.01	0.17
H16	Task involving → Relatedness → Intrinsic Motivation	N		-0.28	0.42
H17	Ego involving → Relatedness → Intrinsic Motivation	N		-0.12	0.06

relationship between autonomy and competency on intrinsic motivation. Reppy and Larwin (2020), as well as Fry and Gano-Overway (2010), Zhang et al. (2011), and Fry et al. (2012) provided evidence linking relatedness, or caring climates, to intrinsic motivation. Based on these studies, a theoretical causal element was designed and tested to determine whether additional

information could be found to explain the relationship between motivational climate and intrinsic motivation.

The measurement model appeared to confirm the data. CR and AVE nearly met or met the standards suggested by Ribeiro et al. (2017) of .70 and .50, providing some evidence that the measurement model was acceptable. These findings are congruent with published literature that suggests that meeting basic psychological needs may lead to greater opportunity for activities to be intrinsically motivating (Huhtiniemi et al., 2019; Jaakkola et al., 2019).

With information provided by the modification indices, as well as a theoretical understanding guiding the analysis decisions, each of the three mediation models was adjusted with covariances between measurement items. These items were allowed to correlate only if they were measuring the same latent construct. With the adjustments, better model fit was achieved.

As a result of the model adjustments, the mediated relationships provide insight into how people might be intrinsically motivated in a physical activity setting when a purposeful task-involving climate is created. Conversely, in ego-involving climates, the opportunity for people to feel intrinsically motivated may be thwarted or at least impaired to some degree. While neither task-involving or ego-involving climates are the answer to every physical activity setting, it should be noted that, in terms of attempting to make college-age youth more physically active and thus healthier, a task-involving climate would be preferable.

In terms of hypotheses testing, 7 of the 17 hypotheses were supported, as there were only direct effect relationships between the predictors of task involving and ego involving and the outcomes of intrinsic motivation, autonomy, competency, and relatedness. There were no direct effects relationships between autonomy, competency, or relatedness and intrinsic motivation. Without a direct effect relationship between the potential mediator and the outcome of intrinsic

motivation, the process of mediation could occur because all of the first three steps of the mediation process were not met (Baron & Kenny, 1986).

Following the analysis of the mediation study, several descriptive statistics stood out in reference to the sample. The majority of the sample was Caucasian, female, and non-first-generation student. Female participants accounted for 73% of the sample, White/Caucasian participants accounted for 68% of the sample, and non-first-generation students accounted for 89% of the sample. With overrepresentation of White, female, non-first-generation students in the study sample, generalizability of the results to another college student population may be in question.

Future Research

Improving this study or taking it as a progression of science focuses on study design modification and experimentation. First, the ideal study participant group would consist of currently enrolled students who could, in real time, assess their current perception of their learning environment. Second, as this study was a mediation study of the relationships between variables of motivational climate and intrinsic motivation, a progression of the study would be to perform an experiment using physical activity courses in which the instructors were taught how to improve their teaching techniques by including task-involving practices, comparing results to those of a control group that did not receive that teaching treatment. So, the control participants would not miss the opportunity to become intrinsically motivated about physical activity, the control group could later become an experimental group, leading the researcher to compare their results after the experiment to their results as a control group.

Due to the large differences in gender and ethnicity representation, further studies that include a more balanced study sample could provide more information about the potential for

mediation by the basic psychological needs. Also, comparisons with youth who are not enrolled in college but involved in some physical activity setting would be useful to determine identify potential differences between the two groups. This would allow generalizability of the findings to all college-age people, whether or not enrolled in college, as much of the world's population is not enrolled in higher education (200 million enrolled to more than 6 billion not enrolled (Worldmeter, 2021).

Practical Implications

Regardless of the potential limitations of the study, there are practical implications that youth development practitioners and physical educators may take from this study. Positive experiences have been shown to influence youth to persist in activities, especially sports and physical activities (Fry & Hogue, 2018; Hildebrand & Johnson, 2001). Activities in which the motivational climate is said to be mastery (task-involving) contribute to the idea that positive experiences lead to intrinsically motivated participants. Therefore, actions and intentions taken by coaches and teachers who are responsible for instruction of various skill-building activities should consider how these positive experiences can be enhanced by adding opportunities for autonomy, competency, and relatedness into their teaching/coaching methods.

It might be easier to understand the methods of teaching and coaching that are more ego-involved and thus less task-involved that might thwart intrinsic motivation for participants. Activities that include competition, in which the sole purpose of the activity is to rank one above another or to show dominance, are ego-involving activities. When coaches and teachers instead allow participants to assess their own performance from beginning to end of an activity session and compare the results only to their own previous results, the activity becomes task involving. This also leads to the idea of competency, in which a participant builds competence in a skill

from beginning to end of the training session(s). Sports and exercise examples range from number of pullups to number of goals scored.

The need for relatedness is connected to how task-involving climates are related to intrinsic motivation and thus potentially linked to continued engagement in the sport or physical activity. Research by Niemiec and Ryan (2009) showed that, when coaches and teachers conveyed warmth, caring, and respect to students, relatedness was enhanced within the activity. The results of this study are intended for practitioners in youth development and physical education to understand how their intentional actions in creating a learning environment can positively influence how a student feels about the activity when they feel autonomous, competent, and related to those in the environment. Understanding these principles is just a beginning to adapting practices and procedures that could influence people to become more physically active, with the goal of improving life for all.

Theoretical Implications

The theoretical implications of this study center on the direct effects between the motivational climate and the basic psychological needs of autonomy, competency, and relatedness. Each of these direct relationships aligned with theoretical understanding, linking motivational climate and psychological needs. More important, the theoretical link was promoted not just in psychological needs as a whole, but for each factor or construct. However, the direct effect relationships with each of the three psychological needs did not provide results significant enough to suggest that a relationship was present. This result runs counter to the literature and gives cause for concern about relations to the theoretical relationship structure. Nonsignificant results between the psychological needs and intrinsic motivation factors suggest that the relationship might not be as strong as previously believed. If autonomy, competency, and

relatedness are not mediators or causal elements of the predictor/outcome relationship, then what other factors may provide compelling theories to explain this phenomenon? The potential for additional confounding variables may play a role in the nonsignificant relationships.

Limitations of the Study

The study includes some limiting factors that may limit generalizability of the results to other populations. The limitations include study design and collection of study participant data. The initial plan was face-to-face recruiting of study participants who were currently enrolled in a physical activity class. However, the global health pandemic presented challenges in recruitment.

Adapting to the current state of health affairs due to the pandemic, the researcher was not allowed to contact instructors of physical activity courses nor allowed to meet face to face with students. Thus, it was decided to recruit from the entire study population via emails. Because students might have been enrolled in a physical activity course previously, it was also decided to allow respondents to mark when or whether they had ever been enrolled in a physical activity course. The limitation of this method was that those who had previously taken a course but were not currently enrolled had to rely on memory of their experience, which could have been several years before, and included the possibility of graduate students having taken a course during their undergraduate years. This presents the possibility of an external threat to validity and generalizability due to time lapse between the physical activity course and the gathering of data. This is an interaction of history and treatment effect (Bracht & Glass, 1968).

When these decisions had been made regarding study design and recruitment, 1,097 persons responded to the online questionnaire. However, those who had not taken a physical activity course or who did not complete the questionnaire were removed from analysis of the data. This resulted in only 252 response sets (23% of the overall data) being usable for analysis.

A further breakdown of the 252 responses showed that only 73 students (29% of the sample) were enrolled in a physical activity course at the time of completing the questionnaire. In fact, 92 students (37% of the sample) had taken a physical activity course more than 1 year prior to the study.

The temporal design of the study is also a limitation. This study used a cross-sectional approach for obtain data used for relationship analysis. While cross-sectional designs are popular in social science research, other methods, such as cross-lagged panel, latent growth curve, and latent difference score models, provide a longitudinal approach to data analysis (O'Laughlin et al., 2018). Longitudinal methods allow researchers to investigate mediation within individuals across time (MacKinnon et al., 2012) to detect change within an individual. Related this study, understanding whether autonomy, competency, and relatedness mediated the relationship of motivational climates and intrinsic motivation across time would be useful in explaining physical activity behavior in terms of adoption, maintenance, or stopping physical action.

References, Study 3

Alesi, M., Gómez-López, M., Chicau Borrego, C., Monteiro, D., & Granero-Gallegos, A. (2019). Effects of a motivational climate on psychological needs satisfaction, motivation and commitment in teen handball players. *International Journal of Environmental Research And Public Health*, *16*(15), 2702. https://dx.doi.org/10.3390%2Fijerph16152702

Ames, C. (1992a). Achievement goals, motivational climate, and motivational processes. In G. Roberts (Ed.), *Motivation in sport and exercise* (pp. 161-176). Human Kinetics.

Ames, C. (1992b). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(3), 261-271. https://psycnet.apa.org/doi/10.1037/0022-0663.84.3.261

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411. https://psycnet.apa.org/record/1989-14190-001

Arena, R., McNeil, A., Sagner, M., & Lavie, C. J. (2017). Healthy living: The universal and timeless medicine for health span. *Progress in Cardiovascular Diseases*, *59*(5), 419-421. https://doi.org/10.1016/j.pcad.2017.01.007

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182. https://psycnet.apa.org/record/1987-13085-001

Bracht, G. H., & Glass, G. V. (1968). The external validity of experiments. *American Education Research Journal, 5*(4), 437-474.

Braithwaite, R., Spray, C. M., & Warburton, V. E. (2011). Motivational climate interventions in physical education: A meta-analysis. *Psychology of Sport and Exercise*, *12*(6), 628-638. https://psycnet.apa.org/doi/10.1016/j.psychsport.2011.06.005

Breske, M. P., Fry, M. D., Fry, A. C., & Hogue, C. M. (2017). The effects of goal priming on cortisol responses in an ego-involving climate. *Psychology of Sport and Exercise, 32*, 74-82. https://psycnet.apa.org/doi/10.1016/j.psychsport.2017.06.001

Bryan, C. L., & Solmon, M. A. (2007). Self-determination in physical education: Designing class environments to promote active lifestyles. *Journal of Teaching in Physical Education*, *26*(3), 260-278. https://doi.org/10.1123/jtpe.26.3.260

Bryan, C. L., & Solmon, M. A. (2012). Student motivation in physical education and engagement in physical activity. *Journal of Sport Behavior*, *35*(3), 267-285.

Cid, L., Pires, A., Borrego, C., Duarte-Mendes, P., Teixeira, D. S., Moutão, J. M., & Monteiro, D. (2019). Motivational determinants of physical education grades and the intention to practice sport in the future. *PLoS One*, *14*(5), e0217218. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0217218

Council, N. R. (2002). *Community programs to promote youth development*. National Academies Press.

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, *62*(1), 119-142. https://psycnet.apa.org/record/1994-33462-001

Deci, E. L., & Ryan, R. M. (2010). *The Corsini encyclopedia of psychology*. Wiley.

Duda, J. L. (1989). Relationship between task and ego orientation and the perceived purpose of sport among high school athletes. *Journal of Sport and Exercise Psychology*, *11*(3), 318-335. https://doi.org/10.1123/jsep.11.3.318

Dweck, C., & Leggett, E. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256-273. https://psycnet.apa.org/doi/10.1037/0033-295X.95.2.256

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage.

Fraser-Thomas, J. L., Côté, J., & Deakin, J. (2005). Youth sport programs: An avenue to foster positive youth development. *Physical Education & Sport Pedagogy*, *10*(1), 19-40. https://doi.org/10.1080/1740898042000334890

Fry, M., & Hogue, C. M. (2018). Psychological considerations for children and adolescents in sport and performance. In O. Braddick (Ed.), *Oxford research encyclopedia of psychology* (Vol. 1, pp. 1-27). Oxford University Press. https:/doi.org/10.1093/acrefore/9780190236557.013.177

Fry, M. D., & Gano-Overway, L. A. (2010). Exploring the contribution of the caring climate to the youth sport experience. *Journal of Applied Sport Psychology*, *22*(3), 294-304. https://psycnet.apa.org/record/2010-15240-004

Fry, M. D., Guivernau, M., Kim, M. S., Newton, M., Gano-Overway, L. A., & Magyar, T. M. (2012). Youth perceptions of a caring climate, emotional regulation, and psychological well-being. *Sport, Exercise, and Performance Psychology*, *1*(1), 44-52. https://psycnet.apa.org/record/2011-22896-001

García-González, L., Sevil-Serrano, J., Abós, A., Aelterman, N., & Haerens, L. (2019). The role of task and ego-oriented climate in explaining students' bright and dark motivational experiences in physical education. *Physical Education and Sport Pedagogy*, *24*(4), 344-358. https://www.tandfonline.com/doi/abs/10.1080/17408989.2019.1592145

Gottfried, A. E. (2019). Academic intrinsic motivation: Theory, assessment, and longitudinal research. In A. Elliot (Ed.), *Advances in motivation science* (Vol. 6, pp. 71-109). Elsevier.

Guay, F., Boggiano, A. K., & Vallerand, R. J. (2001). Autonomy support, intrinsic motivation, and perceived competence: Conceptual and empirical linkages. *Personality and Social Psychology Bulletin, 27*(6), 643-650. https://psycnet.apa.org/record/2001-06735-001

Hastie, P. A., Rudisill, M. E., & Wadsworth, D. D. (2013). Providing students with voice and choice: Lessons from intervention research on autonomy-supportive climates in physical education. *Sport, Education and Society*, *18*(1), 38-56. https://psycnet.apa.org/doi/10.1080/13573322.2012.701203

HealthyPeople.gov. (2017). *Search the data: Healthy People 2020*. https://www.healthypeople.gov/2020/data-search/Search-the-Data#topic-area=3504

Hildebrand, K. M., & Johnson, D. J. (2001). Determinants of college physical activity class enrollment: Implications for high school physical education. *The Physical Educator*, *58*(1), 51-56.

Hogue, C. M., Fry, M. D., & Fry, A. C. (2017). The differential impact of motivational climate on adolescents' psychological and physiological stress responses. *Psychology of Sport and Exercise*, *30*, 118-127. https://psycnet.apa.org/doi/10.1016/j.psychsport.2017.02.004

Hogue, C. M., Fry, M. D., & Iwasaki, S. (2018). The impact of the perceived motivational climate in physical education classes on adolescent greater life stress, coping appraisals, and experience of shame. *Sport, Exercise, and Performance Psychology*, *8*(3), 273-289. https://doi.org/10.1037/spy0000153

Holt, N. L. (2016). *Positive youth development through sport*. Routledge.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling 6*(1), 1-55. https://psycnet.apa.org/doi/10.1080/10705519909540118

Huddleston, H., Fry, M. D., & Brown, T. C. (2012). The relationship between perceived motivational climate and intrinsic motivation in corporate wellness environments. *Revista De Psicologia De lDeporte, 2*1(1), 18-23.

Huhtiniemi, M., Sääkslahti, A., Watt, A., & Jaakkola, T. (2019). Associations among basic psychological needs, motivation and enjoyment within finnish physical education students. *Journal of Sports Science & Medicine, 18*(2), 239-247. PMID:31191093

İlker, G. E., & Hülya, A. Ş. Ç. I. (2019). The role of teacher's feedback in physical education: Motivational climate as mediator. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 34(*2), 372-386.

Jaakkola, T., Barkoukis, V., Huhtiniemi, M., Salin, K., Seppälä, S., Lahti, J., & Watt, A. (2019). Enjoyment and anxiety in Finnish physical education: achievement goals and self-determination perspectives. *Journal of Physical Education and Sport, 19*(3), 1619-1629. https://doi.org/10.7752/jpes.2019.03235

Jones, M. I., Dunn, J. G. H., Holt, N. L., Sullivan, P. J., & Bloom, G. A. (2011). Exploring the 5Cs of positive youth development in sport. *Journal of Sport Behavior*, *34*(3), 250-267.

Kavussanu, M., & Roberts, G. C. (1996). Motivation in physical activity contexts: The relationship of perceived motivational climate to intrinsic motivation and self-efficacy. *Journal of Sport and Exercise Psychology*, *18*(3), 264-280. https://doi.org/10.1123/jsep.18.3.264

Kenny, G. P., Notley, S. R., & Gagnon, D. (2017). Direct calorimetry: A brief historical review of its use in the study of human metabolism and thermoregulation. *European Journal of Applied Physiology, 117*(9), 1765-1785. https://doi.org/10.1007/s00421-017-3670-5

Lerner, R. M., Boyd, M. J., & Du, D. (2010). Adolescent development. In I. B. Weiner & W. E. Craighead (Eds.), *The Corsini encyclopedia of psychology* (pp. 1-2). Corsini.

MacKinnon, D. P., Cheong, J., & Pirlott, A. G. (2012). *Statistical mediation analysis*. American Psychological Association.

Moore, E. W. G., Brown, T. C., & Fry, M. D. (2015). Psychometric properties of the Abbreviated Perceived Motivational Climate in Exercise Questionnaire. *Measurement in Physical Education and Exercise Science*, *19*(4), 186-199. https://dx.doi.org/10.1080/1091367X.2015.1072819

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*(3), 328-346. https://psycnet.apa.org/doi/10.1037/0033-295X.91.3.328

Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Harvard University Press.

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education, 7(*2), 133-144. https://doi.org/10.1177%2F1477878509104318

O'Laughlin, K. D., Martin, M. J., & Ferrer, E. (2018). Cross-sectional analysis of longitudinal mediation processes. *Multivariate Behavioral Research*, *53*(3), 375-402. https://psycnet.apa.org/record/2018-21381-006

Ostrow, K. S., & Heffernan, N. T. (2018). Testing the validity and reliability of Intrinsic Motivation Inventory subscales within ASSISTments. In National Science Foundation (Ed.), *Proceedings of the Nineteenth International Conference on Artificial Intelligence in Education* (pp. 381-394). Springer.

Plant, R. W., & Ryan, R. M. (1985). Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *Journal of Personality*, *53*(3), 435-449. https://psycnet.apa.org/record/1986-24564-001

Reppy, D., & Larwin, K. H. (2020). The association between perception of caring and intrinsic motivation: A study of urban middle school students. *Journal of Education*, *200*(1), 48-61. https://doi.org/10.1177%2F0022057419875123

Ribeiro, M. A., Pinto, P., Silva, J. A., & Woosnam, K. M. (2017). Residents' attitudes and the adoption of pro-tourism behaviours: The case of developing island countries. *Tourism Management*, *61*, 523-537. https://ideas.repec.org/a/eee/touman/v61y2017icp523-537.html

Rokka, S., Kouli, O., Bebetsos, E., Goulimaris, D., & Mavridis, G. (2019). Effect of dance aerobic programs on intrinsic motivation and perceived task climate in secondary school students. *International Journal of Instruction, 12*(1), 641-654. https://10.29333%2Fiji.2019.12141a

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology, 43*(3), 450-461. https://psycnet.apa.org/doi/10.1037/0022-3514.43.3.450

Ryan, R. M., Connell, J. P., & Plant, R. W. (1990). Emotions in nondirected text learning. *Learning and Individual Differences*, *2*(1), 1-17. https://psycnet.apa.org/record/1992-26190-001

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford.

Ryan, R. M., Koestner, R., & Deci, E. L. (1991). Ego-involved persistence: When free-choice behavior is not intrinsically motivated. *Motivation and Emotion*, *15*(3), 185-205. https://link.springer.com/article/10.1007/BF00995170

Ryan, R. M., & Mims, V. 8: Koestner, R.(1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology*, *45*(4), 736-770. https://psycnet.apa.org/doi/10.1037/0022-3514.45.4.736

Sánchez-Oliva, D., Kinnafick, F.-E., Smith, N., & Stenling, A. (2018). Assessing perceived need support and need satisfaction in physical education: Adaptation and validation with English students. *Measurement in Physical Education and Exercise Science*, *22*(4), 332-342. https://doi.org/10.1080/1091367X.2018.1461627

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (2nd ed.). Erlbaum.

Solmon, M. A. (1996). Impact of motivational climate on students' behaviors and perceptions in a physical education setting. *Journal of Educational Psychology*, *88*(4), 731-738. https://doi.org/10.1037/0022-0663.88.4.731

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *9*, 78. https://doi.org/10.1186/1479-5868-9-78

Trigueros, R., Mínguez, L. A., González-Bernal, J. J., Aguilar-Parra, J. M., Padilla, D., & Álvarez, J. F. (2019). Validation of the Satisfaction Scale of Basic Psychological Needs in Physical Education with the incorporation of the novelty in the Spanish context. *Sustainability*, *11*(22), 6250. https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.3390%2Fsu11226250

Ullrich-French, S., McDonough, M. H., & Smith, A. L. (2012). Social connection and psychological outcomes in a physical activity-based youth development setting. *Research Quarterly for Exercise and Sport*, *83*(3), 431-441. https://doi.org/10.1080/02701367.2012.10599878

Vallerand, R. J., Koestner, R., & Pelletier, L. G. (2008). Reflections on self-determination theory. *Canadian Psychology*, *49*(3), 257-262. https://doi.org/10.1037/a0012804

Vlachopoulos, S. P. (2007). Psychometric evaluation of the Basic Psychological Needs in Exercise Scale in community exercise programs: A cross-validation approach. *Hellenic Journal of Psychology*, *4*(1), 52-74.

Vlachopoulos, S. P. (2008). The Basic Psychological Needs in Exercise Scale: Measurement invariance over gender. *Structural Equation Modeling: A Multidisciplinary Journal*, *15*(1), 114-135. https://psycnet.apa.org/doi/10.1080/10705510701758398

Vlachopoulos, S. P., & Karavani, E. (2009). Psychological needs and subjective vitality in exercise: A cross-gender situational test of the needs universality hypothesis. *Hellenic Journal of Psychology*, *6*, 207-222.

Vlachopoulos, S. P., & Michailidou, S. (2006). Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science*, *10*(3), 179-201. https://doi.org/10.1207/s15327841mpee1003_4

Vlachopoulos, S. P., & Neikou, E. (2007). A prospective study of the relationships of autonomy, competence, and relatedness with exercise attendance, adherence, and dropout. *Journal of Sports Medicine and Physical Fitness*, *47*(4), 475-482. PMID:18091690

Worldmeter. (2021). *Current world population.* https://www.worldometers.info/world-population/

Zeldin, S., Krauss, S. E., Kim, T., Collura, J., & Abdullah, H. (2016). Pathways to youth empowerment and community connectedness: A study of youth-adult partnership in Malaysian after-school, co-curricular programs. *Journal of Youth and Adolescence*, *45*(8), 1638-1651. https://doi.org/10.1007/s10964-015-0320-2

Zhang, T., Solmon, M. A., Kosma, M., Carson, R. L., & Gu, X. (2011). Need support, need satisfaction, intrinsic motivation, and physical activity participation among middle school students. *Journal of Teaching in Physical Education*, *30*(1), 51-68. https://psycnet.apa.org/record/2011-03901-004

CHAPTER VI: CONCLUSION

The initial interest in this study topic was to answer the question, What is responsible for the relationship between motivational climates and intrinsic motivation? Numerous studies have linked motivational climate, basic psychological needs, and intrinsic motivation (Edmunds et al., 2010; Edmunds et al., 2006; Hogue, 2018; Hogue et al., 2017; Reinboth & Duda, 2004; Standage et al., 2003). However, none has considered the interconnectivity of the three concepts. In addition, research on these variables in the college student population was limited. Therefore, it appeared that further investigation was needed to determine whether there was interconnectivity among the three variables.

The systematic literature review confirmed early concerns about the lack of research on the mediating effects of psychological needs. Not only was there limited study of any two of the variables; no study had connected all three variables. None of the studies that were reviewed for this study was longitudinal in design, leaving the opportunity for questioning whether any determination of relationships even mattered over a lifetime, in acknowledgment that lifetime engagement in physical activity is the goal advocated by many health providers. To provide a rigorous study, additional reviewers and the possibility of team dynamics to generate ideas produced a thorough approach to reviewing manuscripts.

Another gap that this dissertation was intended to address was the use of the BPN-NES psychometric properties related to the English language. Only one study (Sánchez-Oliva et al., 2018) had been conducted to validate the instrument. In that study, the sample was K–12 students, leaving a question as to the usefulness of the scale for a college student population. Due to the limited research on the English language version of the scale, it would appear that the scale is more popular worldwide than in research in the United States. Finally, the psychometric

properties were determined to be adequate, which provides justification for use in future studies. As college students are a popular study population, an additional valid and reliable measure should be an asset to scholars.

The third study provided the substance of the dissertation. This study was conducted to explore the possibility of a relationship between motivational climate and intrinsic motivation. Most of the results from Study 3 were as expected, related to previous published works (Egli et al., 2011; Kilpatrick et al., 2005; Newton & Duda, 1999; Owen et al., 2014; Roberts & Duda, 1984) that concluded that activities that are intrinsically motivating are generally activities in which people continue to engage, although no other study has been published that met each of the criteria imposed in this study. Now, with greater evidence that the need for autonomy, competency, and relatedness is vital in promoting intrinsic motivation, it would appear that, in order to make youth programming successful in attempting to promote physical activity, program leaders should find and incorporate ways for participants to have voice and make choices, within boundaries. Program leaders should find and incorporate skills and activities in which a participant can see improvement, compared to their earlier participation. Program leaders should find and incorporate ways for participants to feel connected not only to their activity peers but to those in leadership or administrative positions in youth programming, beyond physical activity programming.

The findings of this dissertation provide information and hope for eradicating sedentary behaviors and promoting more healthful lifestyles. With youth and adults regularly engaging in more physical activity, there is a potential for reducing effects of chronic manageable diseases such as obesity, diabetes, and several forms of cancer. The cost in terms of monetary and human capital are great and are often wasted in ongoing treatment and management of diseases that are

the result of lifestyle choices and could be reduced. It is helpful to consider how financial resources could be used for fight other pandemic and health issues if the $1.1 trillion spent on treatment of chronic health conditions (Waters & Graf, 2018) were instead spent on systemic issues that disproportionally affect poor and minority populations.

This dissertation study was multifaceted. Its research questions cannot be answered conclusively. However, the information that was reported here can provide context and insight regarding to how educators and practitioners may inform, educate, and practice skill-building activities, such as physical activity, thereby helping others to become fully-functional, global-minded, responsible adult citizens.

REFERENCES, CHAPTERS 1, 2, 6

Adams, M. A., Sallis, J. F., Kerr, J., Conway, T. L., Saelens, B. E., Frank, L. D., Norman, G. J., & Cain, K. L. (2011). Neighborhood environment profiles related to physical activity and weight status: A latent profile analysis. *Preventive Medicine*, *52*(5), 326–331. https://doi.org/10.1016/j.ypmed.2011.02.020

Ainsworth, B. E., Haskell, W. L., Herrmann, S. D., Meckes, N., Bassett Jr, D. R., Tudor-Locke, C., & Leon, A. S. (2011). 2011 Compendium of Physical Activities: a second update of codes and MET values. *Medicine & Science in Sports & Exercise*, *43*(8), 1575–1581.

Ainsworth, B. E., Haskell, W. L., Leon, A. S., Jacobs, J. D. R., Montoye, H. J., Sallis, J. F., & Paffenbarger, R. S. (1993). Compendium of physical activities: Classification of energy costs of human physical activities. *Medicine and Science in Sports and Exercise*, *25*(1), 71–80. https://doi.org/10.1249/00005768-199301000-00011

Ainsworth, B. E., Haskell, W. L., Whitt, M. C., Irwin, M. L., Swartz, A. M., Strath, S. J., O'Brien, W. L., Bassett, D. R. Jr., Schmitz, K. H., Emplaincourt, P. O., Jacobs, D. R. Jr., & Leon, A. S. (2000). Compendium of physical activities: an update of activity codes and MET intensities. *Medicine and Science in Sports and Exercise*, *32*(9 Suppl.), S498–S504.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1922/CDH_2120VandenBroucke08

Al-Drees, A., Abdulghani, H., Irshad, M., Baqays, A. A., Al-Zhrani, A. A., Alshammari, S. A., & Alturki, N. I. (2016). Physical activity and academic achievement among the medical students: A cross-sectional study. *Medical Teacher*, *38*(Suppl.), S66–S72. https://doi.org/10.3109/0142159X.2016.1142516

American College Health Association. (2018). *National College Health Assessment: Fall 2017 reference group executive summary.* https://www.acha.org/documents/ncha/NCHA-II_FALL_2017_ REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(3), 261–271. https://doi.org/10.1037/0022-0663.84.3.261

Arena, R., McNeil, A., Sagner, M., & Lavie, C. J. (2017). Healthy living: The universal and timeless medicine for healthspan. *Progress in Cardiovascular Diseases*, *59*(5), 419–421. https://doi.org/10.1016/j.pcad.2017.01.007

Armitage, C. J. (2005). Can the theory of planned behavior predict the maintenance of physical activity? *Health Psychology*, *24*(3), 235–245. https://doi.org/10.1037/0278-6133.24.3.235

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469–480. PMID:10842426

Ashdown-Franks, G., Sabiston, C. M., & Stubbs, B. (2019). The evidence for physical activity in the management of major mental illnesses: A concise overview to inform busy clinicians' practice and guide policy. *Current Opinions in Psychiatry*, *32*(5), 375–380. https://doi.org/10.1097/YCO.0000000000000526.

Bailey, T. (2005). Student success: Challenges & opportunities. *Community Journal, 76*(1), 16–19.

Bandura, A. (1986). *Social foundations of thought and action.* Prentice-Hall.

Barnekow-Bergkvist, M., Hedberg, G., Janlert, U., & Jansson, E. (1996). Physical activity pattern in men and women at the ages of 16 and 34 and development of physical activity from adolescence to adulthood. *Scandinavian Journal of Medicine & Science in Sports*, *6*(6), 359–370. https://doi.org/10.1111/j.1600-0838.1996.tb00108.x

Beale, L. (2017). *Human disease and health promotion*. Wiley.

Bendíková, E., & Nemcek, D. (2017). Attitudes and preferences of children living in orphanage towards physical education lessons. *European Journal of Contemporary Education*, *6*(4), 664–673. https://doi.org/10.13187/ejced.2017.4.664

Berkey, C. S., Rockett, H. R. H., Gillman, M. W., & Colditz, G. A. (2003). One-year changes in activity and in inactivity among 10- to 15-year-old boys and girls: Relationship to change in body mass index. *Pediatrics*, *111*(4), 836–843. https://doi.org/10.1542/peds.111.4.836

Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine*, *45*(11), 886–895. https://doi.org/10.1136/bjsports-2011-090185

Biddle, S. J. H., Fox, K. R., Boutcher, S. H., & Faulkner, G. E. (2001). The way forward for physical activity and the promotion of psychological well-being. In S. J. H. Biddle, K. R. Fox, & S. H. Boutcher (Eds.), *Physical Activity and Psychological Well-Being* (pp. 154–168). Routledge.

Booth, S. L., Sallis, J. F., Ritenbaugh, C., Hill, J. O., Birch, L. L., Frank, L. D., Glanz, K., Himmelgreen, D. A., Mudd, M., Popkin, B. M., Rickard, K. A., St. Jeor, S., & Hays, N. P. (2001). Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points. *Nutrition Reviews*, *59*(3), S21–S36. https://doi.org/0.1111/j.1753-4887.2001.tb06983.x

Boston University School of Public Health. (2019). *The transtheoretical model (stages of change).* http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories6.html

Bray, S. R., & Born, H. A. (2004). Transition to university and vigorous physical activity: Implications for health and psychological well-being. *Journal of American College Health*, *52*(4), 181–188. https://doi.org/10.3200/JACH.52.4.181-188

Buckworth, J., & Nigg, C. (2004). Physical activity, exercise, and sedentary behavior in college students. *Journal of American College Health*, *53*(1), 28–34. https://doi.org/10.3200/JACH.53.1.28-34

Butte, N. F., Watson, K. B., Ridley, K., Zakeri, I. F., McMurray, R. G., Pfeiffer, K. A., Crouter, S. E., Harrmann, S. D., Bassett, D. R., Long, A., Berhane, Z., Trost, S. G., Ainsworth, B. E., Berrigan, D., & Fulton, J. E. (2018). A youth compendium of physical activities: activity codes and metabolic intensities. *Medicine and Science in Sports and Exercise*, *50*(2), 246–256. https://doi.org/10.1249/MSS.0000000000001430

Carlson, S. A., Densmore, D., Fulton, J. E., Yore, M. M., & Kohl, H. W. (2009). Differences in physical activity prevalence and trends from three US surveillance systems: NHIS, NHANES, and BRFSS. *Journal of Physical Activity and Health*, *6*(Suppl.), S18–S27. https://doi.org/10.1123/jpah.6.s1.s18

Carlson, S. A., Fulton, J. E., Schoenborn, C. A., & Loustalot, F. (2010). Trend and prevalence estimates based on the 2008 physical activity guidelines for Americans. *American Journal of Preventive Medicine*, *39*(4), 305–313. https://doi.org/10.1016/j.amepre.2010.06.006

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, *100*(2), 126–131. PMID:3920711

Castro, O., Bennie, J., Vergeer, I., Bosselut, G., & Biddle, S. J. H. (2018). Correlates of sedentary behaviour in university students: A systematic review. *Preventive Medicine*, *116*, 194–202. https://doi.org/10.1016/j.ypmed.2018.09.016

Centers for Disease Control and Prevention, Division of Nutrition, Physical Activity, Overweight, and Obesity. (2017). *Adult obesity prevalence maps: Overweight & obesity*. https://www.cdc.gov/obesity/data/prevalence-maps.html

Centers for Disease Control and Prevention, National Center for Health Statistics. (2015). *Leading causes of death and numbers of deaths, by sex, race, and Hispanic orgin: United States, 1980 and 2014 (Table 19).*

Church, T. S., Thomas, D. M., Tudor-Locke, C., Katzmarzyk, P. T., Earnest, C. P., Rodarte, R. Q., Martin, C. K., Blair, S. N., & Bouchard, C. (2011). Trends over 5 decades in US occupation-related physical activity and their associations with obesity. *PloS One*, *6*(5), e19657. https://doi.org/10.1371/journal.pone.0019657

Coakley, J. (1993). Sport and socialization. *Exercise and Sport Sciences Reviews*, *21*(1), 169–200.

Coakley, J. (2011). Youth sports: What counts as "positive development?" *Journal of Sport and Social Issues*, *35*(3), 306–324. https://doi.org/10.1177/0193723511417311

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*(1), 37-46. https://doi.org/10.1177%2F001316446002000104

Cohen, S. A. (1987). Instructional alignment: Searching for a magic bullet. *Educational Researcher*, *16*(8), 16–20. https://doi.org/10.2307/1175370

Corder, K., Sharp, S. J., Atkin, A. J., Griffin, S. J., Jones, A. P., Ekelund, U., & van Sluijs, E. M. F. (2015). Change in objectively measured physical activity during the transition to adolescence. *British Journal of Sports Medicine*, *49*(11), 730–736. https://doi.org/10.1136/bjsports-2013-093190

Das, P., & Horton, R. (2012). Rethinking our approach to physical activity. *The Lancet*, *380*(9838), 189–190. https://doi.org/10.1016/S0140-6736(12)61024-1

De Meester, A., Cardon, G., De Bourdeaudhuij, I., & Haerens, L. (2017). Extracurricular school-based sports as a stepping stone toward an active lifestyle? Differences in physical activity and sports-motivation between extracurricular school-based sports participants and nonparticipants. *Journal of Teaching in Physical Education*, *36*(4), 485–497. https://doi.org/10.1123/jtpe.2016-0035

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*(2), 109–134. https://doi.org/10.1016/0092-6566(85)90023-6

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits : Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Deliens, T., Deforche, B., De Bourdeaudhuij, I., & Clarys, P. (2015). Determinants of physical activity and sedentary behaviour in university students: A qualitative study using focus group discussions. *BMC Public Health*, *15*(1). https://doi.org/10.1186/s12889-015-1553-4

Dennison, B. A., Straus, J. H., Mellits, E. D., & Charney, E. (1988). Childhood physical fitness tests: Predictor of adult physical activity levels? *Pediatrics*, *82*(3), 324–330. PMID:3405661

Dishman, R. K., Sallis, J. F., & Orenstein, D. R. (1985). *The* determinants of physical activity and exercise. *Public Health Reports, 100*(2) 158–171. PMID:3920714

Dolezal, B. A., Neufeld, E. V, Boland, D. M., Martin, J. L., & Cooper, C. B. (2017). Interrelationship between sleep and exercise: A systematic review. *Advances in Preventive Medicine*, *2017,* Article 1364387. https://doi.org/10.1155/2017/1364387

Dorsey, K. B., Herrin, J., & Krumholz, H. M. (2011). Patterns of moderate and vigorous physical activity in obese and overweight compared with non-overweight children. *International Journal of Pediatric Obesity*, *6*(Supp. 3), e547–e555. https://doi.org/10.3109/17477166.2010.490586

Duda, J. L. (1991). Motivating older adults for physical activity: It's never too late. *Journal of Physical Education, Recreation & Dance*, *62*(7), 44–48. https://doi.org/10.1080/07303084.1991.10604001

Dwyer, T., Sallis, J. F., Blizzard, L., Lazarus, R., & Dean, K. (2001). Relation of academic performance to physical activity and fitness in children. *Pediatric Exercise Science*, *13*(3), 225–237. https://doi.org/10.1123/pes.13.3.225

Edmunds, J., Bernstein, L., Glennie, E., Willse, J., Arshavsky, N., Unlu, F., Bartz, D., Silberman, T., Scales, W. D., & Dallas, A. (2010). Preparing students for college: The implementation and impact of the early college high school model. *Peabody Journal of Education*, *85*(3), 348-364.

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology*, *36*(9), 2240-2265. https://psycnet.apa.org/doi/10.1111/j.0021-9029.2006.00102.x

Egli, T., Bland, H. W., Melton, B. F., & Czech, D. R. (2011). Influence of age, sex, and race on college students' exercise motivation of physical activity. *Journal of American College Health*, *59*(5), 399-406. https://pubmed.ncbi.nlm.nih.gov/21500059/

Farooq, M. A., Parkinson, K. N., Adamson, A. J., Pearce, M. S., Reilly, J. K., Hughes, A. R., Janssen, X., Basterfield,L., & Reilly, J. J. (2018). Timing of the decline in physical activity in childhood and adolescence: Gateshead Millennium Cohort Study. *British Journal of Sports Medicine*, *52*(15), 1002–1006. https://doi.org/10.1136/bjsports-2016-096933

Fishbein, M., & Ajzen, I. (1980). *Understanding attitudes and predicting social behavior*. Martin Books.

Fletcher, J. (2016). Applying self-determination theory to college students' physical-activity behavior: Understanding the motivators for physical (in) activity. *Communication Studies*, *67*(5), 489–508. https://doi.org/10.1080/10510974.2016.1212911

Fox, K. R. (1999). The influence of physical activity on mental well-being. *Public Health Nutrition*, *2*(3a), 411–418. https://doi.org/10.1017/s1368980099000567

Freedman, D. S., Mei, Z., Srinivasan, S. R., Berenson, G. S., & Dietz, W. H. (2007). Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa Heart Study. *Journal of Pediatrics*, *150*(1), 12–17. https://doi.org/10.1016/j.jpeds.2006.08.042

Fryar, C. D., Carroll, M. D., & Ogden, C. L. (2014). *Prevalence of overweight and obesity among children and adolescents: United States, 1963–1965 through 2011–2012.* National Center for Health Statistics.

Fullmer, M. O., Wilkinson, C., Prusak, K. A., Eggett, D., & Pennington, T. (2018). Adolescent physical activity and motivational profiles while keeping a physical activity record. *Journal of Teaching in Physical Education*, *37*(1), 1–11. https://doi.org/10.1123/jtpe.2017-0072

Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2008). *Health behavior and health education: theory, research, and practice.* Wiley.

Godman, H. (2014). *Regular exercise changes the brain to improve memory, thinking skills.* https://crufit.net/blog/2016/05/18/regular-exercise-changes-the-brain-to-improve-memory-thinking-skills

Goetzel, R. Z., Reynolds, K., Breslow, L., Roper, W. L., Shechter, D., Stapleton, D. C., Lapin, P. J., & McGinnis, J. M. (2007). Health promotion in later life: It's never too late. *American Journal of Health Promotion*, *21*(4), 1–8. https://doi.org/10.4278/0890-1171-21.4.tahp-1

Gordon-Larsen, P., Nelson, M. C., & Popkin, B. M. (2004). Longitudinal physical activity and sedentary behavior trends: Adolescence to adulthood. *American Journal of Preventive Medicine*, *27*(4), 277–283. https://doi.org/10.1016/j.amepre.2004.07.006

Gu, X., Chen, Y.-L., Jackson, A. W., & Zhang, T. (2018). Impact of a pedometer-based goal-setting intervention on children's motivation, motor competence, and physical activity in physical education. *Physical Education and Sport Pedagogy*, *23*(1), 54–65. https://doi.org/10.1080/17408989.2017.1341475

Hales, C. M., Carroll, M. D., Fryar, C. D., & Ogden, C. L. (2017). *Prevalence of obesity among adults and youth: United States, 2015–2016*. Centers for Disease Control and Prevention. https://www.cdc.gov/nchs/products/databriefs/db288.htm

Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., & Ekelund, U. (2012). Global physical activity levels: Surveillance progress, pitfalls, and prospects. *The Lancet*, *380*(9838), 247–257. https://doi.org/10.1016/S0140-6736(12)60646-1

Hambrecht, R., Adams, V., Erbs, S., Linke, A., Krankel, N., Shu, Y., Baither, Y., Gielen, S., Thiele, J. F., Gummert, F., Mohr, F. W., & Schuler, G. (2003). Regular physical activity improves endothelial function in patients with coronary artery disease by increasing phosphorylation of endothelial nitric oxide synthase. *Circulation*, *107*(25), 3152–3158. https://doi.org/10.1161/01.CIR.0000074229.93804.5C

Hamilton, M. T., Healy, G. N., Dunstan, D. W., Zderic, T. W., & Owen, N. (2008). Too little exercise and too much sitting: Inactivity physiology and the need for new recommendations on sedentary behavior. *Current Cardiovascular Risk Reports*, *2*(4), 292–298. https://doi.org/10.1007/s12170-008-0054-8

Harrington, C. (2018). *5 key benefits of youth sports participation.* https://www.jerseywatch.com/blog/benefits-of-youth-sports-participation/

HealthyPeople.gov. (2020). *Access to health services*. https://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services

Helmrich, S. P., Ragland, D. R., & Paffenbarger, J. R. S. (1994). Prevention of non-insulin-dependent diabetes mellitus with physical activity. *Medicine and Science in Sports and Exercise*, *26*(7), 824–830. PMID:7934754

Hingson, R., & White, A. (2014). New research findings since the 2007 Surgeon General's Call to Action to Prevent and Reduce Underage Drinking: A review. *Journal of Studies on Alcohol and Drugs*, *75*(1), 158–169. https://doi.org/10.15288/jsad.2014.75.158

Hogue, C. M., Fry, M. D., & Fry, A. C. (2017). The differential impact of motivational climate on adolescents' psychological and physiological stress responses. *Psychology of Sport and Exercise*, *30*, 118-127. https://psycnet.apa.org/doi/10.1016/j.psychsport.2017.02.004

Hogue, C. M., Fry, M. D., & Iwasaki, S. (2019). The impact of the perceived motivational climate in physical education classes on adolescent greater life stress, coping appraisals, and experience of shame. *Sport, Exercise, and Performance Psychology*, *8*(3), 273. https://psycnet.apa.org/record/2018-60118-001

Høidrup, S., Sørensen, T. I. A., Strøger, U., Lauritzen, J. B., Schroll, M., & Grønbæk, M. (2001). Leisure-time physical activity levels and changes in relation to risk of hip fracture in men and women. *American Journal of Epidemiology*, *154*(1), 60–68.

Huang, T. T. K., Harris, K. J., Lee, R. E., Nazir, N., Born, W., & Kaur, H. (2003). Assessing overweight, obesity, diet, and physical activity in college students. *Journal of American College Health*, *52*(2), 83–86. https://doi.org/10.1080/07448480309595728

Hurd, A. R., & Anderson, D. M. (2010). *The park and recreation professional's handbook*. Human Kinetics.

Jette, M., Sidney, K., & Blümchen, G. (1990). Metabolic equivalents (METS) in exercise testing, exercise prescription, and evaluation of functional capacity. *Clinical Cardiology*, *13*(8), 555–565. https://doi.org/10.1002/clc.4960130809

Jones-Palm, D. H., & Palm, J. (2005). *Physical activity and its impact on behavior among youth.* https://www.icsspe.org/sites/default/files/PhysicalActivity.pdf

Jung, M. E., Bray, S. R., & Ginis, K. A. M. (2008). Behavior change and the Freshman 15: Tracking physical activity and dietary patterns in 1st-year university women. *Journal of American College Health*, *56*(5), 523–530. https://doi.org/10.3200/JACH.56.5.523-530

Kilpatrick, M., Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. *Journal of American College Health*, *54*(2), 87–94. https://doi.org/10.3200/JACH.54.2.87-94

Kim, M., Cardinal, B. J., & Yun, J. (2015). Enhancing student motivation in college and university physical activity courses using instructional alignment practices. *Journal of Physical Education, Recreation & Dance*, *86*(9), 33–38. https://doi.org/10.1080/07303084.2015.1085343

Knittle, K., Nurmi, J., Crutzen, R., Hankonen, N., Beattie, M., & Dombrowski, S. U. (2018). How can interventions increase motivation for physical activity? A systematic review and meta-analysis. *Health Psychology Review*, *12*(3), 211–230. https://doi.org/10.1080/17437199.2018.1435299

Knuth, A. G., & Hallal, P. C. (2009). Temporal trends in physical activity: A systematic review. *Journal of Physical Activity and Health*, *6*(5), 548–559. https://doi.org/10.1123/jpah.6.5.548

Kwan, M. Y., Cairney, J., Faulkner, G. E., & Pullenayegum, E. E. (2012). Physical activity and other health-risk behaviors during the transition into early adulthood: A longitudinal cohort study. *American Journal of Preventive Medicine*, *42*(1), 14–20. https://doi.org/0.1016/j.amepre.2011.08.026

Laaksonen, D. E., Lindström, J., Lakka, T. A., Eriksson, J. G., Niskanen, L., Wikström, K., Aunola, S., Keinanen-Kiukaanniemi, S., Laaksa, M., Valle, T. T., Ilanne-Parikka, P., Louheranta, A., Hamalainen, H., Rastas, M., Salminen, V., Cepaitis, Z., Hakumaki, M., Kaikkonen, H., Harkonen, P., Sundvall, J., Tuomilehto, J., & Uusitupa, M.. (2005). Physical activity in the prevention of type 2 diabetes: The Finnish Diabetes Prevention Study. *Diabetes*, *54*(1), 158–165. https://doi.org/10.2337/diabetes.54.1.158

Levine, J. A., Schleusner, S. J., & Jensen, M. D. (2000). Energy expenditure of nonexercise activity. *American Journal of Clinical Nutrition*, *72*(6), 1451–1454. https://doi.org/10.1093/ajcn/72.6.1451

MacCallum, L., Howson, N., & Gopu, N. (2012). *Designed to move: A physical activity action agenda*. The American College of Sports Medicine, Nike, & The International Councili of Sport Science and Physical Education.

MacDonald Gibson, J., Rodriguez, D., Dennerlein, T., Mead, J., Hasch, T., Meacci, G., & Levin, S. (2015). Predicting urban design effects on physical activity and public health: A case study. *Health and Place*, *35*, 79–84. https://doi.org/10.1016/j.healthplace.2015.07.005

Manley, A. F. (1996). *Physical activity and health: A report of the Surgeon General*. Diane Publishing.

Mansfield, E. D., Ducharme, N., & Koski, K. G. (2012). Individual, social and environmental factors influencing physical activity levels and behaviours of multiethnic socio-economically disadvantaged urban mothers in Canada: A mixed-methods approach. *International Journal of Behavioral Nutrition and Physical Activity*, *9*(1), Article 42.

Martin, R., & Miller, T. (1999). Fielding sport: A preface to politics? *Cultural Politics*, *16*, 1–13.

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: A meta-analysis. *Health Psychology Review*, *5*(2), 97–144. https://doi.org/10.1080/17437199.2010.521684

McMahon, E. M., Corcoran, P., O'Regan, G., Keeley, H., Cannon, M., Carli, V., Wasserman, C., Hadlaczky, G., Sarchiapone, M., Apter, A., Balazs, J., Balint, M., Bobes, J., Brunner, R., Cozman, D., Haring, C., Iosue, M., Kaess, M., Kahn, J.-P., Nemes, B., Podiogar, T., Postuvan, V., Saiz, P., Sisask, M., Tubiana, A., Varnik, P., Hoven, C. W., & Wasserman, D. (2017). Physical activity in European adolescents and associations with anxiety, depression and well-being. *European Child & Adolescent Psychiatry*, *26*(1), 111–122. https://doi.org/10.1007/s00787-016-0875-9

Mehmeti, I., & Halilaj, B. (2018). How to increase motivation for physical activity among youth. *SportMont*, *16*(1), 29–32. https://doi.org/10.26773/smj.180206

Milroy, J. J., Orsini, M. M., D'Abundo, M. L., Sidman, C. L., & Venezia, D. (2015). Physical activity promotion on campus: Using empirical evidence to recommend strategic approaches to target female college students. *College Student Journal*, *49*(4), 517–526.

Mitchell, C., Clark, A., & Gilliland, J. (2016). Built environment influences of children's physical activity: examining differences by neighbourhood size and sex. *International Journal of Environmental Research and Public Health*, *13*(1), 130-133. https://doi.org/10.3390/ijerph13010130

National Center for Chronic Disease Prevention and Health Promotion. (2018). *About chronic diseases*. https://www.cdc.gov/chronicdisease/about/index.htm

National Center for Chronic Disease Prevention and Health Promotion. (2019). *Lack of physical activity*. https://www.cdc.gov/chronicdisease/resources/publications/factsheets/physical-activity.htm

National Center for Education Statistics. (2011). *The NCES Fast Facts Tool provides quick answers to many education questions.* http://nces.ed.gov/fastfacts/display.asp?id=80

National Center for Education Statistics. (2020). *The condition of education: Undergraduate enrollment indicator May 2020.* https://nces.ed.gov/programs/coe/indicator_cha.asp

National Center for Health Statistics. (2001). *Healthy People 2010.* https://doi.org/10.3810/psm.2000.10.1228

Nelson, M. C., Gordon-Larsen, P., Song, Y., & Popkin, B. M. (2006). Built and social environments: Associations with adolescent overweight and activity. *American Journal of Preventive Medicine*, *31*(2), 109–117. https://doi.org/10.1016/j.amepre.2006.03.026

Newton, M. & Duda, J. L. (1999). The interaction of motivational climate, dispositional goal orientations, and perceived ability in predicting indices of motivation. *International Journal of Sport Psychology, 30*(1), 63-82..

NIRSA. (2018). *About NIRSA*. https://nirsa.net/nirsa/about/

Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology*, *71*(2), 225–242. https://doi.org/10.1348/000709901158497

Ntoumanis, N., & Standage, M. (2009). Motivation in physical education classes: A self-determination theory perspective. *Theory and Research in Education*, *7*(2), 194–202. https://doi.org/10.1177/1477878509104324

Oftedal, A., & Schneider, I. (2013). Outdoor recreation availability, physical activity, and health outcomes: County-level analysis in Minnesota. *Journal of Park & Recreation Administration*, *31*(1), 34–56.

Ogden, C. L., & Carroll, M. (2010). *Prevalence of obesity among children and adolescents: United States, trends 1963-1965 through 2007-2008*. Centers for Disease Control and Prevention.

Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *Journal of the American Medical Association*, *303*(3), 242–249. https://doi.org/10.1001/jama.2009.2012

Ogden, C. L., Fakhouri, T. H., Carroll, M. D., Hales, C. M., Fryar, C. D., Li, X., & Freedman, D. S. (2017). Prevalence of obesity among adults, by household income and education—United States, 2011–2014. *Morbidity and Mortality Weekly Report, 66*(50), 1369–1373.

Owen, K. B., Smith, J., Lubans, D. R., Ng, J. Y., & Lonsdale, C. (2014). Self-determined motivation and physical activity in children and adolescents: A systematic review and meta-analysis. *Preventive Medicine*, *67*, 270-279. https://doi.org/10.1016/j.ypmed.2014.07.033

Owen, N., Bauman, A., & Brown, W. (2009). Too much sitting: A novel and important predictor of chronic disease risk? *British Journal of Sports Medicine*, *43*(2), 81–83. https://doi.org/10.1136/bjsm.2008.055269

Owen, N., Leslie, E., Salmon, J., & Fotheringham, M. J. (2000). Environmental determinants of physical activity and sedentary behavior. *Exercise and Sport Sciences Reviews*, *28*(4), 153–158. PMID:11064848

Ozemek, C., Lavie, C. J., & Rognmo, Ø. (2019). Global physical activity levels: Need for intervention. *Progress in Cardiovascular Diseases*, *62*(2), 102-107. https://doi.org/10.1016/j.pcad.2019.02.004

Pate, R. R., O'neill, J. R., & Lobelo, F. (2008). The evolving definition of "sedentary." *Exercise and Sport Sciences Reviews*, *36*(4), 173–178. https://doi.org/10.1097/JES.0b013e3181877d1a

Pate, R. R., Pfeiffer, K. A., Trost, S. G., Ziegler, P., & Dowda, M. (2004). Physical activity among children attending preschools. *Pediatrics*, *114*(5), 1258–1263. https://doi.org/10.1542/peds.2003-1088-L

Plotnikoff, R. C., Costigan, S. A., Williams, R. L., Hutchesson, M. J., Kennedy, S. G., Robards, S. L., Allen, J., Collins, C. E., Callister, R., & Germov, J. (2015). Effectiveness of interventions targeting physical activity, nutrition and healthy weight for university and college students: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1), 45. https://doi.org/10.1186/s12966-015-0203-7

Pratt, M., Varela, A. R., Salvo, D., Kohl, H. W., III, & Ding, D. (2020). Attacking the pandemic of physical inactivity: What is holding us back? *British Journal of Sports Medicine, 54*(13), 760-762. https://doi.org/10.1136/bjsports-2019-101392

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, *51*(3), 390–395. https://doi.org/https://doi.org/10.1037/0022-006X.51.3.390

Prochaska, J. O., & DiClemente, C. C. (1986). Toward a comprehensive model of change. In W. R. Miller & N. Heather (Eds.), *Applied clinical psychology: Treating addictive behaviors: Processes of change* (pp. 3–27). Plenum. https://doi.org/10.1007/978-1-4613-2191-0_1

Pullman, A. W., Masters, R. C., Zalot, L. C., Carde, L. E., Saraiva, M. M., Dam, Y. Y., Simmpson, J. A. R, & Duncan, A. M. (2009). Effect of the transition from high school to university on anthropometric and lifestyle variables in males. *Applied Physiology, Nutrition, and Metabolism*, *34*(2), 162–171. https://doi.org/10.1139/H09-007

Racette, S. B., Deusinger, S. S., Strube, M. J., Highstein, G. R., & Deusinger, R. H. (2008). Changes in weight and health behaviors from freshman through senior year of college. *Journal of Nutrition Education and Behavior*, *40*(1), 39–42. https://doi.org/10.1016/j.jneb.2007.01.001

Reilly, J. J. (2005). Descriptive epidemiology and health consequences of childhood obesity. *Best Practice & Research Clinical Endocrinology & Metabolism*, *19*(3), 327–341. https://doi.org/10.1016/j.beem.2005.04.002

Reilly, J. J., Armstrong, J., Dorosty, A. R., Emmett, P. M., Ness, A., Rogers, I., Steer, C., Sherriff, A., & Avon Longitudinal Study of Parents and Children Study Team. (2005). Early life risk factors for obesity in childhood: Cohort study. *British Medical Journal*, *330*(7504), Article 1357. https://doi.org/10.1136/bmj.38470.670903.E0

Reilly, J. J., Methven, E., McDowell, Z. C., Hacking, B., Alexander, D., Stewart, L., & Kelnar, C. J. H. (2003). Health consequences of obesity. *Archives of Disease in Childhood*, *88*(9), 748–752. https://doi.org/10.1136/adc.88.9.748

Reinboth, M., & Duda, J. L. (2004). The motivational climate, perceived ability, and athletes' psychological and physical well-being. *The Sport Psychologist*, *18*(3), 237-251. https://psycnet.apa.org/doi/10.1123/tsp.18.3.237

Ridley, K., Ainsworth, B. E., & Olds, T. S. (2008). Development of a compendium of energy expenditures for youth. *International Journal of Behavioral Nutrition and Physical Activity*, *5*(1), 45–52. https://doi.org/10.1186/1479-5868-5-45

Roberts, G. C., & Duda, J. L. (1984). Motivation in sport: The mediating role of perceived ability. *Journal of Sport Psychology*, *6*(3), 312-324. https://doi.org/10.1123/jsp.6.3.312

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford.

Sallis, J. F. (2000). Age-related decline in physical activity: A synthesis of human and animal studies. *Medicine and Science in Sports and Exercise*, *32*(9), 1598–1600. https://doi.org/10.1097/00005768-200009000-00012

Sallis, J. F., Floyd, M. F., Rodríguez, D. A., & Saelens, B. E. (2012). Role of built environments in physical activity, obesity, and cardiovascular disease. *Circulation*, *125*(5), 729–737. https://doi.org/10.1161/CIRCULATIONAHA.110.969022

Sallis, J. F., & Glanz, K. (2006). The role of built environments in physical activity, eating, and obesity in childhood. *Future of Children*, *16*(1), 89–108. https://doi.org/10.1353/foc.2006.0009

Salmon, J., Owen, N., Crawford, D., Bauman, A., & Sallis, J. F. (2003). Physical activity and sedentary behavior: A population-based study of barriers, enjoyment, and preference. *Health Psychology*, *22*(2), 178–188. https://doi.org/0.1037//0278-6133.22.2.178

Schnohr, P., Scharling, H., & Jensen, J. S. (2003). Changes in leisure-time physical activity and risk of death: An observational study of 7,000 men and women. *American Journal of Epidemiology*, *158*(7), 639–644. https://doi.org/10.1093/aje/kwg207

Scott, D., & Willits, F. K. (1989). Adolescent and adult leisure patterns: A 37-year follow-up study. *Leisure Sciences*, *11*(4), 323–335. https://doi.org/10.1080/01490408909512230

Scott, D., & Willits, F. K. (1998). Adolescent and adult leisure patterns: A reassessment. *Journal of Leisure Research*, *30*(3), 319–330.

Shaw, L. K. (2008). *Transition variables and the Personality Assessment Inventory in university counseling centers* (Unpublished doctoral dissertation, University of Tennessee, Knoxville).

Shephard, R. J. (1997). Curricular physical activity and academic performance. *Pediatric Exercise Science*, *9*(2), 113–126. https://doi.org/10.1123/pes.9.2.113

Singh, A. S., Mulder, C., Twisk, J. W. R., Van Mechelen, W., & Chinapaw, M. J. M. (2008). Tracking of childhood overweight into adulthood: A systematic review of the literature. *Obesity Reviews*, *9*(5), 474–488. https://doi.org/10.1111/j.1467-789X.2008.00475.x

Spreitzer, E., & Snyder, E. E. (1989). Sports involvement and quality of life dimensions. *Journal of Sport Behavior*, *12*(1), 3–11.

Standage, M., Duda, J. L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology*, *95*(1), 97-110. https://psycnet.apa.org/record/2003-01605-009

Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, *75*(3), 411–433. https://doi.org/10.1348/000709904X22359

Staurowsky, E. J., DeSousa, M. J., Ducher, G., Gentner, N., Miller, K. E., Shakib, S., Theberge, N., & Williams, N. (2009). *Her life depends on it II: Sport, physical activity, and the health and well-being of American girls and women.* Women's Sports Foundation

Steptoe, A. S., & Butler, N. (1996). Sports participation and emotional well-being in adolescents. *The Lancet*, *347*(9018), 1789–1792. https://doi.org/10.1016/s0140-6736(96)91616-5

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *9*, Article 78.. https://doi.org/10.1186/1479-5868-9-78

Trost, S. G., Kerr, L. M., Ward, D. S., & Pate, R. R. (2001). Physical activity and determinants of physical activity in obese and non-obese children. *International Journal of Obesity*, *25*(6), 822–829. https://doi.org/10.1038/sj.ijo.0801621

Trudeau, F., & Shephard, R. J. (2008). Physical education, school physical activity, school sports and academic performance. *International Journal of Behavioral Nutrition and Physical Activity*, *5*(1), 10-19. https://doi.org/10.1186/1479-5868-5-10

U.S. Department of Health and Human Services. (2014). *Physical activity guidelines for Americans, 2008.*

U.S. Department of Health and Human Services. (2018). *Physical activity guidelines for Americans* (2nd ed.). https://health.gov/paguidelines/second-edition/pdf/Physical_Activity_Guidelines_2nd_edition.pdf

U.S. Department of Labor, Bureau of Labor Statistics. (2016). *College enrollment and work activity of recent high school and college graduates: Summary*. https://www.bls.gov/news.release/hsgec.nr0.htm

Ussher, M. H., Owen, C. G., Cook, D. G., & Whincup, P. H. (2007). The relationship between physical activity, sedentary behaviour and psychological well-being among adolescents. *Social Psychiatry and Psychiatric Epidemiology*, *42*(10), 851–856. https://doi.org/10.1007/s00127-007-0232-x

van Uffelen, J. G. Z., Khan, A., & Burton, N. W. (2017). Gender differences in physical activity motivators and context preferences: A population-based study in people in their sixties. *BMC Public Health*, *17*(1), 624–635. https://doi.org/10.1186/s12889-017-4540-0

VanderZwaag, H. J. (1988). *Policy development in sport management*. Benchmark Press.

Wald, A., Muennig, P. A., O'Connell, K. A., & Garber, C. E. (2014). Associations between healthy lifestyle behaviors and academic performance in US undergraduates: A secondary analysis of the American College Health Association's National College Health Assessment II. *American Journal of Health Promotion*, *28*(5), 298–305. https://doi.org/10.4278/ajhp.120518-QUAN-265

Wankel, L. M., & Berger, B. G. (1990). The psychological and social benefits of sport and physical activity. *Journal of Leisure Research*, *22*, 167–182. https://doi.org/10.1080/00222216.1990.11969823

Warburton, D. E. R., Nicol, C. W., & Bredin, S. S. D. (2006). Health benefits of physical activity: The evidence. *Canadian Medical Association Journal, 174*(6), 801–809. https://doi.org/10.1503/cmaj.051351

Waters, H., & Graf, M. (2018). *The costs of chronic disease in the US*. The Milken Institute.

Whelton, S. P., Chin, A., Xin, X., & He, J. (2002). Effect of aerobic exercise on blood pressure: A meta-analysis of randomized, controlled trials. *Annals of Inernal Medicine, 136*(7), 493–503. https://doi.org/10.7326/0003-4819-136-7-200204020-00006

Wilcox, S., Irwin, M. L., Addy, C., Ainsworth, B. E., Stolarczyk, L., Whitt, M., & Tudor-Locke, C. (2001). Agreement between participant-rated and compendium-coded intensity of daily activities in a triethnic sample of women ages 40 years ears and older. *Annals of Behavioral Medicine*, *23*(4), 253–262. https://doi.org/10.1207/S15324796ABM2304_4

World Health Organization. (2020a). *Constitution*. https://www.who.int/about/who-we-are/constitution

World Health Organization (2020b). *Physical activity.* https://www.who.int/health-topics/physical-activity

World Health Organization. (2009). *Global health risks: Mortality and burden of disease attributable to selected major risks*.

World Health Organization. (2010). *Global recommendations on physical activity for health*. https://doi.org/10.1080/11026480410034349

World Health Organization. (2014). *Physical inactivity: A global public health problem*.

World Health Organization. (2017). *About social determinants of health*.

Yang, X., Telama, R., Leino, M., & Viikari, J. (1999). Factors explaining the physical activity of young adults: the importance of early socialization. *Scandinavian Journal of Medicine & Science in Sports*, *9*(2), 120–127. https://doi.org/10.1111/j.1600-0838.1999.tb00220.x

Yli-Piipari, S., Layne, T., Hinson, J., & Irwin, C. (2018). Motivational pathways to leisure-time physical activity participation in urban physical education: A cluster-randomized trial. *Journal of Teaching in Physical Education*, *37*(2), 123–132. https://doi.org/10.1123/jtpe.2017-0099

APPENDIX

STUDY QUESTIONNAIRE

Age

Please specify your age group

A. 17 years of age or younger
B. 18-20 years of age
C. 21-22 years of age
D. 23-25 years of age
E. 26-30 years of age
F. 31 years of age or older
G. Prefer not to answer (You must indicate that you are 18 years of age or older to participate)

Ethnicity

Please specify your ethnicity

A. African American
B. Asian
C. Caucasian/ White
D. Latino or Hispanic
E. Native American
F. Native Hawaiian or Pacific Islander
G. Two or More
H. Other/Unknown
I. Prefer not to answer

Gender

What gender do you identify as?

A. Female
B. Male
C. Prefer not to answer

Academic Classification

What was your academic classification at the time of enrollment in your most recent Physical Activity Course?

A. Freshman
B. Sophomore
C. Junior
D. Senior
E. Graduate Student
F. I don't remember.
G. I prefer not to answer.

Cultural Capital Collegiate Experience: (Ward, L., Siegel, M. J., & Davenport, 2012)

Which of the following best describes your generational status classification?

A. My parent(s) did not attend any college (First Generation College Student)

B. My parent(s) attended some college (Non-First-Generation College Student)

Abbreviated Perceived Motivational Climate in Exercise Questionnaire

During PE class…
1. The teacher(s) encourage students to try new skills.
2. Students of all fitness levels are made to feel valued.
3. Students are rewarded and noticed when they try hard.
4. The teacher(s) encourage students to help each other.
5. The teacher(s) emphasize always trying your best.
6. The focus is to keep improving on each exercise/skill each class.
7. Students are hesitant/embarrassed to ask the teacher(s) or other students for help.
8. The teacher(s) give most of his/her attention to only a few students.
9. Students feel embarrassed if they don't know how to perform an exercise/skill.
10. The teacher(s) make it clear who he/she thinks are the most fit and/or most skilled students.
11. Students are encouraged to do better than other students.
12. Students are excited when they do better than their fellow peers.

The Basic Psychological Needs in Physical Education Scale (BPN-PE)

In general in PE . . .
1. I feel that I improve even in the tasks considered difficult by most of the students
2. My relationships with my classmates are very friendly
3. We do things that are of interest to me
4. I feel I perform correctly even the tasks considered difficult by most of the students
5. I feel like I have a close bond with my classmates
6. I feel that the way PE is taught is the way I would like to
7. I feel I do very well even in the tasks considered difficult by most of the students
8. I feel like a valued member of a group of close friends
9. I feel that the way classes are taught is a true expression of who I am
10. I am able to succeed even in the lessons considered difficult by most of the students
11. I feel like I belong to a large group of close friends
12. I feel like the activities we are doing have been chosen by me

Intrinsic Motivation Inventory (Interest/Enjoyment subscale)

1. I enjoyed doing this activity very much
2. This activity was fun to do.
3. I thought this was a boring activity. (R)
4. This activity did not hold my attention at all. (R)
5. I would describe this activity as very interesting.
6. I thought this activity was quite enjoyable.
7. While I was doing this activity, I was thinking about how much I enjoyed it.