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The extant research exploring the relationship between physical activity and self-esteem lacks samples of young adults as well as individuals from racially and ethnically diverse populations. Racial and ethnic minorities and young adults are not appropriately represented in the literature which creates an issue for generalizability of findings from research. The purpose of this study was to test the relationship between the time young adults spend engaging in physical activity behaviors over the course of a week and their reported global self-esteem, physical self-worth, and the sub-domains of sports competence, physical condition, body attractiveness, and physical strength. It was hypothesized that individuals who report more time doing physical activity would also report higher levels of self-esteem and that this relationship would vary depending on the participants' race and/or ethnicity and gender. Individuals were recruited from an undergraduate course offered in the Department of Kinesiology at UNCG and completed a Qualtrics survey of questionnaires regarding their physical activity habits, global self-esteem, physical self-worth and the aforementioned sub-domains of self-esteem. The participants who completed this study (n=179) primarily identified as a race(s) besides white, Non-Hispanic, and female. On average, participants engaged in 66.4 minutes (SD=50.09) of moderate-to-vigorous physical activity each day and had a mean global self-esteem score of 19.08 (SD=4.89) out of a possible score of 40. Physical activity was correlated with physical strength (Pearson's r=.186), sport competence (Pearson's r=.229), and physical condition (Pearson's r=.269), hence significant main effects for these variables are not further described in regression analyses. There was a significant interaction of race and physical activity for global self-esteem, such that although white participants reported higher baseline global self-esteem, increased physical activity was associated with higher global self-esteem for black participants more than for whites. In regression analyses with race, there were main effects of race for body attractiveness and global self-esteem. No significant main

effects of ethnicity or interactions involving ethnicity were found. Limitations to this study include that many of the participants were kinesiology majors and data was collected during the Covid-19 pandemic. A strength of this study is the representation of race and ethnicity which contributes to the generalizability of the findings. The results of this study are important as understanding how physical activity impacts global and physical self-esteem across demographic groups is necessary for more effectively encouraging engagement in physical activity for a diverse group of people.

UNDERSTANDING THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND SELF-ESTEEM WITH RACE AND ETHNICITY AS MODERATORS: A CROSS-SECTIONAL SURVEY ANALYSIS

by

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CHAPTER I: INTRODUCTION

Self-esteem is an evaluation of an individual's view of their self, and it is important for individuals to strive for high levels of self-esteem (Fox, 2000). Individuals with high self-esteem have been shown to be more resilient and satisfied with life, whereas low self-esteem has been associated with depression and feelings of hopelessness (Fox, 2000). There is a great deal of research exploring how self-esteem can be impacted by physical activity, and the literature generally supports that physical activity has a positive influence on how people judge their self-esteem. Shavelson et al. (1976) developed a hierarchical structure of self-esteem, with global self-esteem being at the pinnacle of the model and several domains branched below (see Figure 1).

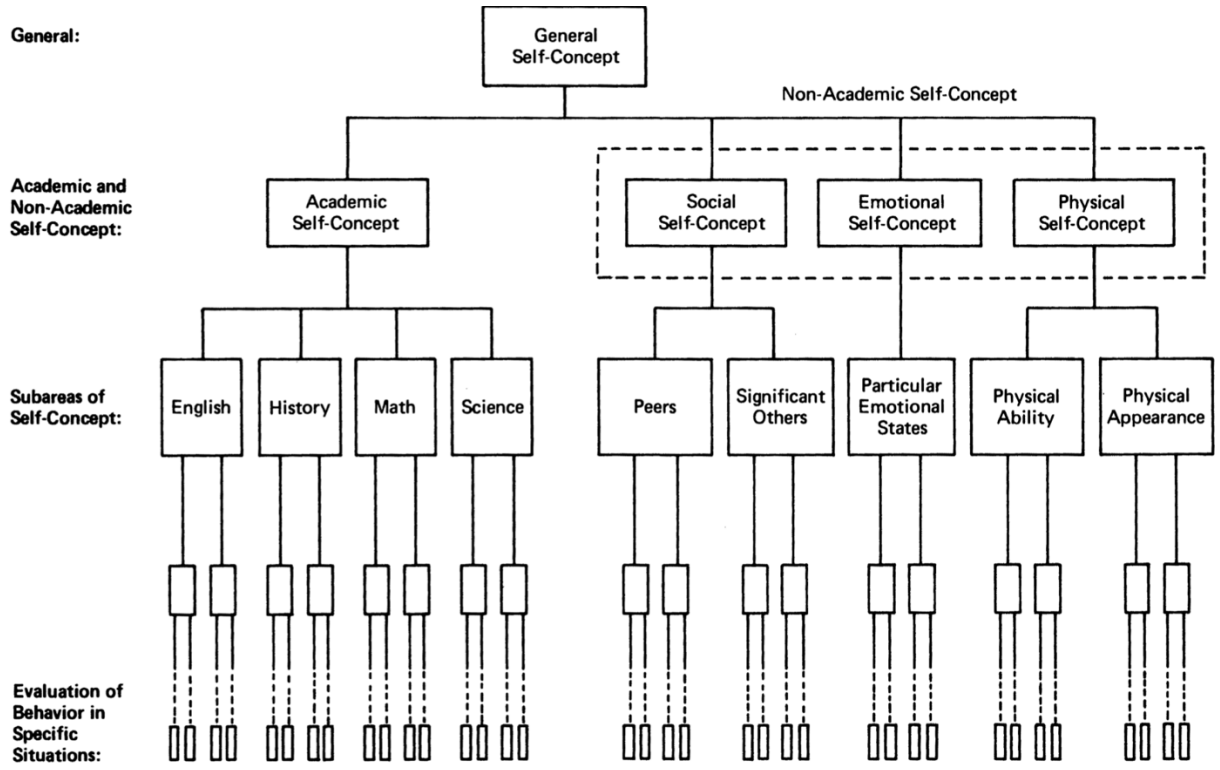

Figure 1. Shavelson et al. (1976) self-esteem model

One of these domains, physical self-esteem, was broken into the sub-domains of physical competence and physical appearance by Sonstroem and Morgan (1989), who proposed a model wherein physical self-efficacy impacts these two sub-domains, further affecting the larger domain (see Figure 2). Fox and Corbin (1989) also expanded on the domain of physical self-esteem, which they termed physical self-worth, and identified the following sub-domains: sports competence, attractive body, physical strength, and physical condition (see Figure 3). Much of the literature delving into the relationship between physical activity and self-esteem is interested in global self-esteem, the domain of physical self-worth, and its sub-domains as described by Fox and Corbin.

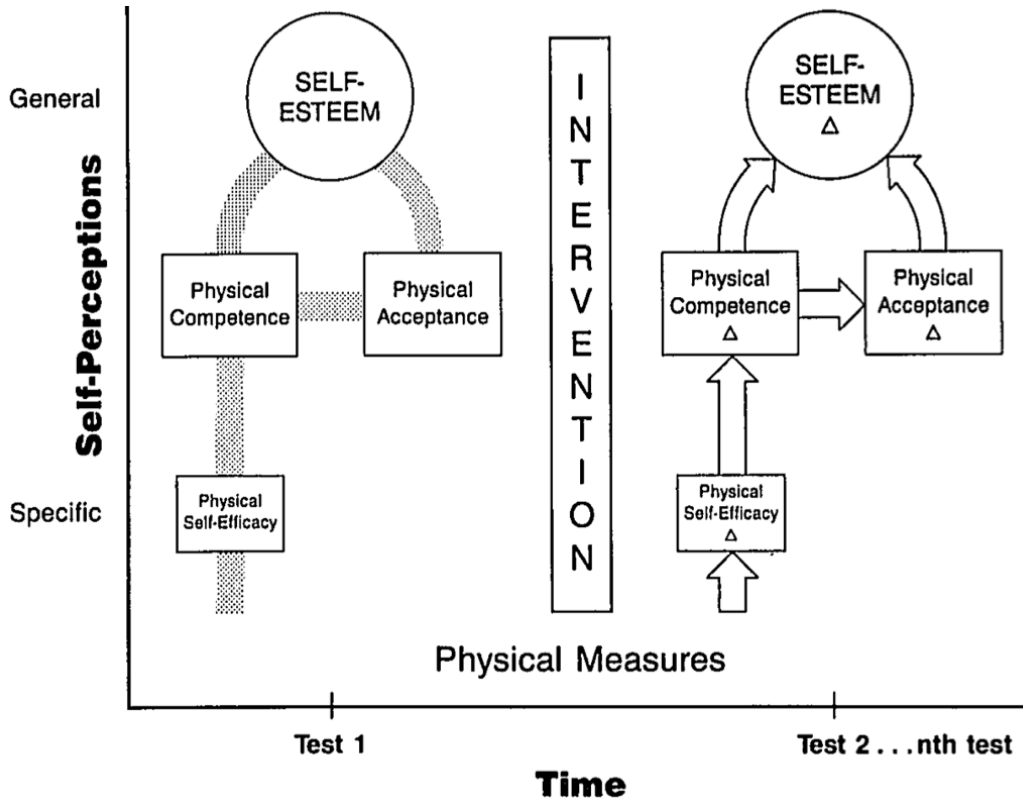

Figure 2. Sonstroem & Morgan (1989) self-esteem model

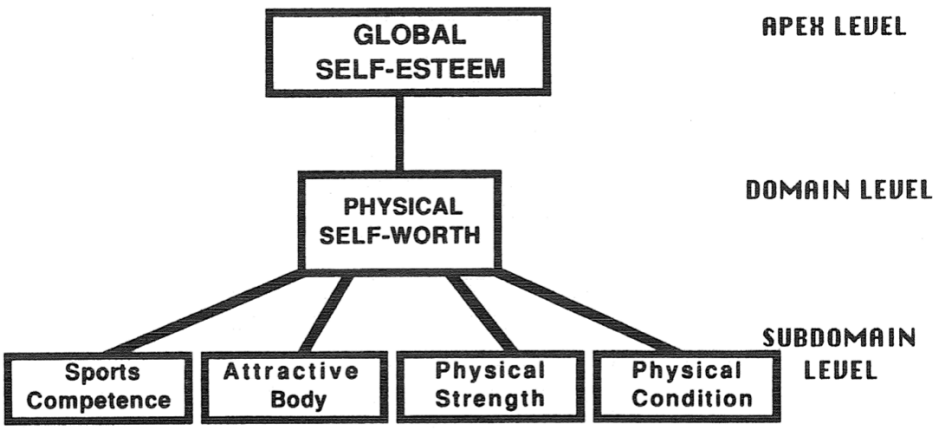

Figure 3. Fox & Corbin (1989) self-esteem model

Studies in this line of research reflect various approaches to navigating the connection between physical activity and self-esteem including studying self-esteem in response to chronic exercise interventions or acute bouts of physical activity, as well as conducting surveys of self-reported physical activity behavior and self-esteem. Reviews of the literature have reported mixed findings of the role of physical activity with self-esteem. Spence et al. (2005) demonstrated that physical activity has positive effects on self-esteem with an average weighted effect size of d+ = 0.23. Ekeland et al. (2005) found mixed results in their systematic review of physical activity interventions and their associations with changes in self-esteem such that some of the included studies yielded a positive influence of physical activity to self-esteem while others did not.

There are not many studies published which measured the effects of an exercise intervention with self-esteem in a sample of young adults; however, the studies of this age group reflect benefits to self-esteem at the global level and for the sub-domains of physical self-worth (Hasanpour et al., 2014; Legrand, 2014; Yìğìter, 2014). Acute bouts of physical activity have mostly featured samples of individuals around the age of 40, though younger and older participants have also been recruited (Ellingsen et al., 2018; Ellis et al., 2013; Randall et al., 2014; Rogerson et al., 2016). These studies of acute exercise and self-esteem have mostly found positive associations between the two

variables. Surveys based on self-report data of physical activity habits of participants and self-esteem have also generally supported positive correlations of physical activity and self-esteem (Guinn et al., 1997; Janjhua et al., 2020; McPhie & Rawana, 2012; Misra et al., 1996), though most of these studies were from samples of older adults or adolescents, ignoring the young adult age group.

There are two major gaps in the literature of physical activity and self-esteem across the previously described methodologies. A great deal of published research ignores racial and ethnic diversity either by including samples of upwards of 80% white participants (e.g.,Awick et al., 2017; Elavsky & McAuley, 2007; Ellis et al., 2013; Furnham et al., 2002; Gothe et al., 2011; McAuley et al., 2000; Randall et al., 2014; Tiggemann & Williamson, 2000) or failing to describe the racial and ethnic demographics of the samples at all (e.g. Barton et al., 2012; Ekeland et al., 2005; Legrand, 2014; McAuley et al., 1997; Opdenacker et al., 2009; Papaioannou et al., 2013; Rogerson et al., 2016; Scully et al., 1998). By not describing this demographic information and including such racially and ethnically homogenous samples, these authors are restricting the generalizability of their findings and may be missing important information about potentially unique relationships relative to race or ethnicity. Both Pearce (1999) and McArthur and Raedeke (2009) show that racial and ethnic minorities participate in less physical activity than individuals who identify as white. Given this discrepancy in physical activity habits, it is important to consider how these individuals' physical activity behavior is connected to their self-esteem. Another missing piece of the literature is the lack of inclusion of young adults as participants. As has been described, many studies focus on adolescents or older adults; yet, very few report findings from young adult participants. It appears, from the few studies published with young adult participants, that physical activity can improve self-esteem for this age group; so, it is key to continue building upon the literature of this relationship with young adults.

The purpose of this study is to survey individuals between the ages of 18 to 25 years about their demographics, physical activity behavior, and their self-esteem at two levels: global self-esteem and the sub-domains of physical self-worth as described by Fox and Corbin (1989). The relationship between the frequency and duration of physical activity over the last seven days and global and sub-domain self-esteem will be measured, and race and ethnicity will be analyzed as potential moderators to this relationship. It is hypothesized that more time spent engaging in physical activity will be associated with higher self-esteem. It is also hypothesized that the race and ethnicity of the participants will serve as a moderator to the connection between physical activity behavior and self-esteem.

CHAPTER II: LITERATURE REVIEW

Self-esteem is defined as an individual's regard for their feeling of worth and evaluation of their self (Sonstroem & Morgan, 1989). High self-esteem has been associated with benefits including resilience to life stressors, emotional stability, and being a high achiever in work and school; conversely, low self-esteem has been linked to detriments such as anxiety, feelings of hopelessness, and the perception of life being out of personal control (Fox, 2000). Thus, it is important to understand methods of improving an individual's self-esteem.

Several models of self-esteem have been posited in the literature, with the most prominent being a hierarchical structure. Shavelson et al. (1976) proposed a comprehensive model of self-esteem, or self-concept (Figure 1). Shavelson et al. (1976) place global self-esteem at the top of the model and then identify four domains: academic self-esteem, social self-esteem, emotional self-esteem, and physical self-esteem. Research on exercise and self-esteem is located in the physical self-esteem domain of the model, which has sub-domains of physical ability and physical appearance. Self-concept and self-esteem are often used interchangeably with this model given that at the time of the development of the model there was not a clear difference in definition between the two; Sonstroem & Morgan (1989) renamed the Shavelson et al. (1976) model using self-esteem in place of self-concept, and self-esteem will hereafter replace self-concept. Sonstroem and Morgan (1989) constructed a model that further branched the sub-domains of physical self-esteem and posited that physical self-efficacy was a factor of physical ability, which they renamed physical competence. This theoretical model, termed the Exercise and Self-Esteem Model (EXSEM), suggests that change to physical self-efficacy, an individual's belief in their ability to perform physical activity, contributes to change in the umbrella domain of physical competence. The change to physical competence directly and indirectly leads

to change in global self-esteem through effects to physical appearance (Figure 2). Fox and Corbin (1989) developed another model that went into detail for the physical self-esteem domain of the Shavelson et al. hierarchy (Figure 3). In this model, physical self-esteem goes by the term physical self-worth and has the sub-domains of sports competence, attractive body, physical strength, and physical condition.

A great deal of research has been conducted analyzing the relationship between physical activity and exercise with global and physical self-esteem in individuals across diverse populations. Several instruments have been developed to measure these two factors. Fox and Corbin (1989) developed the Physical Self-Perception Profile (PSPP) which individually measures the previously mentioned sub-domains of physical self-worth domain. The PSPP is used in many research studies to measure sub-domains of physical self-worth (e.g. Awick et al., 2017; Awick, Phillips et al., 2017; Elavsky, 2010; Elavsky & McAuley, 2007; Gothe et al., 2011; McAuley et al., 1997, 2000; Opdenacker et al., 2009). Rosenberg (1965) developed a measure of global self-esteem which utilizes a continuum on which people can rank higher or lower for their self-esteem according to items in the scale which assess positive and negative views of the self. The Rosenberg (1965) Self-Esteem Scale (RSES) is a concise and easy to use measuring tool and has been used in a vast number of studies (e.g. Awick et al., 2017; Awick, Phillips, et al., 2017; Barton et al., 2012; Elavsky, 2010; Elavsky & McAuley, 2007; Ellingsen et al., 2018; Ellis et al., 2013; Flowers et al., 2018). The RSES and PSPP are often used together to quantify the sub-domains of physical self-worth in conjunction with global self-esteem. Much of the literature implicates positive impacts on self-esteem from physical activity (Barton et al., 2012; Elavsky & McAuley, 2007; Ellis et al., 2013; García-Martínez et al., 2012; Hasanpour et al., 2014; Janjhua et al., 2020; Legrand, 2014; McAuley et al., 1997, 2000; Misra et al., 1996; Ng & Tam, 2000; Opdenacker et al., 2009; Randall et al., 2014; Rogerson et al., 2016; Spence et al., 2005; Yiğiter, 2014).

Studies demonstrating this positive relationship have been conducted in several different ways. Some of the existing research followed exercise interventions to assess changes to self-esteem in relation to the effects of exercise (Awick et al., 2017; Awick, Phillips et al., 2017; Barton et al., 2012; Elavsky & McAuley, 2007; García-Martínez et al., 2012; Gothe et al., 2011; Guimarães et al., 2020; Hasanpour et al., 2014; Legrand, 2014; McAuley et al., 1997, 2000; Ng & Tam, 2000; Opdenacker et al., 2009; Yiğiter, 2014). Other studies in the literature utilized acute exercise to draw a comparison between self-esteem both before and after a single session of exercise (Ellingsen et al., 2018; Ellis et al., 2013; Flowers et al., 2018; Randall et al., 2014; Rogerson et al., 2016). Cross-sectional research and surveys (Furnham et al., 2002; Guinn et al., 1997; Janjhua et al., 2020; McPhie & Rawana, 2012; Misra et al., 1996; Papaioannou et al., 2013; Tiggemann & Williamson, 2000). The cross-sectional studies typically measure the physical activity-related habits of participants and how they are connected to self-esteem. Additionally, several reviews exploring self-esteem and physical activity have been conducted (Ekeland et al., 2005; Fox, 2000; Raglin, 1990; Scully et al., 1998; Spence et al., 2005).

Included in the scope of this review are analyses of the relationship from physical activity and exercise to global and sub-domain self-esteem through methodologies such as exercise interventions, acute bouts of exercise, cross-sectional surveys, and literature reviews. While some of the studies that are included in the review did also assess variables in addition to physical activity and self-esteem, those methods and findings will not be discussed as they are irrelevant to the topic of interest.

Exercise Interventions

Much of the existing literature has examined effects of exercise interventions on the self-esteem of participants. Research utilizing exercise interventions has been conducted with rather limited age groups of primarily older adults (Awick et al., 2017; Awick, Phillips, et al., 2017; Gothe et al., 2011; Guimarães et al., 2020; Opdenacker et

al., 2009) and middle-aged adults (Elavsky & McAuley, 2007; García-Martínez et al., 2012; McAuley et al., 1997; Ng & Tam, 2000). It is important to make clear that little research has studied this relationship of physical activity and self-esteem in samples of adolescents and young adults (Hasanpour et al., 2014; Legrand, 2014; Yiğiter, 2014). Given that there is such a vast amount of published research in this literature, it is surprising that there is such a lack of emphasis on studying young people.

Older Adults

Opdenacker et al. (2009) conducted a study with sedentary older adults in which they assigned participants to one of two exercise interventions lasting 11 months in comparison to a non-exercise control. Participants in the exercise condition were randomized into either a structured exercise program in a supervised fitness facility or a lifestyle exercise home-based program. The structured group met three times per week for sessions lasting between an hour and 90 minutes which included training to improve balance, flexibility, strength, and endurance. Individuals in the lifestyle exercise program received information on incorporating exercise into their daily lives through adding aerobic activities and strength training. Dutch versions of the RSES and PSPP were taken by the participants prior to being assigned to a condition, at baseline before physical activity programs started, at the completion of the program, and at one-year post-intervention. Results from the study show a significant increase in the physical condition sub-domain of self-esteem for exercise conditions compared to the control condition which persisted through the one-year follow-up, as well as significant improvements in body attractiveness and physical self-worth for the lifestyle physical activity program, though only the increase in the body attractive scores stayed significant at the time of the one-year follow-up.

Gothe et al. (2011) also studied sedentary older adults who were randomized into a walking or flexing-toning-balance group, and the individuals took part in their respective exercise program for 12 months. Both exercise groups were supervised and met three

times per week to complete moderate-intensity exercise. The walking group increased in the intensity and length of time at which they were walking, and the flexing-toning-balance group completed resistance exercises and yoga. While a significant change to global self-esteem was not found through the interventions and there was no correlation between changes in physical self-worth and global self-esteem, changes to general physical self-worth and sub-domains of physical condition, attractive body, and strength were found and showed correlations with improved physical self-worth.

Awick et al. (2017) also studied sedentary older adults and randomized participants into a home-exercise intervention or a control. The participants in the exercise intervention received DVDs with exercises that focus on flexing, toning, and balance; the control group received DVDs about healthy aging. Both conditions lasted for six months, and the RSES and PSPP were collected prior to the beginning of the interventions, at the completion of the interventions, and at 6 months after the interventions as a follow-up. The home-exercise group did show an increase to scores on the self-esteem sub-domain of physical self-worth; however, global self-esteem was improved for both the exercise group and control condition.

Guimarães, Cardoso, and Lima (2020) studied sedentary older adults to determine effects of regular yoga sessions on self-esteem and self-image in comparison to a control group that did not exercise. After completing three 60-minute long sessions of yoga per week for three months, the exercise group demonstrated a significant increase to both self-esteem and self-image from pre- to post-intervention when compared to the non-exercise control group.

McAuley and colleagues (2000) studied the implications to self-esteem of a six-month walking or stretching and toning program in a sample of sedentary older adults who were randomized to one of the two conditions. Participants in each condition met three times per week for the duration of the six-month intervention and completed the RSES

and PSPP on three occasions: prior to beginning the exercise program, at the conclusion of the program, and six-months following the end of the program. Results from these participants showed significant increases to both global and sub-domain measures of self-esteem, the stretching and toning group showed more growth to the sub-domain of strength esteem, although both groups saw slight decreases in self-esteem at the six-month follow-up measure relative to the post-intervention score.

Middle-Aged Adults

A primary goal of Elavsky and McAuley (2007) was to draw comparisons between two exercise conditions and a control group in a sample of middle-aged women categorized as either sedentary or low active. Participants were randomized into one of three conditions: yoga, walking, control. The yoga and walking groups took part in exercise lasting 90 minutes twice per week or 60 minutes three times per week, respectively, for four months; conversely, the participants in the control condition did not exercise. Following the intervention period, the RSES and PSPP revealed that the walking group improved in self-esteem when compared to the yoga and control group and that the walking group had increased self-esteem in the sub-domains of physical condition and physical strength. The sub-domain of body attractiveness was also improved in the walking condition and the yoga group, but not for the control. Elavsky (2010) followed up on the longitudinal effects of the original intervention from Elavsky and McAuley on participants' self-esteem after two years. The participants who agreed to take part in this follow-up analysis completed the RSES as well as the PSPP. The results showed that increases in sub-domains of self-esteem such as attractive body and physical condition, as measured by the PSPP, were significantly affiliated with improvements to physical self-worth which contributed to improvements in the participants' global self-esteem at two years post-intervention.

McAuley et al. (1997) were interested in measuring changes in global and sub-domain self-esteem through an exercise intervention and also looked at physical self-esteem as

a mediator to changes in physical self and global self-esteem. A sample of middle-aged adults participated in a 20-week long aerobic exercise intervention wherein they completed three sessions of walking per week, with the sessions increasing in duration as time progressed. The participants showed a significant increase to their global self-esteem following the exercise program and improvements to physical self-worth and physical condition as measured by the PSPP and RSES, but no significant change to the sub-domain of attractive body. Through hierarchical regression analyses, physical self-worth was determined to mediate the changes between global self-esteem and the sub-domains of physical condition and attractive body.

Ng and Tam (2000) recruited a sample of primarily middle-aged participants who had been diagnosed with cardiac disease and had recovered from cardiac surgery to study changes in self-esteem through physical activity. The study consisted of a two-month aerobic and resistance exercise program compared to a control. Given that the objective of the study was to examine how both the physical and psychological well-being of participants would be affected by an exercise program, a measure of self-esteem was administered to the participants. The results of the study showed that the participants in the exercise program had significant improvements to their self-esteem, and that individuals below the age of 60 who took part in the study showed significant correlations between their mobility skills and their self-esteem.

García-Martínez et al. (2012) studied a sample of middle-aged women, on average around age 59, with fibromyalgia who were randomly assigned to an exercise group or a control group. The exercise group took part in hour-long sessions three times per week for 12 weeks and focused on aerobic and resistance training exercises. A primary goal of the research was to analyze changes to both self-esteem and self-concept after physical activity. The findings showed significant increases to measures of self-esteem for the exercise group that were not present in the control group, providing more support of the notion that physical activity is beneficial for an individual's self-esteem.

Barton et al. (2012) worked with a sample of participants (M=53 yrs, SD=15 yrs) who received various mental health diagnoses and allocated participants to attend sessions for one of the following activities once a week for a maximum of six weeks: swimming, green exercise (outdoor walks), or social activity. The RSES was administered to the participants after each exercise or social activity session, and the results of the study showed that self-esteem improved significantly following a single bout of either green exercise or swimming, but not social activity.

Awick, Phillips, et al. (2017) used the subscale of physical self-worth from the PSPP and the RSES to study connections between self-esteem and physical activity in middle-aged women who had survived breast cancer. The participants of the study wore an accelerometer for six months to track physical activity and measures of self-efficacy and self-esteem were given at the start and end of the six months. Results revealed that the participants who engaged in more physical activity over the course of the six-months reported higher scores of self-efficacy and further, the women who reported higher self-efficacy were more likely to also endorse a higher score on the self-esteem sub-domain of physical self-worth which was also associated with global self-esteem.

Young Adults

Hasanpour et al. (2014) conducted a study on the effects of an 8-week aerobic exercise intervention on self-esteem in a sample of individuals aged 13 to 19 years old who were orphaned girls. The participants of the study were randomized either to a control group or the aerobic exercise condition. Exercisers met three times per week for 60-minute sessions of aerobic exercise. A measure of self-esteem was given to the participants at baseline, post-intervention, and at a one-month follow-up. The results showed a significant increase in self-esteem for the exercise group that persisted through the follow-up assessment which was not present for the control group. Although the self-

esteem score for the exercise group decreased slightly from post-intervention to the follow-up, it was still significantly higher than the score of the control group.

Legrand (2014) studied a sample of 44 low-income women aged (18- 35 yrs) who either had depression or reported low-mood. Legrand assessed physical activity and participants' depressive symptoms as mediated by global self-esteem, physical self-esteem, and physical self-perceptions. The participants were randomly assigned to either an exercise condition or control, with the exercisers attending two sessions per week of aerobic activity for seven weeks. One day per week the participants were instructed to do fast walking or jogging for 30 minutes and the other day was a group Zumba class lasting around 45 minutes. Following the intervention, the participants in the exercise group showed significant increases to their global and physical self-esteem, with the biggest changes to esteem occurring between the second and fourth weeks of the program and then remaining steady through the end of the program. However, proper statistical analysis to test the hypothesis of self-esteem as mediating changes to depressive symptoms through physical activity were not conducted, thus a conclusion cannot be made regarding mediation.

Yìğìter (2014) assigned 40 female university students to a control condition and another 40 were put into the exercise group. The exercise participants completed three sixty-minute sessions of aerobic and sport activities for twelve weeks. The exercisers could take part in activities including walking, swimming, and tennis, among other aerobic activities. When compared to the control group, the results showed significant increases to global self-esteem from the start of the exercise program to when it was measured post-intervention.

Given the expanse of literature regarding middle-aged and older adults, the need for more research exploring the relationship between physical activity and self-esteem in young adults is clear. Generally, findings from studies that measure self-esteem

following a physical activity intervention lasting at least a few weeks are in support of a positive relationship between the two, wherein physical activity works to improve self-esteem.

Acute Bouts

Another commonly used study design to gauge the relationship between physical activity and levels of global and sub-domain self-esteem is to have the participants complete an acute bout or several acute bouts of exercise and administer measures of self-esteem pre- and post-exercise (Ellingsen et al., 2018; Ellis et al., 2013; Flowers et al., 2018; Randall et al., 2014; Rogerson et al., 2016). This line of research is a smaller body of literature and is mostly focused on samples of individuals who have been diagnosed with various mental health disorders. Another major focus of this research is on the exploration of green, outdoor, exercise environments as a variable in the connection of physical activity and self-esteem. The primary objective of these studies was to explore changes to participants' scores of self-esteem from their pre-to the post-exercise assessment.

Ellingsen and colleagues (2018) were interested in the effects of acute exercise on self-esteem in a clinical sample of males (31-44 yrs) with substance use disorders as well as personality disorders, though not all participants were diagnosed with both. The participants completed three sessions of exercise, one each on different occasions: playing soccer, going for a supervised walk, and circuit training. The RSES was given to the participants before and after exercising, as well as at one-, two-, and four-hours post-exercise. Surprisingly, no significant findings of exercise improving self-esteem for these individuals was found; although, scores did move in a positive albeit insignificant direction.

Another study analyzing self-esteem's connection to acute physical activity was conducted by Ellis et al. (2013). With a sample of individuals (19-70 yrs, M= 44.6 yrs)

who had been diagnosed with disorders such as schizophrenia and depression, participants engaged in 45 minutes of moderate aerobic activity and completed the RSES prior to and after exercising. The results of the study revealed a significant increase in evaluation of global self-esteem after exercising when compared to the participants' baseline scores that did not significantly vary depending on diagnosed disorders.

Randall et al. (2014) also studied self-esteem pre- and post-exercise in a sample of individuals (M= 40.16 yrs) who had various mental health diagnoses including: depression, depression and anxiety, anxiety, bipolar disorder, and schizophrenia. The participants participated in an exercise session of approximately forty-five minutes at moderate intensity in one of the following activities: walking, gardening activity, gym activities, badminton, or table-tennis. Global self-esteem was measured before and after exercise, and the findings of the study showed that self-esteem was significantly improved across disorders following the acute bout of exercise. Additionally, participants with schizophrenia had the largest gains to self-esteem, while those who improved the least were the participants diagnosed with bipolar disorder.

Flowers et al. (2018) carried out a study to determine if the psychological benefits to acute exercise, such as self-esteem, would be more pronounced in an outdoor, natural environment (i.e., green exercise) in comparison to an indoor space. Undergraduate students (18-51 yrs, M= 19.9 yrs), were recruited to take part in the study. The participants were randomized into one of four groups: a green exercise group that also watched a promotional video about green exercise, a green exercise group that did not view the promotional video, an indoor exercise group that was shown the promotional video about green exercise, and an indoor exercise group that did not watch the video. The participants assigned to the green exercise conditions completed the exercise outdoors on a pavilion overlooking a grassy sports field, and participants in the indoor conditions completed the exercise in the lab with a view of a plain wall. For all of the

conditions, the participants engaged in fifteen minutes of cycling at a moderate intensity and completed the RSES before and after exercising. While the effect of time by treatment group on self-esteem was not significant, the green exercise group that viewed the video had larger improvements to self-esteem when compared to the green exercise group that did not observe the video. Interestingly, neither of the indoor groups showed a significant effect on self-esteem.

Rogerson et al. (2016) also studied an acute bout of green exercise as it applies to changes in self-esteem. The participants of the study were individuals (M=40.8 yrs) who volunteered to take part in various outdoor running events. They were measured with the RSES before and after the run, and participants were surveyed from four different events. Each running event featured a different set of outdoor characteristics that are typical of green exercise environments. The expectation of the study was finding that the features of these different green exercise environments would play a significant role in the effect of physical activity on self-esteem. The first location was along what authors considered the beach route which featured views of cliffs and beaches along the run. The second and third locations of runs were the grassland and river routes which featured wide grassy spaces and followed a river through an urban area, respectively. Lastly, the heritage route for the run had views of flowerbeds and grassy areas, as well as a castle and buildings. The results show that while the location of the running was not significant in the changes to self-esteem, there were significant improvements to self-esteem of the participants' scores from baseline to post-exercise.

Overall, the research exploring acute bouts of physical activity in connection with self-esteem are supportive of engagement in physical activity improving an individual's evaluation of self-esteem. Much of the literature in this line of research focuses on samples from clinical populations which is a difference from the broader literature of the effects of exercise interventions to self-esteem. Green exercise is also a prominent

characteristic of this research that was not explored in exercise interventions except one study where green exercise was a possible exercise condition (Barton et al., 2012).

Cross-Sectional Survey Analyses

Another approach that researchers have taken to study self-esteem and physical activity has been through the use of a cross-sectional study design and administering surveys with the intention of measuring the participants' self-esteem and physical activity behaviors at a specific point in time. The purpose of this line of research is to compare participants' self-reported physical activity habits with their evaluation of self-esteem. Studies in this area do not assign exercise to the participants, rather they opt to survey the existing exercise habits of their participants. Much of this literature measures self-esteem and exercise from samples of adolescents (Furnham et al., 2002; Guinn et al., 1997; Janjhua et al., 2020; McPhie & Rawana, 2012; Papaioannou et al., 2013), though some research used samples of older adults (Misra et al., 1996; Tiggemann & Williamson, 2000).

Guinn et al. (1997) recruited sample of Mexican American adolescent (13-15 yrs) female students to assess self-esteem and exercise behavior. The participants completed the RSES and answered questions about their exercise involvement. The results showed a positive correlation between global self-esteem and engagement in physical activity. A multiple regression of variables demonstrated that physical activity behavior was a significant predictor of self-esteem, explaining 5% of the variance across subjects.

Janjhua et al. (2020) studied a sample of adolescent (13-18 yrs) participants to analyze the impact of taking part in yoga for self-esteem. The RSES was provided to the adolescents who were currently practicing yoga and to those who were not. Findings indicated that the participants who practiced yoga reported higher self-esteem than the participants who were not practicing yoga. A limitation to the study is that the authors

did not describe the length of time that the group practicing yoga had actually been doing yoga, thus, the effect of chronic or acute yoga cannot be concluded from this research.

McPhie and Rawana (2012) carried out a secondary data analysis of data from a sample of early and late adolescent participants from a previous study to explore the mediating effect of self-esteem on the connection between physical activity and symptoms of depression. The participants completed a modified version of the RSES and a measure of the frequency of physical activity engagement over the past week. The results demonstrate full mediation of self-esteem as applied to the relationship between physical activity and the reduction in symptoms of depression for both early and late adolescent boys as well as late adolescent girls, but not for early adolescent girls. The findings of the study suggest that higher frequency of physical activity is related to improved self-esteem scores and decreases in symptoms of depression for early and late adolescent participants.

Furnham et al. (2002) collected data from a sample of adolescent (15-18 yrs) students to explore the reasons that these individuals exercise and how those reasons relate to their evaluation of their global self-esteem. Participants in the study filled out questionnaires of reasons for the participants' exercise habits as well as the RSES. The reasons for exercising that the participants were able to select from included positive reasons such as improving mood, body fitness and health, enjoyment, and negative reasons including attractiveness, weight control, and body toning. The description of reasons as positive and negative is subjective, and the authors do not explain how these categories were determined. Findings from the surveys showed that the participants who reported lower global self-esteem typically exercised for the negative reason of controlling their weight. Additionally, a significant correlation was found between self-esteem and exercising for body fitness and body tone, which represent a positive and negative reason for exercise, as previously stated.

Papaioannou et al. (2013) took a cross-cultural approach to studying self-esteem and physical activity through measuring the definition of aspects of well-being, such as self-esteem, across several countries and how engaging in moderate-to-vigorous physical activity (MVPA) is related to that well-being in the different countries. The nations of interest for this study were France, Greece, Norway, Spain, and England, and adolescent soccer players from each of the countries were recruited as participants. The athletes who took part in the study completed the RSES and answered questions about their participation in MVPA. The findings from this study show an equivalence in interpretation of self-esteem across the countries from which the athletes were surveyed, and that MVPA is associated in the same way to global self-esteem across cultures.

Tiggemann and Williamson (2000) were interested in the amount of exercise in which participants take part and how that is related to their well-being, namely their self-esteem and body satisfaction, across age and gender. The results from participants' reports of these variables represent findings that young men and women (< 21 yrs) had lower self-esteem than their older (> 21 yrs) counterparts. The average age of both the young women and men was 18.4 years old. The older women were 33.6 years old on average, and the older men were, on average, 36.5 years old. Correlations showed that young women had a significantly negative relationship between exercise and self-esteem such that increases in exercise were associated with a decrease in self-esteem. This finding is strange given that young men and both older women and men reported positive a correlation between exercise and self-esteem, though the only significant correlation was the one found for older men. The authors suggest the negative correlation for the young women may be due to the targeting of this group by the media or through self-objectification. The older men had a significantly positive relationship between exercise and self-esteem.

Misra et al. (1996) surveyed older women (ages 66 to 87 years) who had been participating in an exercise class over the course of six months to analyze the relationship between the exercise and participants' self-esteem, and to possibly connect the participants' rating of self-esteem to their health. To be eligible for participation in the study, the women had to be attending at least one exercise class per week and be at least sixty years of age. The RSES was administered to qualifying participants in several of the exercise classes. A scale of exercise habit frequency was also given to the participants. Significant correlations were found to exist between exercise habit frequency and self-esteem, and general health and self-esteem such that women with higher reported self-esteem reported more frequent exercising and a good self-rating of their general health.

In contrast to the results of studies regarding exercise interventions and acute bouts of physical activity, cross-sectional research yields more mixed findings about the relationship from physical activity to self-esteem, though the findings still generally suggest a positive relationship between the two variables. The discrepancies in the findings could be in part due to limitations in research design such as not measuring frequency and duration of exercise behaviors (Janjhua et al., 2020; McPhie & Rawana, 2012), or it could be that self-reports of self-esteem and physical activity behaviors do not have as strong a relationship when there is no manipulation of physical activity participation. It is also evident that there is a lack of cross-sectional analyses focused on young adults, with much of the described research including adolescents and older adults.

Reviews

Several reviews of the literature surrounding physical activity and self-esteem are generally supportive of a positive relationship; however, the reviews also discuss several of the limitations to the literature and the drawbacks that these limitations

impose on the findings of published research studies (Ekeland et al., 2005; Fox, 2000; Scully et al., 1998; Spence et al., 2005).

Scully et al. (1998) evaluated physical activity in connection with multiple psychological outcomes such as self-esteem, anxiety, depression, and mood state. With respect to self-esteem, the authors found a positive relationship between physical activity and self-esteem, but also point out that studies exploring sub-domains of self-esteem are inadequate in number. There also has been limited research on the effects of exercise mode on self-esteem, though the existing literature suggests that there are benefits to be gained from various forms of exercise. Finally, there has not been sufficient research to guide exercise prescription to boost self-esteem, particularly when attempting to improve individuals' evaluation of their self-esteem at the sub-domain level.

Fox (2000) describes evidence in relation to self-esteem and exercise among cross-sectional studies wherein global self-esteem does appear to be associated with participating in exercise; however, the results of studies addressing these two factors may heavily depend on sample characteristics such as the exercise setting and individual characteristics like age or gender. Fox also explains that the sub-domains of self-esteem as assessed by the PSPP have a positive relationship to participating in regular physical activity. With regard to studies of exercise interventions, the literature of interventions for global self-esteem yield some mixed results which implies that exercise alone may not be enough to improve self-esteem, even as changes to physical self-perceptions may occur. The author also mentions the importance of considering physical self-worth as an indicator of mental health as it has relevance for emotional adjustment.

Ekeland et al. (2005) were interested in evaluating the research on potential benefits to self-esteem from exercise interventions lasting at least four weeks in samples of children and young adults younger than 20 years. Based on the studies included in the

review, which consisted of various exercise interventions including primarily aerobic and resistance exercise, the self-esteem of the participants was improved for some of the studies but not others. A significant limitation to this review is the high risk of bias that was found in many of the included studies. Among the 23 studies included in the review, 14 were rated to have a high risk of bias, with 8 having a moderate risk, and only one study having a low risk of bias.

Spence et al. (2005) included a total of 113 studies on physical activity and self-esteem and evaluated potential moderators of the relationship. Many of the studies included in the review had participants that began with a moderate fitness level as well as a moderate level of self-esteem. The exercise intensity of the interventions was generally moderate, most of the included studies had interventions lasting up to fourteen weeks with some extending longer, and aerobic exercise made up the majority of interventions. Based on their statistical analyses of effect sizes from the literature, the findings showed that engaging in physical activity contributes to a small, but significant, increase in global self-esteem with an average weighted effect size of $d+ = 0.23$. The only significant moderator that was found was the change in physical fitness of participants such that individuals who demonstrated a significant change to their physical fitness experienced a greater increase to their global self-esteem.

Conclusion

The extant literature has explored the relationship between physical activity and self-esteem through three main designs: exercise interventions, acute bouts of physical activity, and cross-sectional analysis. Several reviews have also been conducted to summarize the research. In general, the literature is supportive of positive effects to self-esteem from physical activity. Findings from exercise interventions and acute bouts of exercise in particular which measure self-esteem at both the global level and physical self-worth domain demonstrate benefits to participants' evaluation of self-esteem. There

are mixed findings from the research utilizing cross-sectional designs and in the included reviews.

It is important to point out that throughout the literature on physical activity behavior and self-esteem there are notable gaps in the literature. One such gap is the lack of racial and ethnic diversity represented in the samples used in the research. A large amount of the published research is based on samples of individuals that are mostly, at least 80%, white (e.g. Awick et al., 2017; Elavsky & McAuley, 2007; Ellis et al., 2013; Furnham et al., 2002; Gothe et al., 2011; McAuley et al., 2000; Misra et al., 1996; Randall et al., 2014; Tiggemann & Williamson, 2000). While a great deal of research has been done with demographics of mostly white individuals, there is also the issue of many studies not providing any description of the racial or ethnic demographics of their participants (e.g. Barton et al., 2012; Ekeland et al., 2005; García-Martínez et al., 2012; Guimarães et al., 2020; Legrand, 2014; McAuley et al., 1997; Ng & Tam, 2000; Opdenacker et al., 2009). The absence of proper representation from racial minorities such as African American, Asians, or Hispanics, means that there is no way to compare the findings from primarily white samples to any other group. This creates an issue when trying to make claims that self-esteem can be improved through chronic or acute exercise to a generalized population; results from white samples of participants can only be potentially extended to those white people represented in the study, if the study was designed in such a way that generalizing the results is appropriate. The present disparity of focus on representing racial and ethnic minorities, makes it clear that it is imperative to include a sample that is representative of real-world racial and ethnic diversity in research.

Pearce (1999) discussed a report from the US Surgeon general and concluded that racial and ethnic minorities (i.e., people who do not identify as white) participate in less physical activity than their majority counterparts, and this could be due to cultural and accessibility barriers. McArthur and Raedeke (2009) conducted a study to measure

physical activity habits of individuals aged 17 to 50 (M= 19.6 years), and found that participants who identified as black females were the least physically active of the sample with a large effect size of d = 0.81. Keeping in mind these findings, it is crucial to understand how this lower engagement with physical activity may be related to self-esteem. Even though less physical activity does not necessarily mean that the relationship of physical activity with self-esteem is different, it is a possibility, and the literature does not sufficiently demonstrate how the lower physical activity in individuals across races and ethnicities is connected to self-esteem. Especially considering the lack of diversity included in the research samples of published research, future research needs to incorporate more representative, culturally and societally proportional samples of individuals being studied.

An additional gap in the research, as has been demonstrated in the discussion of acute exercise and chronic exercise interventions, is the sparse inclusion of young adults. There are quite a few studies that were included in this review that studied adolescents (Ekeland et al., 2005; Furnham et al., 2002; Guinn et al., 1997; Janjhua et al., 2020; McPhie & Rawana, 2012; Papaioannou et al., 2013; Tiggemann & Williamson, 2000) and many more studies with middle-aged and older adults as the samples of participants (Awick et al., 2017; Awick, Phillips et al., 2017; Barton et al., 2012; Elavsky, 2010; Elavsky & McAuley, 2007; García-Martínez et al., 2012; Gothe et al., 2011; Guimarães et al., 2020; McAuley et al., 1997; Misra et al., 1996; Ng & Tam, 2000; Opdenacker et al., 2009; Tiggemann & Williamson, 2000). Tiggemann and Williamson (2000) found differences between younger and older adults, and findings from the few studies of physical activity and self-esteem in young adults are generally in support of a positive relationship (Hasanpour et al., 2014; Legrand, 2014; Yiğìter, 2014). It is clear from the scant number of studies that use young adults as participants, future research needs to be inclusive of young adults in their samples. Measures of self-esteem, such as the Rosenberg (1965) Self-Esteem scale to assess global self-esteem and the PSPP (Fox & Corbin, 1989) in order to get at the sub-domains of physical self-worth, need to

be more widely applied in studies that feature samples of participants that are more racially and ethnically representative of general populations as well as within the young adult age group.

CHAPTER III: METHODS

Participants

The participants of this study were recruited from two semesters of an undergraduate course in the Department of Kinesiology at UNCG between the fall of 2020 and the spring of 2021. The data from the fall cohort was collected from late September through early November 2020. The spring cohort data was collected from late January through February 2021. The students in this course are required to take part in research projects, and the instructors of the course have allowed the following surveys to be included for the students' total set of questionnaires via Qualtrics.

Procedure

Upon agreeing to participate in the study, participants are presented with several surveys to assess their self-esteem and physical activity habits. Personally identifiable information was not collected as part of the study.

Measures

Demographic Questions

The participants were asked questions regarding their racial and ethnic identification, biological sex, gender identification, age, year in college, college major, whether they are living on- or off-campus, who they are living with, how their courses are being delivered, participation in athletics at either the recreational or competitive level, as well as height and weight to calculate BMI. Answer choices for questions of race and ethnicity are based on the options provided on the US Census (Bureau, n.d.), and the choices for gender identification are designed to be inclusive for all people taking part in

the study. Participants were given the opportunity to select any and all gender identifiers that apply to them, or they had the option to type in a response if they do not feel that any of the available options are appropriate.

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem scale (RSE) is a validated measure of global self-esteem (Rosenberg, 1965b) and has been used in a vast number of studies of self-esteem (e.g. Awick et al., 2017; Barton et al., 2012; Elavsky & McAuley, 2007; Guinn et al., 1997; McAuley et al., 1997; Misra et al., 1996). Participants respond on a 4-point scale from Strongly Agree to Strongly Disagree to 10 statements. Five of the statements in the scale are "positive" in nature (e.g. "On the whole, I am satisfied with myself," and "I feel that I have a number of good qualities"). The other five statements are "negative" and are reverse scored (e.g. "At times I think I am no good at all," and "All in all, I am inclined to feel that I am a failure"). Higher scores on the RSE indicate higher global self-esteem. The RSE has been found to have test-retest reliability of .85 and .88, and internal consistency of .92 (Rosenberg, 1965a).

Physical Self-Perception Profile

The Physical Self-Perception Profile (PSSP) has also been used in many studies (e.g. (Elavsky, 2010; Elavsky & McAuley, 2007; Gothe et al., 2011; McAuley et al., 2000; Opdenacker et al., 2009) and is a validated 30-item questionnaire which measures physical self-worth and its subdomains, measured in subscales, including: sport competence, physical condition, body attractiveness, physical strength (Fox & Corbin, 1989). Each item of the PSSP presents participants with two statements related to physical self-worth or its aforementioned subdomains and asks them to decide which of the two statements more accurately represents how they feel, and to what extent that statement is true for them by selecting either "Sort of True for Me" or "Really True for Me" for their chosen statement. For example, one item of the PSSP gives the following

statements to choose from, “Some people feel extremely proud of who they are and what they can do physically” and “Others are sometimes not quite so proud of who they are physically.” Once selecting which statement is more accurate for them, the participant decides if that statement is “Sort of True for Me” or “Really True for Me.” Some of the items are reverse scored, and higher scores represent higher physical self-worth. Test-retest reliability over a 23-day period of the PSPP is shown to be between .81 and .88 (Fox & Corbin, 1989).

International Physical Activity Questionnaire – Short Form

The International Physical Activity Questionnaire – Short Form (IPAQ-SF) measures the time that participants spent engaging in various intensity of physical activity behaviors within the last 7 days (Craig et al., 2003). Participants are asked to state how many days in the last week, and how much time per day on those days, they engaged in vigorous and moderate physical activity, walking, and time spent sitting. The data were converted to moderate-to-vigorous physical activity (MVPA) minutes per day and used to measure physical activity behavior as a continuous variable.

Data Analysis

The data collected through the surveys on Qualtrics have been scored appropriately and analyzed using SPSS (Version 26) through Citrix Workspace. No personally identifiable information, including IP addresses, were obtained from participants as part of data collection; therefore, answers to survey questions are not traceable to the individual participants. Linear regression and Pearson’s correlation analyses were carried out to measure the extent to which the time spent engaging in physical activity behavior (measured in MVPA minutes per day using the IPAQ-SF) predicted scores of global and physical self-esteem (measured by scores on RSE and PSPP respectively), as well as if race and ethnicity served as moderators of this relationship. Participants

identifying as either white or black in terms of race were included in the analyses, and participant ethnicity was categorized as either Hispanic or not Hispanic.

CHAPTER IV: RESULTS

Demographic findings

Between the fall 2020 (n=91) and spring 2021 (n=88) cohorts, a total of 179 participants completed the questionnaires. The participants of this study were 39.11% white, 89.39% Non-Hispanic, and 59% identified as female. See Table 1 for a full list of demographic findings. In further analyses, only participants identifying as white or black/African American (n=148) are included given the small group of participants identifying as other races (n=26).

Variable	**Frequency**
Gender	-
Male	72
Female	106
Transgender	1
Race	-
White	70
Black or African American	78
American Indian or Alaska Native	1
Asian	12
Native Hawaiian or Pacific Islander	1
Other	6
Two or more	7
Ethnicity	-

Hispanic	19
Non-Hispanic	160
Grade	-
Freshman	4
Sophomore	14
Junior	57
Senior	104
Major	-
Kinesiology	171
Psychology	1
Other	7

Table 1. Demographic findings

Physical activity findings

On average, participants in this study took part in 66.4 minutes per day (SD=50.09) of moderate-to-vigorous physical activity (MVPA). While the fall cohort was not asked about their participation in athletics, 10.22% of participants from the spring cohort were varsity athletes and 18.18% consider themselves to be recreational athletes. Participants identifying as black completed an average of 54.42 (SD=44.65) minutes of MVPA per day and white participants engaged in an average of 76.95 (SD=51.96) MVPA minutes per day. Lastly, participants identifying as Hispanic completed 70.98 (SD=52.81) minutes of MVPA per day and Non-Hispanic participants engaged in 65.86 minutes of MVPA per day (SD=49.91). See Table 2 for full list of physical activity findings.

Variable	**Mean (SD)**
MVPA minutes per day (n=179)	66.4 (50.09)
MVPA min. per day (Black)	54.42 (44.65)
MVPA min. per day (White)	76.95 (51.96)
MVPA min. per day (Hispanic)	70.98 (52.81)
MVPA min. per day (Non-Hispanic)	65.86 (49.91)
Athlete Status (n=88)	**Frequency**
Varsity Athletes	9
Recreational Athletes	16
Not currently participating in organized sports	63

Table 2. Physical activity findings

Self-Esteem findings

The average score of global self-esteem as measured by the RSE was 19.08 (SD=4.89) out of a maximum possible score of 40. The average score of physical self-worth as measured by the PSPP was 16.04 (SD=5.09) out of a maximum possible score of 24. See Table 3 and Table 4 for a full list of self-esteem findings. Table 5 shows the means and standard deviations for each dependent variable as a function of race by gender.

	RSE (SD)	Physical Self-Worth (SD)	Body Attractiveness (SD)	Physical Condition (SD)	Sport Competence (SD)	Physical Strength (SD)
n=179	19.08 (4.89)	16.04 (5.09)	14.27 (4.56)	15.77 (5.00)	15.65 (4.94)	15.12 (4.86)

Table 3. Self-esteem findings from overall sample

Demo-graphic group	RSE (SD)	Physical Self-Worth (SD)	Body Attractiveness (SD)	Physical Condition (SD)	Sport Competence (SD)	Physical Strength (SD)
White (n=70)	19.77 (4.51)	16.10 (4.98)	13.74 (4.32)	17.07 (4.75)	15.69 (4.97)	15.44 (5.06)
Black (n=78)	17.45 (4.71); n=77	17.21 (4.94)	15.62 (4.59)	15.51 (5.13)	16.18 (5.07)	15.87 (4.72)
Non-Hispanic (n=160)	19.13 (4.91); n=159	16.06 (5.02)	14.43 (4.47)	15.95 (4.92)	15.70 (4.96)	15.17 (4.73)
Hispanic (n=19)	18.68 (4.91)	15.84 (5.38)	12.95 (5.23)	14.21 (5.53)	15.26 (4.92)	14.68 (5.97)
Male (n=72)	19.24 (5.24)	16.81 (4.87)	14.15 (5.15)	17.14 (4.69)	16.89 (4.99)	16.18 (4.92)
Female (n=106)	18.97 (4.69); n=105	15.57 (5.2)	14.34 (4.17)	14.87 (5.03)	14.78 (4.76)	14.33 (4.67)

Table 4. Self-esteem findings from demographic groups

	RSE (SD)	Physical Self-Worth (SD)	Body Attractiveness (SD)	Physical Condition (SD)	Sport Competence (SD)	Physical Strength (SD)
White Females (n=30)	20.16 (4.57)	15.51 (5.4)	13.84 (4.07)	16.71 (5.02)	14.60 (4.93)	14.93 (4.84)

White Males (n=25)	19.08 (4.42)	17.16 (3.4)	13.56 (4.82)	17.72 (4.26)	17.64 (4.49)	16.36 (5.42)
Black Females (n=47)	17.24 (4.48); n=46	16.49 (4.85)	15.34 (4.53)	13.81 (4.77)	15.15 (5.12)	14.49 (4.59)
Black Males (n=30)	17.70 (5.17)	18.53 (4.85)	16.07 (4.81)	18.30 (4.55)	17.7 (4.72)	17.83 (4.17)

Table 5. Self-esteem by race and gender

Correlations between IPAQ and Self-Esteem

Physical activity was not significantly correlated with scores on the RSE (Pearson's $r(176)=.102$, $p>.05$).

Physical activity was not significantly correlated with physical self-worth (Pearson's $r(177)=.114$, $p>.05$) nor body attractiveness (Pearson's $r(177)=.007$, $p>.05$).

Physical activity was significantly correlated with the physical strength (Pearson's $r(177)=.186$, $p<.05$), sport competence (Pearson's $r(177)=.229$, $p<.01$), and physical condition (Pearson's $r(177)=.269$, $p<.001$) sub-domains of physical self-esteem.

Effects of Race and Physical Activity on Self-Esteem

The main effect of race ($R^2=.06$, $\beta=.25$) and the interaction of race and physical activity ($R^2_{change}=.034$, $\beta=-.40$) significantly predicted global self-esteem, $F(3,143)=5.07$, $p<.05$, $R^2_{total}=.096$. There was no significant main effect of physical activity ($R^2_{change}=.003$), $p>.05$. As shown in Figure 4, the white participants generally reported higher global self-esteem than black participants. Seen in Figure 5, as physical activity increases, the

global self-esteem of the black participants increases whereas the white participants remained relatively stable in global self-esteem with increasing physical activity.

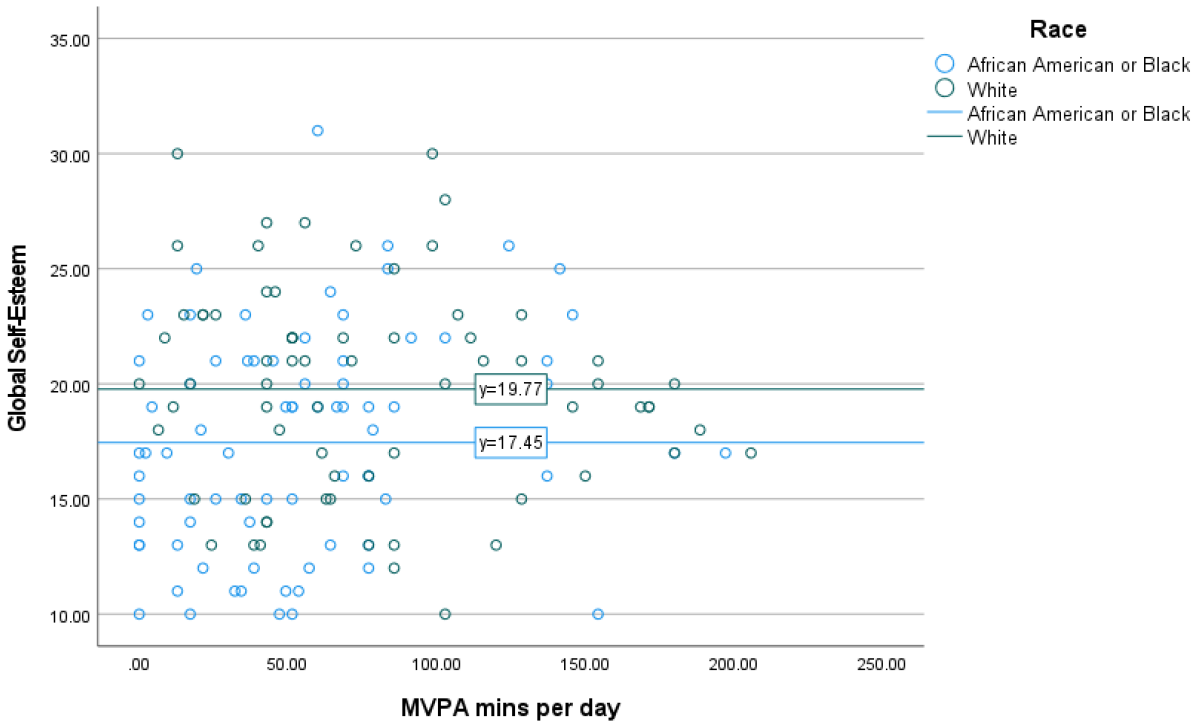

Figure 4. Main effect of race for global self-esteem

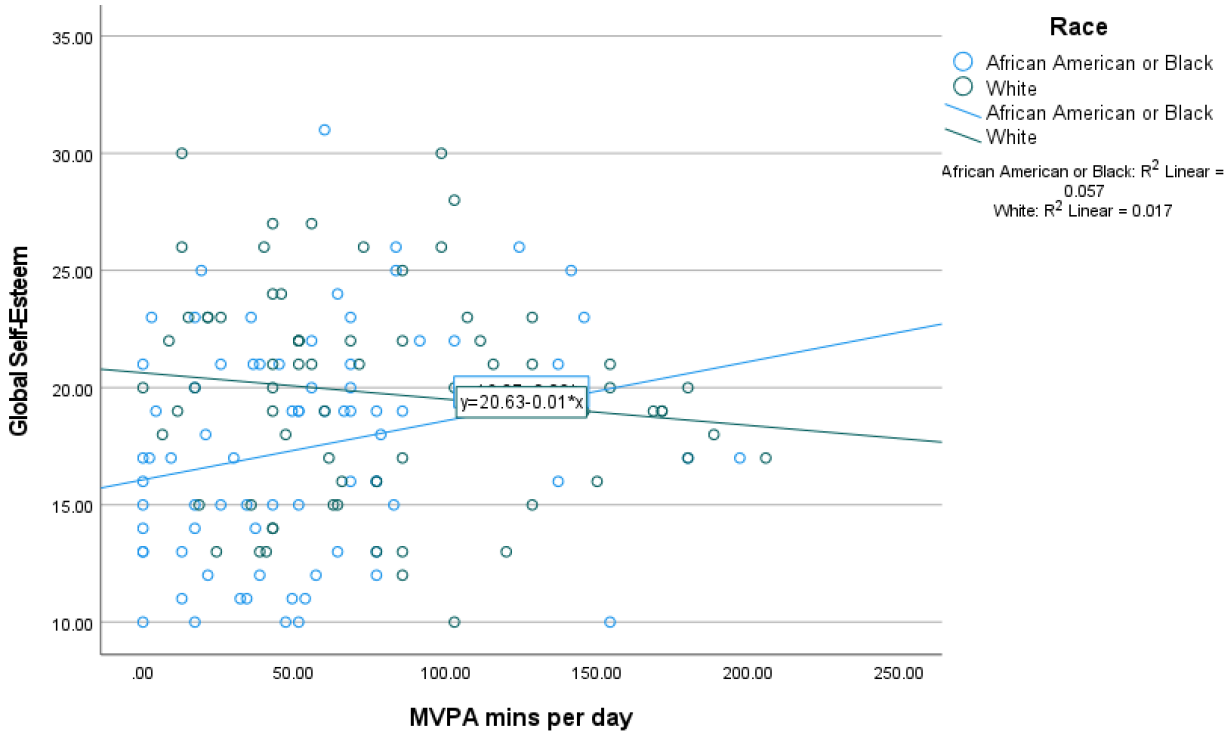

Figure 5. Interaction of race and physical activity for global self-esteem

The main effects of race and physical activity were not significant predictors of physical self-worth. The interaction was also non-significant, p's>.05

The main effect of physical activity (R^2_{change}=.081, β=.29), predicted scores for sport competence, F(2,145)=6.63, p<.01, R^2_{total}=.084. Neither the main effect of race (R^2=.002) nor interaction (R^2_{change}=.001) were significant predictors, p's>.05. As shown in Figure 6, increased physical activity was associated with higher sport competence regardless of racial identification.

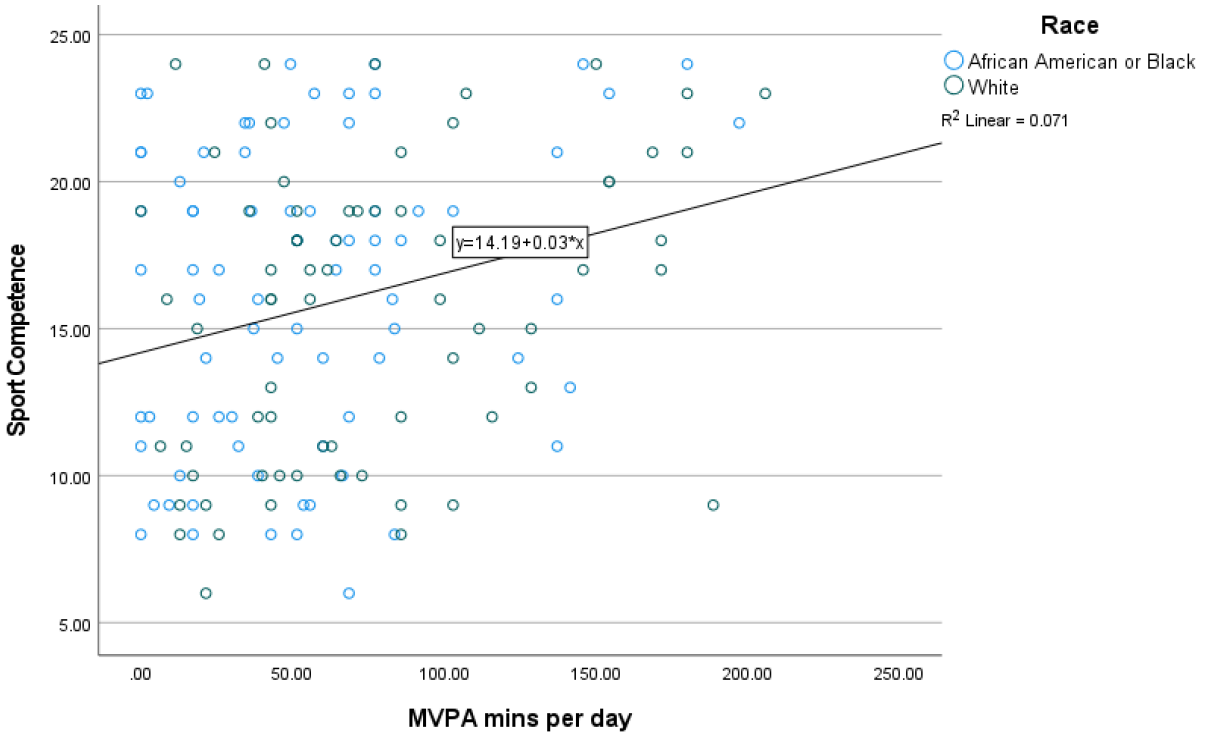

Figure 6. Main effect of physical activity for sport competence

For physical condition, there was a significant main effect of physical activity (R^2_{change}=.054, β=.24), F(2,145)=6.17, R^2_{total}=.08, p<.01. No main effect of race (R^2=.024, p=.058) or interaction (R^2_{change}=.002, p>.05). As is shown in Figure 7, for both black and white participants, increased physical activity was associated with higher reported physical condition.

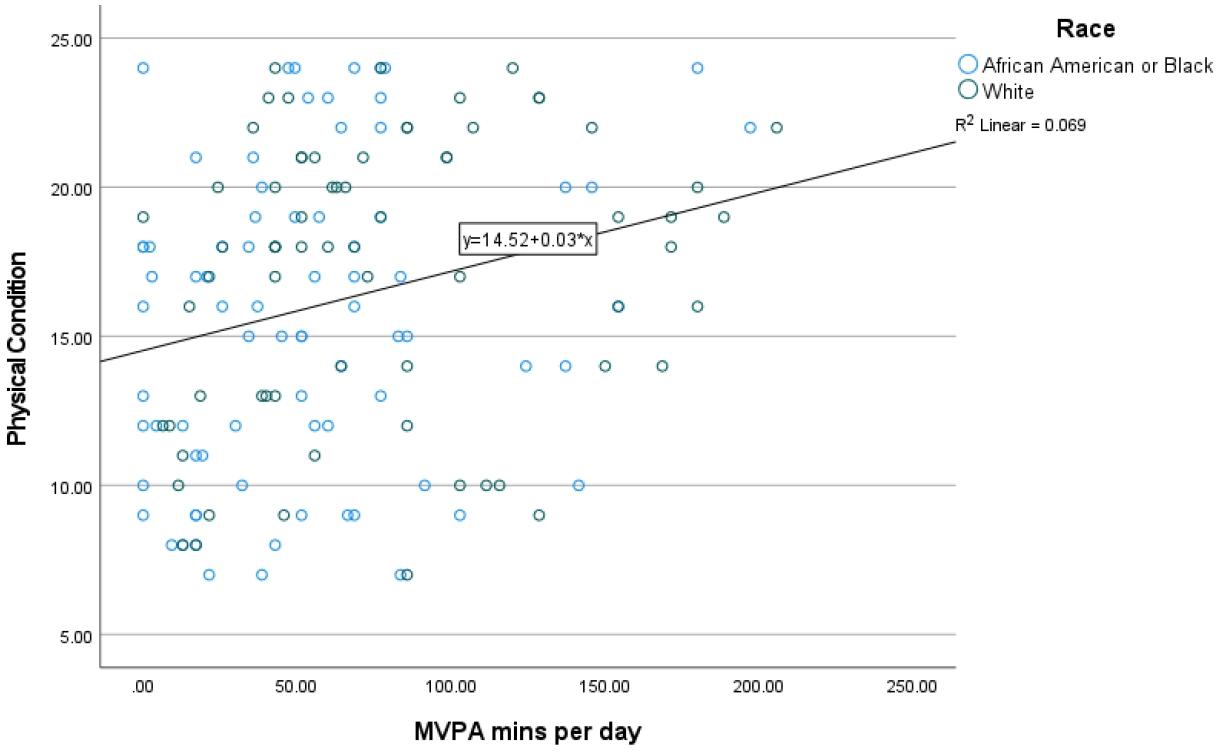

Figure 7. Main effect of physical activity for physical condition

The main effect of race (R^2=.043, β=-.21), significantly predicted body attractiveness, F(1,146)=6.49, R^2_{total}=.047, p<.05. Neither the main effect of physical activity (R^2_{change}=.00) nor the interaction (R^2_{change}=.004), were significant predictors, p's>.05. Demonstrated in Figure 8, black participants reported higher body attractiveness than white participants regardless of physical activity.

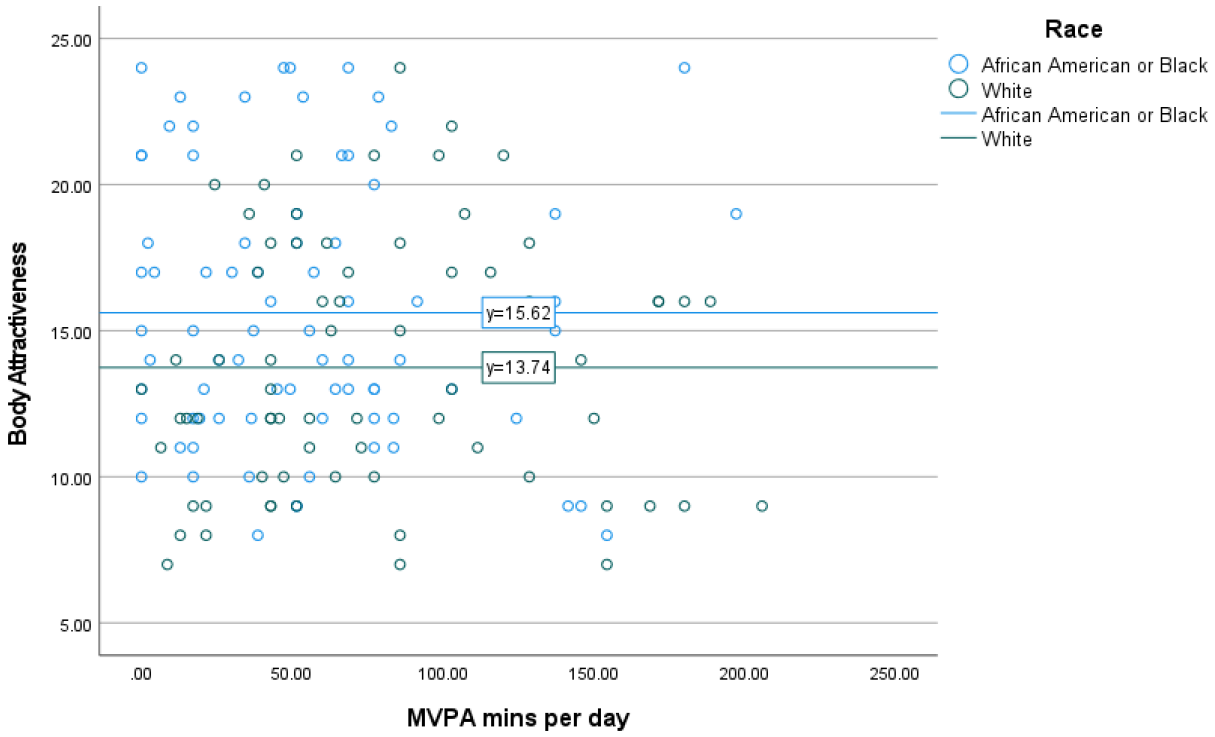

Figure 7. Main effect of race for body attractiveness

There were no significant main effects of race or physical activity, nor was the interaction a significant predictor for physical strength, p's>.05

Effects of Ethnicity and Physical Activity on Self-Esteem

Neither the main effects of ethnicity (R^2=.001), physical activity (R^2_{change}=.011), nor the interaction (R^2_{change}=.01) significantly predicted RSE score, F(3,174)=1.26, p>.05, R^2_{total}=.021.

Neither the main effects of ethnicity (R^2=.00), physical activity (R^2_{change}=.013), nor the interaction (R^2_{change}=.01) significantly predicted physical self-worth, F(3,175)=1.42, p>.05, R^2_{total}=.024.

The main effect of physical activity (R^2_{change}=.053) significantly predicted sport competence, F(2,176)=4.99, p<.05, R^2_{total}=.055, β=.23. As shown in Figure 9, increases in physical activity contributed to increased sport competence for both Hispanic and Non-Hispanic participants. Neither the main effect of ethnicity (R^2=.001) nor the interaction (R^2_{change}=.002) significantly predicted sport competence.

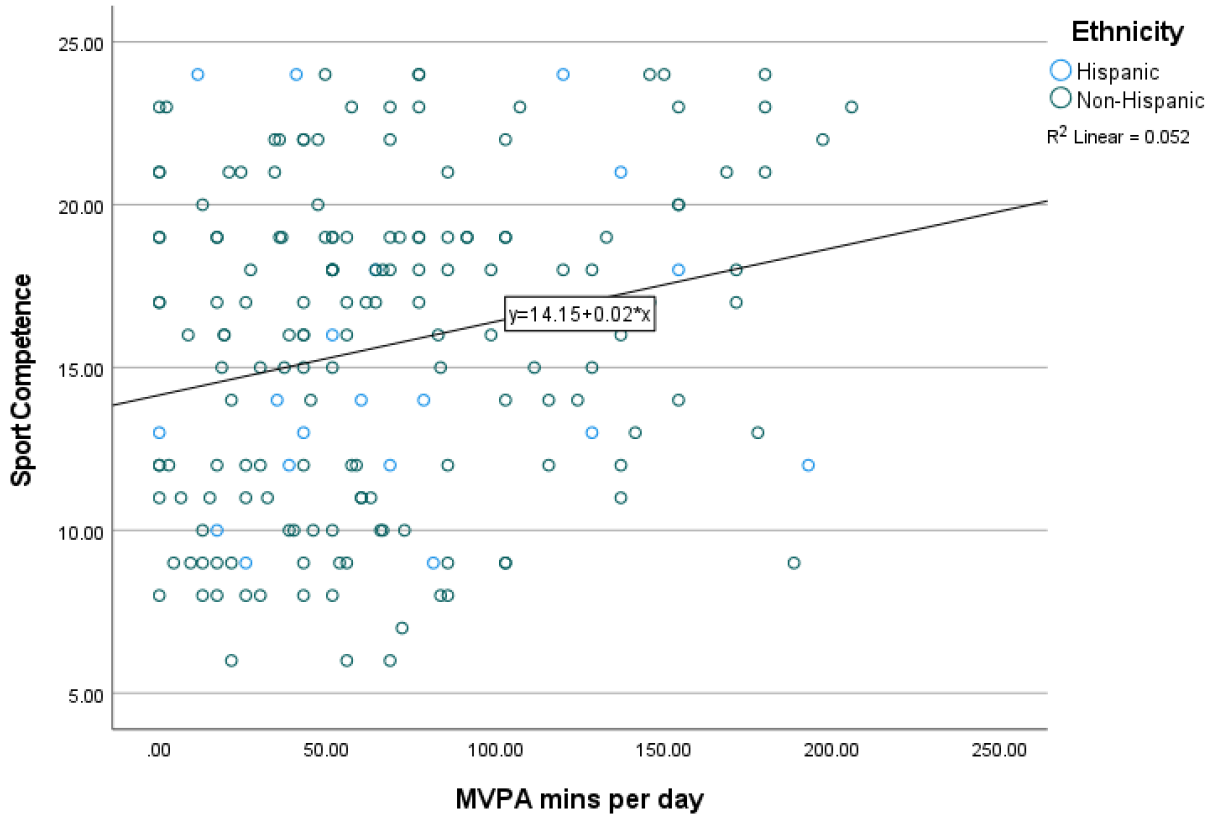

Figure 8. Main effect of physical activity for sport competence

Neither the main effect of ethnicity (R^2=.012) nor the interaction of ethnicity and physical activity (R^2_{change}=.005) significantly predicted physical condition. However, the main effect of physical activity (R^2_{change}=.074, β=.273) was a significant predictor of physical condition such that for both Hispanic and Non-Hispanic participants, increased physical

activity was associated with increased physical condition as shown in Figure 10 ($F(2,176)=8.26$, $p<.01$, $R^2_{total}=.091$).

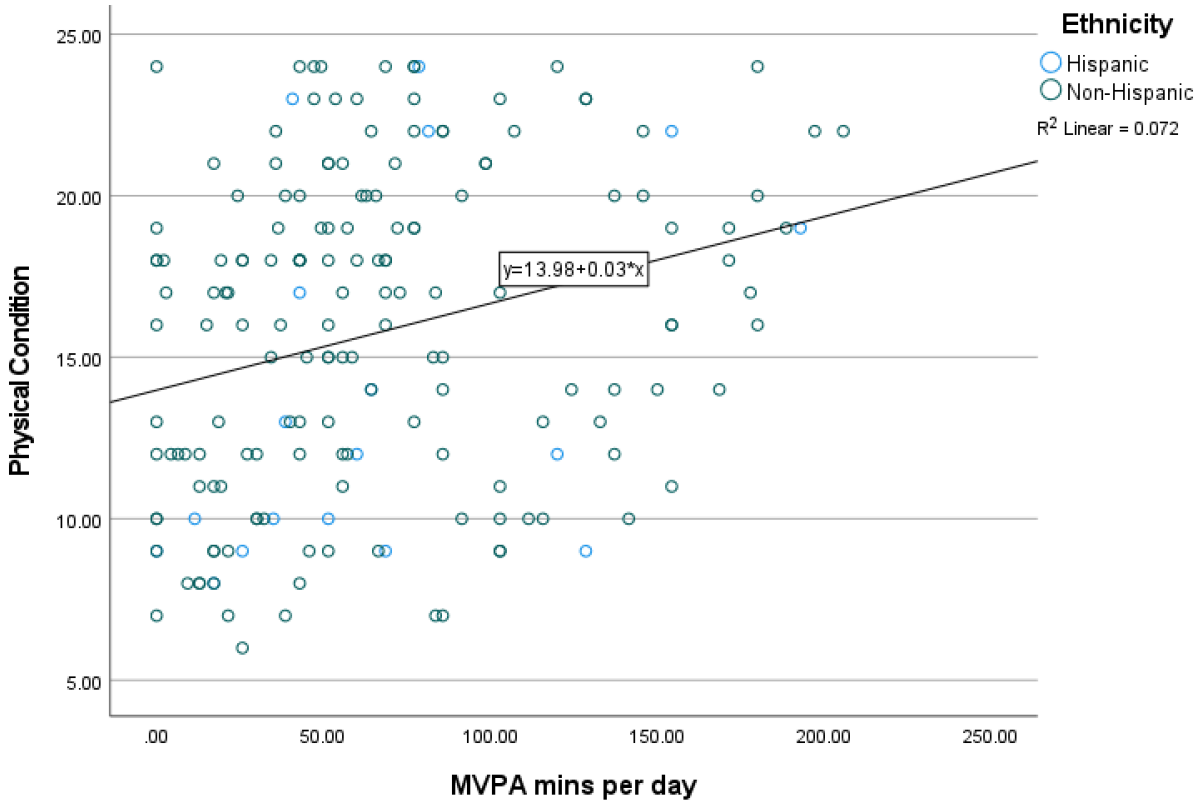

Figure 9. Main effect of physical activity for physical condition

Neither the main effects of ethnicity ($R^2=.01$), physical activity ($R^2_{change}=.00$), nor the interaction ($R^2_{change}=.001$) significantly predicted body attractiveness (p's>.05).

Neither the main effect of ethnicity ($R^2=.001$) nor the interaction of ethnicity and physical activity ($R^2_{change}=.002$) significantly predicted physical strength. However, physical activity was a significant predictor, $R^2_{change}=.035$, $\beta=.187$, of physical strength such that as physical activity increased so did physical strength for both Hispanic and Non-Hispanic participants, $F(2,176)=3.27$, $p<.05$, $R^2_{total}=.037$. This is shown in Figure 11.

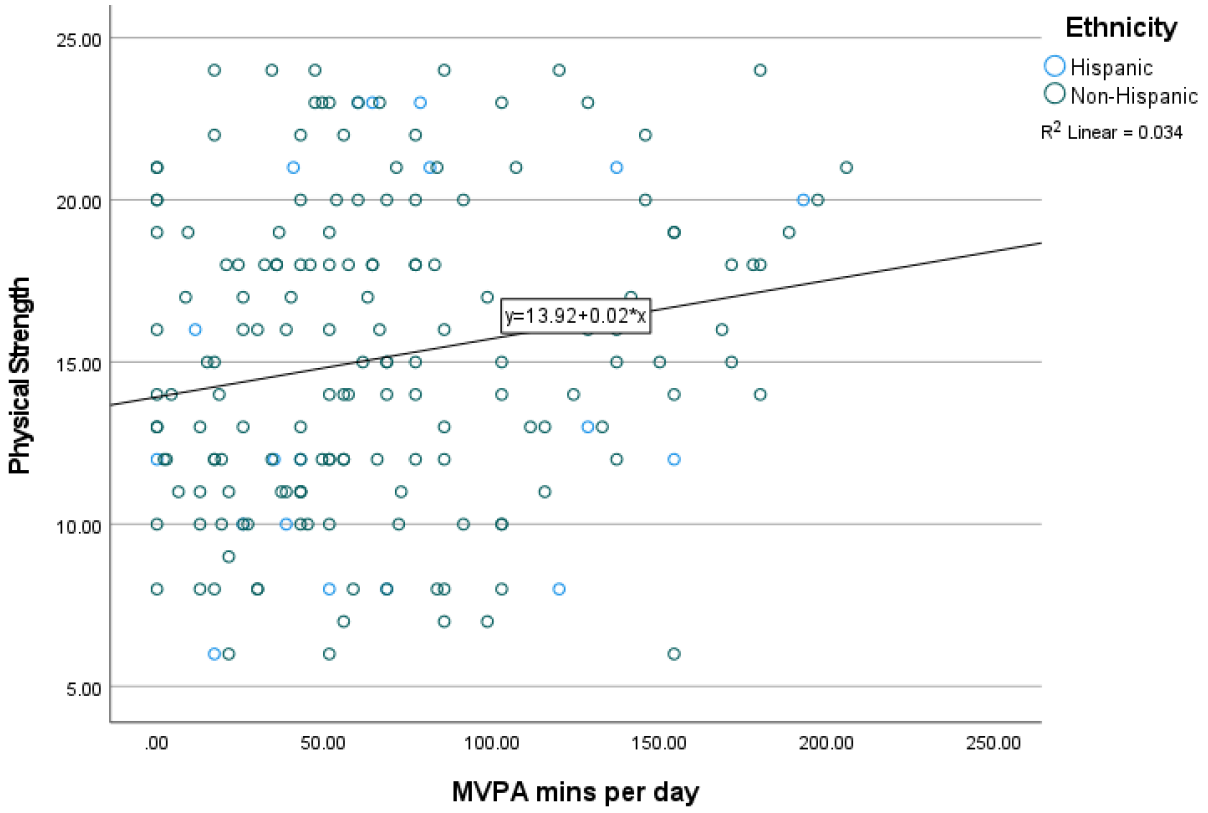

Figure 10. Main effect of physical activity for physical strength

See Table 6 for a summary of significant (p-value shown) and non-significant (n.s.) findings for race and ethnicity moderating the relationship between physical activity and self-esteem.

Variable	Physical Activity	Race	Race x PA		Physical Activity	Ethnicity	Ethnicity x PA
Global SE	n.s.	p<.05	p<.05		n.s.	n.s.	n.s.
Physical Self-worth	n.s.	n.s.	n.s.		n.s.	n.s.	n.s.
Body attractiveness	n.s.	p<.05	n.s.		n.s.	n.s.	n.s.

Sport competence	p<.01	n.s.	n.s.		p<.05	n.s.	n.s.
Physical condition	p<.01	n.s.	n.s.		p<.01	n.s.	n.s.
Physical strength	n.s.	n.s.	n.s.		p<.05	n.s.	n.s.

Table 6. Main effects and interactions for race, ethnicity, and physical activity

CHAPTER V: DISCUSSION

The purpose of this study was to examine the relationship between time spent engaging in physical activity and self-esteem. Young adults between the ages of 18 and 28 years (M=21.23, SD= 1.54) completed a set of questionnaires related to their physical activity behavior over the past week, global self-esteem, physical self-worth and its subscales including: sport competence, physical strength, physical condition, and body attractiveness. It was hypothesized that physical activity would have a positive relationship with measures of self-esteem. Additionally, it was hypothesized that the relationship between physical activity and self-esteem would be moderated by the participants' racial and ethnic identifications.

The results from this study demonstrated relationships between physical activity and several measures of global and physical self-esteem after controlling for race or ethnicity. Generally, participants engaging in increased physical activity also demonstrated increased levels of self-esteem. This was observed for physical condition, physical strength (after controlling for ethnicity), and sport competence. An interesting and significant interaction effect emerged between race and physical activity for scores of global self-esteem wherein as physical activity increased, black participants' scores increased whereas scores for white participants remained relatively stable.

The finding from this study that physical activity is positively associated with self-esteem is in line with previous literature which frequently indicates such a relationship and has been shown through surveys, acute exercise studies, and research regarding exercise interventions (Barton et al., 2012; Ellis et al., 2013; García-Martínez et al., 2012; Misra et al., 1996; Rogerson et al., 2016; Spence et al., 2005). However, this finding is important because this sample was far more racially and ethnically diverse than samples in much of the research in this area. Only 40% of participants from the overall

sample in this study identified as white, and 10.6% of participants identified as Hispanic. In comparison, many studies regarding physical activity and self-esteem are from samples of participants that are more than 80% white (such as Awick et al., 2017; Elavsky & McAuley, 2007; Ellis et al., 2013; Gothe et al., 2011; Misra et al., 1996; Tiggemann & Williamson, 2000). With regard to race and ethnicity, previous research has shown that black individuals typically report higher self-esteem than whites (Sinclair et al., 2010; Zeigler-Hill, 2007) but that they also report completing less physical activity (McArthur & Raedeke, 2009). The finding in this study that there is a positive relationship between physical activity and self-esteem is important because it indicates that participants across demographics were more likely to report higher self-esteem if they also reported more engagement in physical activity. The diversity of the sample and this finding help us to understand the relationship between physical activity and self-esteem across a broader spectrum of individuals than have previously been considered in the research.

Surprisingly, the average score of global self-esteem in this study (M=19.08) is considerably lower than that of participants in a similar age range (M=29.67) from a study providing normative data for the RSE (Sinclair et al., 2010). There are several reasons that this lower-than-expected self-esteem may have been reported. First, as has been discussed, many studies exploring self-esteem do not reflect findings from diverse samples with regards to race and ethnicity. This lack of representation of racial and ethnic diversity has likely contributed to an absence of understanding global self-esteem in young adults across different groups. Another explanation for the finding of low global self-esteem in this sample could be that this data was collected during the Covid-19 pandemic which no doubt has had effects on the mental health of young adults. This sample is made up of undergraduate students who have faced numerous changes to their personal, learning, working, etc. environments and likely have faced changes to the way that they feel about themselves which would be reflected in this measure of self-esteem. A third explanation for this finding could be that given the social

and political climate of the United States it is possible that feelings of self-esteem may have been critically decreased particularly for black participants.

Findings related to physical self-esteem as measured by the PSPP indicate that increases in physical activity were related to increased evaluation of several of the sub-domains including physical condition, sport competence, and physical strength. While race and ethnicity were generally not found to be significant predictors of these sub-domains, there was a significant effect of race in predicting body attractiveness such that black participants were consistently reporting higher body attractiveness than white participants regardless of the amount of physical activity they completed. This specific sub-domain refers to the level of confidence that people have in their appearance as well as their perception of maintaining an attractive physique (Fox & Corbin, 1989). Important to consider when interpreting this finding is that self-esteem is theorized to be structured hierarchically with these PSPP sub-domains contributing to a larger domain of physical self-esteem which is ultimately one facet of one's global self-esteem.

The significant interaction between race and physical activity for global self-esteem emerging from the analysis is important. The findings from this study suggest that increases in physical activity are associated with self-esteem for black participants than those who identified as white. Racial and ethnic minorities take part in less physical activity than white, Non-Hispanic individuals (McArthur & Raedeke, 2009). This interaction is important because it may indicate an important reason for encouraging racial and ethnic minorities to take part in more physical activity. Additionally, keeping in mind the lack of racial and ethnic diversity represented in the literature, these results contribute to the literature that it may not be appropriate to assume relationships between physical activity and psychological outcomes can be generalized to a diverse population. Lastly, the reasons for this interaction as well as the main effect of race predicting body attractiveness are important to explore. It is possible that there is an impact of internalized stereotypes playing into the minds of the participants related to

self-esteem, perhaps especially in the minds of the black participants. A study from Zhang et al. (2009) found that the more strongly black women identified with their ethnicity and culture the less body dissatisfaction was reported. This is in line with the finding from this study that black participants reported higher body attractiveness than white participants.

The findings from this study may have important implications for encouraging the adoption of physical activity into young adults' lifestyles. The 2018 Physical Activity Guidelines Advisory Committee reported that only about half of the adults in the United States meet the recommendations for physical activity and that approximately 33% of US adults are considered to be inactive (PAGAC, 2018). Findings from the literature suggest that participating in physical activity is associated with higher self-esteem (Ekeland et al., 2005; Guinn et al., 1997; Legrand, 2014; McAuley et al., 1997; Misra et al., 1996; Rogerson et al., 2016) which is also supported by the findings of this study. As has been shown in the literature, there are several key benefits of maintaining high self-esteem such as feeling satisfied with life, independent, and resilient to stress whereas having low self-esteem puts individuals at risk for feelings of hopelessness, anxiety, and depression (Fox, 2000). Therefore, taking the results of this study and others which demonstrate increases in physical activity being affiliated with increased self-esteem could be a strategy to relay the importance of engaging in physical activity to young adults. It is also important to consider the underrepresentation of racial and ethnic minorities in the literature and the implications this has for the extent to which findings can be generalized. This study contributes to addressing the issue of the relative absence of diversity, though there are several limitations.

A limitation of this study is that the majority of participants in this study were kinesiology majors. This likely restricts the generalizability of these findings in addition to the fact that the participants from both cohorts were recruited from the same undergraduate class at one university. Another limitation to this study is that the data was collected

during the Covid-19 pandemic which may have affected the participants' self-esteem and the amount of physical activity they complete. One key strength to this study is the representation of racial and ethnic minorities in the sample. In the state of North Carolina, approximately 70% of the population identifies as white (*U.S. Census Bureau QuickFacts*, 2019). In this sample, we were able to represent non-white individuals at a higher proportion with nearly 61% of participants identifying as a race(s) other than white. With regard to ethnicity, approximately 10% of the population in North Carolina identify as Hispanic (*U.S. Census Bureau QuickFacts*, 2019) and our sample was able to represent nearly this same proportion; 10.6% of the sample of this study identified as Hispanic. This is to say that while this study is limited by the participants coming mostly from the same major area of study, the findings represent an incredibly diverse group of individuals with regards to race and ethnicity.

Overall, this study reflects a positive relationship between participation in physical activity and self-esteem at the physical and global levels. The significant interaction between race and physical activity indicated that increases in physical activity were associated with increased reported global self-esteem for black participants while white participants reported a relatively stable level of global self-esteem even with higher levels of physical activity. This study addressed an important gap in the physical activity and self-esteem literature by including a racially and ethnically diverse sample of participants in an underrepresented age group. Future directions of this line of research should seek to further understand levels of global and physical self-esteem across racial and ethnic groups as they compare to their white and Non-Hispanic counterparts or to use similar methods as this study with a sample that is more heterogeneous in terms of physical activity behavior. Additionally, it is important for future research to explore the role of physical activity for young adults identifying as black measuring whether physical activity plays a more important role in contributing to other domains of self-esteem for them or if physical activity in general plays a more crucial role in global self-esteem for black young adults than white. It is crucial to gain an understanding of how behaviors

such as physical activity relate to the construct of self-esteem given the important benefits to be gained from high self-esteem such as life satisfaction and resiliency (Fox, 2000).

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APPENDIX A: QUESTIONNAIRES

Demographic Questions

1. What is your age?
    a. Response in years
2. How do you identify your gender?
    a. Man
    b. Woman
    c. Trans-Man
    d. Trans-Woman
    e. Gender Non-conforming
    f. Other (write-in response)
    g. Prefer not to answer
3. Are you of Spanish, Hispanic, or Latino origin?
    a. Yes
    b. No
4. Choose one or more races that you consider yourself to be:
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian
    e. Native Hawaiian or Pacific Islander
    f. Other
5. What is your height? (height taken in feet and inches)
6. What is your weight? (weight in pounds)
7. What year in school are you?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. Graduate
8. What is your major?
    a. Kinesiology
    b. Psychology
    c. Other
9. How are you currently taking classes? (select all that apply)
    a. Online
    b. Hybrid
    c. Face-to-Face
10. Are you an international Student?

    a. Yes
    b. No
11. What is your home country? (written response)
12. Please describe your participation in sports:
    a. Varsity Athlete
    b. Recreational athlete (i.e., participating in organized sports through intramurals, clubs, or adult leagues)
    c. Not currently participating in organized sports
13. Who are you currently living with? (select all that apply)
    a. Friends
    b. Parents/Guardians
    c. Siblings
    d. Spouse/Partner
    e. Children
    f. Other types of acquaintances
    g. Other
14. Where are you currently living?
    a. On-campus
    b. Off-campus
15. Where On-campus are you currently living?
    a. Apartment
    b. Dorm
16. Where Off-campus are you currently living?
    a. Apartment/house within 10 miles
    b. Parent's apartment/house outside 10 miles
17. Do you have any current limitations (injury, illness) that would prevent you from performing normal physical activity?
    a. Yes (please specify)
    b. No