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UNDERSTANDING THE INFLUENCE OF MOTIVATIONAL READINESS ON THE RELATIONSHIPS BETWEEN BODY IMAGE AND WEIGHT-RELATED HEALTH BEHAVIORS IN AFRICAN AMERICAN ADULTS

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ABSTRACT

This study explored the associations among body image, motivational readiness, and weight-related health behaviors in African American men and women. African American adults (*N*=204) completed questionnaires on body image (perceived and desired), exercise and weight stages of change (SOC), physical activity (PA), and fruit and vegetable consumption (FVC). Linear regression and mediation model analyses were performed. Most (74.0%) participants were women (*M* age=48.1 years, *SD*=14.8) and obese (*M* BMI=31.7 kg/m^2, *SD*=7.8). Perceived BMI was significantly associated with minutes of vigorous PA (β=-0.2, *t*=-2.7, *p*=.007), moderate PA (β=-0.2, *t*=-2.3, *p*=.023), total MVPA (β=-0.2 *t*=-2.9 *p*=.004), and FVC (β=-0.1, *t*=-2.1, *p*=.041). While desired BMI was not found to be directly associated with PA or FVC, participants who desired to be smaller had higher levels of exercise SOC which was associated with increased minutes of vigorous PA (indirect effect=-3.8, 95% CI [-8.0, -1.0]), moderate PA (indirect effect=-3.1, 95% CI [-7.0, -0.7]), and total MVPA (indirect effect=-6.2, 95% CI [-14.0, -1.9]). Results suggest that perceived BMI, rather than desired BMI, may be a driving factor for PA or FVC in African American men and women. However, when individuals increase their exercise SOC, maintaining a healthy weight may be more important and a lower desired BMI is associated with higher levels of PA. Health promotion efforts are needed to reduce inaccurate perceptions of body size and to increase motivational readiness for exercise in order to increase PA among African American men and women.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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Chapter 1

Introduction

African American men and women are at an increased risk for developing heart disease, diabetes, cancer, and many other chronic diseases (DeSantis et al., 2016; National Center for Chronic Disease Prevention and Health Promotion & Division for Heart Disease and Stroke Prevention, 2014; Office of Minority Health, 2016; Whitt-Glover, Nwaokelemeh, Price, & Hopkins, 2018). This increased risk stems largely from high rates of obesity (Benjamin et al., 2017; Ogden, Carroll, Fryar, & Flegal, 2015), insufficient physical activity (Benjamin et al., 2017), and poor dietary habits (Ewing, 2015). Nearly half of African American adults are obese compared to roughly one third of White adults (Ogden et al., 2015), and racial and ethnic minorities are less likely to meet physical activity guidelines (at least 150 minutes of moderate-intensity physical activity each week) than non-Hispanic Whites (Benjamin et al., 2017; United States Department of Health and Human Services., 2008). Additionally, the traditional African American diet includes foods low in fiber, calcium, and potassium and high in fat, contributing to obesity and poor health outcomes (Ewing, 2015).

Cultural norms may contribute to differences in physical activity and dietary habits among African American adults (LaVeist, 2005). Previous research shows that body image ideals may differ between African American women and non-Hispanic White women (Baruth, Becofsky, Wilcox, & Goodrich, 2014; Mama et al., 2011), additionally suggesting that body image is a poor indicator of physical activity and healthy dietary habits in African American adults (Anderson & Libonati, 2012; Gradidge, Norris, Micklesfield, & Crowther, 2015; Komar-Samardzija, Braun, Keithley, & Quinn, 2012; Kruger, Lee, Ainsworth, & Macera, 2008; Mama et al., 2011). The general disproval of the thin ideal among African American adults may interfere with the relationship between body image and weight-related health behaviors (Thomas, Moseley, Stallings, Nichols-English, & Wagner, 2008). While many body image studies exist, many are done in adolescent populations, and fail to incorporate racial minorities (Ruotsalainen, Kyngas, Tammelin, & Kaariainen, 2015; Zach et al., 2013).

Despite a poor association between body image and physical activity, previous research has found that motivational readiness is positively associated with physical activity, with higher levels of motivational readiness associated with higher levels of physical activity (S. J. Marshall & Biddle, 2001). Motivational readiness may have an impact on an individual's decision to participate in healthful behaviors (Mama, McNeill, et al., 2015; S. J. Marshall & Biddle, 2001), like physical activity and diet, acting as a method of positive reinforcement (Mama, McNeill, et al., 2015; McNeill, Wyrwich, Brownson, Clark, & Kreuter, 2006). However, limited studies have explored how motivational readiness influences the relationship between body image and physical activity and diet in African American men and women.

The mediating role of motivational readiness in the relationship between body image and physical activity is not well understood, particularly among African American adults. Thus, the purpose of this study was to explore the associations among body image, motivational readiness and weight-related health behaviors (physical activity and dietary habits) in African American men and women. The specific aims were to explore: (1) the relationship between body image and weight-related health behaviors (physical activity and diet); (2) the relationship between body image and motivational readiness for exercise and weight loss; and (3) whether motivational readiness mediates the relationship between body image and weight-related health behaviors in African American men and women. We hypothesized that as perceived and desired body image increased, health behaviors would decrease, and the relationship between body image and participant health behaviors would differ by gender. Furthermore, we expected that as perceived and desired body image increased, motivational readiness would decrease, and the relationship between body image and motivational readiness for exercise and weight loss would differ by gender. Finally, we hypothesized that body image would indirectly influence weight-related health behaviors through motivational readiness.

Chapter 2

Literature Review

Disease Risk

In the United States, African American adults experience a significant burden of disease, including the highest death rates from heart disease among all racial/ethnic groups in industrialized countries (David, 2005; National Center for Chronic Disease Prevention and Health Promotion & Division for Heart Disease and Stroke Prevention, 2014). African American adults also experience high rates of hypertension and develop hypertension approximately 10 years younger than White adults (Lackland, 2014; Lloyd-Jones et al., 2010; Thorpe et al., 2016). Among African American adults, approximately 40 percent of men and 45 percent of women are hypertensive compared to 30 percent and 25 percent of White men and women, respectively (Lackland, 2014). Less than half of hypertensive African American adults have their condition under control (National Center for Chronic Disease Prevention and Health Promotion & Division for Heart Disease and Stroke Prevention, 2014). This increased severity of disease in African Americans results in more organ damage compared to their White counterparts (David, 2005).

Previous research has found significant overlap between hypertension and diabetes, with hypertensive adults being 2.5 times more likely to develop diabetes (Cheung & Li, 2012). With disproportionately high rates of hypertension, African American adults are also 80 percent more likely to be diagnosed with diabetes than their White counterparts (Office of Minority Health, 2016). Although White adults are more likely to be diagnosed with Type 1 diabetes, African Americans are around two times more likely to be diagnosed with Type 2 diabetes, a disease attributable to lifestyle behaviors (M. C. Marshall, 2005). The prevalence of medically diagnosed diabetes in African American adults (11.3 percent) is almost double the prevalence in White adults (6.8 percent) (Whitt-Glover et al., 2018). Among the many complications associated with diabetes, African Americans are two times more likely to undergo lower limb amputations, 4.2 times more likely to develop end stage renal disease, 1.2 times more likely to experience visual impairment, and twice as likely to die from diabetes as compared to Whites (Office of Minority Health, 2016). In addition, fewer diabetic African American adults have proper glycemic control, the management of appropriate blood sugar levels, and are less likely to increase treatment to improve glycemic control compared to White adults (Tang, Funnell, Sinco, Spencer, & Heisler, 2015).

In addition to disproportionately high rates of hypertension and diabetes, African Americans hold a significant cancer burden. For most cancers, African American adults have the highest mortality rates and shortest survival rates of all racial and ethnic groups (DeSantis et al., 2016). African American adults are more likely than Whites to be diagnosed at a later stage of cancer, contributing to high mortality rates (O'Keefe, Meltzer, & Bethea, 2015). Although African American women are slightly less likely to be diagnosed with breast cancer (National Center for Health Statistics, 2016), death rates for breast cancer, the most common cancer among African American women, is 42 percent higher in African American women compared to White women (DeSantis et al., 2016). Colorectal cancer death rates are 52 percent higher in African American men and 41 percent higher in African American women compared to White men and women (DeSantis et al., 2016). Many studies have pointed to socioeconomic status as the driving factor in these disparities (Berg, Ross, & Latourette, 1977; Dayal, Power, & Chiu, 1982; Freeman & Wasfie, 1989; Gordon, Crowe, Brumberg, & Berger, 1992), but when equal access to medical care is ensured, racial disparities in cancer still persist (Katz & Hofer, 1994; Trock et al., 1993).

These trends continue across many diseases, such as kidney disease, stroke, and mental health conditions (David, 2005; Whitt-Glover et al., 2018). For many diseases, while incidence rates may be lower among African Americans, morbidity and mortality rates are higher (David, 2005). Nearly 50 percent of the increased risk in morbidity and mortality in African Americans is attributed to modifiable risk factors, such as obesity and physical activity (Manson, Skerrett, Greenland, & VanItallie, 2004; Tarver-Carr et al., 2002).

Obesity

The prevalence of overweight and obesity continues to climb in the United States, and is considered a major risk factor for many chronic health conditions, including six of the ten leading causes of death (LaVeist, 2005). Obesity contributes between 280,000 and 320,000 deaths per year, and over 100,000 excess deaths are associated with obesity (Benjamin et al., 2017; Manson et al., 2004). African Americans carry a significant burden of the high overweight and obesity rates in the United States. Overall, 48 percent of African Americans are obese compared to 34.5 percent of Whites (Benjamin et al., 2017; Ogden et al., 2015). In addition to body mass index (BMI), waist circumference has been found to be a predictor of morbidity and mortality, and is often used in combination with BMI for weight management (Ladabaum, Mannalithara, Myer, & Singh, 2014). Among African Americans, the prevalence of abdominal obesity (defined as a waist circumference of >88 cm for women and >102 cm for men) disproportionately affects African American women, with an age-adjusted average waist circumference of just over 100 cm, compared to around 94 cm in non-Hispanic White women (Ladabaum et al., 2014). African American women also hold the highest average waist circumference among genders and races (Ladabaum et al., 2014). Previous research has found that higher waist circumference is associated with increased mortality risk, regardless of BMI level (Cerhan et al., 2014). While disparities exist between racial/ethnic groups, staggering differences are also present when considering within group differences. Over 56 percent of Black women are obese, and that number increases to about 84 percent when including black women who are overweight or obese compared to 37.5 percent and 72.1 percent of overweight and overweight or obese African American men, respectively (Benjamin et al., 2017; CDC/NCHS, 2011-2012; National Center for Health Statistics, 2017; Ogden et al., 2015; Wang & Beydoun, 2007) (Figure 1). Only 29.7 percent of African Americans maintain a healthy weight compared to 39.8 percent of Non-Hispanic Whites (Lloyd-Jones et al., 2010). This excess weight significantly increases the risk of metabolic disorders, increases inflammatory makers, and increases the risk of cardiovascular disease (Manson et al., 2004).

Globally, and specifically in the United States, obesity rates have tripled largely due to increases in sedentary behavior and the consumption of high fat, energy dense foods (World Health Organization, 2017). The US Burden of Disease Collaborators identified physical inactivity and poor diet as two of the seven substantial causes of mortality and morbidity in the United States (Benjamin et al., 2017).

Obesity-Related Health Behaviors

Physical activity helps prevent and control obesity through increasing energy expenditure, slowing abdominal obesity, building muscle mass, and reducing depression and anxiety (Hu, 2008). Low rates of activity can lead to premature mortality. Men and women who are less active are 3.4 and 4.7 times more likely to die from all causes, respectively, than those who are the most active (Manson et al., 2004). Meeting the recommended requirements for physical activity has a 20 percent to 30 percent reduction in risk of all-cause mortality (Manson et al., 2004). The U.S. Department of Health and Human Services has established a physical activity guideline of at least 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity or an equivalent combination each week with strength training at least twice a week (United States Department of Health and Human Services., 2008). Previous research has found that even low levels of physical activity (75 minutes or less of brisk walking per week) were associated with reduced risk of all-cause mortality compared to individuals who did not participate in any physical activity (Benjamin et al., 2017).

Unfortunately, racial and ethnic minorities in the US are less likely to meet federal guidelines for physical activity (Benjamin et al., 2017; Wilson-Frederick et al., 2014). Around 39 percent of African Americans are inactive compared to 27 percent of their White counterparts (Benjamin et al., 2017). Only 42 percent of African American adults report meeting physical activity recommendations compared to 53 percent of Whites (Benjamin et al., 2017). African American adults have the highest rates of physical inactivity among all races, and African American women consistently report less physical activity than African American men (CDC, 2014; Whitt-Glover et al., 2018). Additionally, the prevalence of leisure-time physical activity is lowest in African Americans (Ladabaum et al., 2014).

In addition to low levels of physical activity, racial and ethnic minorities often experience significant diet-related disparities, leading to poor nutrient profiles, dietary behaviors, and dietary patterns (Satia, 2009). Over 20 percent of African American households experience food insecurity compared to less than 10 percent of White households (USDA, 2016). The traditional African American diet contains foods that may be nutrient rich, but can also be low in fiber, calcium, and potassium and high in fat, often centered around meat instead of vegetables (Ewing, 2015). A "Western-style diet" that is focused on meat and excess added sugar has been linked to higher rates of obesity (Newby, Muller, Hallfrisch, Andres, & Tucker, 2004; Newby et al., 2003; Schulz, Nothlings, Hoffmann, Bergmann, & Boeing, 2005; Schulze, Fung, Manson, Willett, & Hu, 2006). Previous research has found that only 51 percent of African American adults' total fruit consumption comes from whole fruit compared to 63 percent of White adults' total fruit consumption (Lin & Morrison, 2016). The remainder of fruit intake comes from fruit juices, which contributes to weight gain (Mozaffarian, Hao, Rimm, Willett, & Hu, 2011). In addition, only 34 percent of African American adults stay below the recommended limit for added sugars, the lowest percentage among all racial groups, compared to 46 percent of White adults (Bowman et al., 2017). African American adults who did not meet the added sugar recommendations had a tendency to consume more energy dense foods with more calories and less nutrient rich foods like fruits, vegetables, and whole grains (Bowman et al., 2017). In addition, the rates of binge eating behaviors in African American women have been found to be equal to or greater than their White counterparts, contributing to obesity and many other negative health outcomes (Talleyrand, Gordon, Daquin, & Johnson, 2017).

Theoretical Frameworks for Health Behavior Change

In order to improve levels of physical activity and poor dietary behaviors, researchers have used behavior change theories to develop and evaluate interventions to improve healthy behaviors (Mama, John, & Bhuiyan, 2018). The most commonly used theories are The Social Cognitive Theory, The Theory of Planned Behavior, The Self Determination Theory, and The Transtheoretical Model, all of which have been tested and adopted in the health behavior literature (Buchan, Ollis, Thomas, & Baker, 2012). While there are many theories that have been used to explain behavior change, the Transtheoretical Model (TTM) was developed in 1983 as a comprehensive model to analyze smoking cessation (Prochaska & DiClemente, 1983; Prochaska, Redding, & Evers, 2002). The TTM has been used to recognize behavior change as a process rather than a single event (Mama et al., 2018). According to the TTM, behavior change is not a linear event, and individuals do not “complete” the change process. The TTM is designed to be cyclical, where individuals may enter at any point, regress, progress, and/or cycle through multiple times (Glanz & National Cancer Institute, 2005) This theory contains six stages: pre-contemplation, contemplation, preparation, action, maintenance, and termination, that include specific processes and principles that should be tailored to the individual’s stage membership (Mama et al., 2018; Prochaska et al., 2002). Over time, the TTM has been applied to various health behaviors, including alcohol and substance abuse, anxiety disorders, eating disorders and obesity, high-fat diets, sedentary lifestyles, and many more (Prochaska et al., 2002). Previous research has validated the use of the TTM to explain physical activity behavior change (Buxton, Wyse, & Mercer, 1996; Marcus & Simkin, 1994; S. J. Marshall & Biddle, 2001) and adoption of a low-fat diet in adults (Auld et al., 1998; Lamb & Joshi, 1996; Read, 1996). Additionally, the TTM has been validated for use in diverse samples and racial and ethnic minorities (Blaney et al., 2012; Paxton et al., 2008).

Psychosocial Factors

With the knowledge of the importance of physical activity and diet in obesity and disease prevention, researchers have identified both interpersonal and intrapersonal factors that contribute to the likelihood of an individual participating in physical activity (Mama, McNeill, et al., 2015). These significant differences in physical activity and dietary habits among African American adults may be partially explained by the differences in standards of beauty and perceptions of being overweight and obese across cultures (LaVeist, 2005). When compared to White women, African American women are more likely to value a curvy body and may desire to be bigger, demonstrating a stronger acceptance of a larger body size (Baruth, Sharpe, Parra-Medina, & Wilcox, 2014). Studies that have explored associations between body image and health behaviors have often found that body image is not a good predictor of physical activity (Anderson & Libonati, 2012; Gradidge et al., 2015; Komar-Samardzija et al., 2012; Kruger et al., 2008; Mama et al., 2011). In one study, researchers found that roughly half of men and women with high levels of body satisfaction were regularly active as opposed to individuals who had low levels of body satisfaction, who had 44% lower odds of engaging in physical activity (Kruger et al., 2008). When controlling for race, this relationship between body image and physical activity was consistent in Whites, but was not significant in blacks, indicating body image may not be a strong predictor of physical activity in African Americans (Kruger et al., 2008). Another study revealed that African American women were the only ethnic group in which perceived BMI was significantly lower than measured BMI, and individuals who had a lower ideal BMI did not participate in significantly more physical activity than women who had a relative stable ideal BMI (Anderson & Libonati, 2012; Mama et al., 2011). This study also revealed that African American women have much lower rates of physical activity, but there was no association between body dissatisfaction and physical activity (Anderson & Libonati, 2012). There is some evidence that the relationship between body image and physical activity is cyclical; there is an optimal level of body satisfaction and that having too low or too high body image can interfere with the initiation and maintenance of physical activity (Johnson, Fallon, Harris, & Burton, 2013). However, this relationship was not analyzed for racial differences (Johnson et al., 2013). In African American culture, the overall disproval with the thin ideal may interfere with the potential relationship between body image and physical activity (Thomas et al., 2008), warranting further research.

Additional psychosocial factors such as self-efficacy and motivation contribute to physical activity, often acting as a method of positive reinforcement (Mama, McNeill, et al., 2015; McNeill et al., 2006). Motivational readiness has been found to be associated with differing levels of physical activity as well as stages in the Transtheoretical Model (TTM) (Mama, McNeill, et al., 2015). Previous research has shown that there is an indirect association between motivational readiness and physical activity, with body composition acting as a mediator (Mama, McNeill, et al., 2015). Direct paths between intention, attitude, and perceived control and stages of motivational readiness were found and could be utilized to understand individuals in differing stages of motivational readiness for physical activity (Courneya, 1995). Data confirm that stage of change is associated with differing levels of physical activity as well as differing levels of motivational readiness (S. J. Marshall & Biddle, 2001). Helping an individual progress one stage nearly doubles the likelihood of performing an action in the future (Marcus et al., 1992).

Study Rationale

Previous research and current data confirm that African American men and women face some of the highest rates of many of the top leading causes of death in the United States (David, 2005; Whitt-Glover et al., 2018). African American adults are at an increased risk for heart disease, hypertension, diabetes, cancer, and many other chronic diseases of lifestyle (DeSantis et al., 2016; National Center for Chronic Disease Prevention and Health Promotion & Division for Heart Disease and Stroke Prevention, 2014; Office of Minority Health, 2016; Whitt-Glover et al., 2018). This increased risk of disease and mortality stems largely from high rates of obesity (Benjamin et al., 2017; Ogden et al., 2015), low rates of physical activity (Benjamin et al., 2017), and poor dietary habits (Ewing, 2015).

Differences in physical activity and dietary habits may be partially explained by the different standards of beauty in African American culture. Compared to Whites, African American women value their curves and desire to be bigger (Baruth, Becofsky, et al., 2014), which may interfere with the relationship between body image and weight-related health behaviors (Thomas et al., 2008).

Motivational readiness may have an impact on an individual's decision to participate in healthful behaviors (Mama, McNeill, et al., 2015; S. J. Marshall & Biddle, 2001), like physical activity and diet, but the mediating role of motivational readiness on the relationship between body image and physical activity and diet is unknown. Additionally, less is known about the relationship between body image, motivational readiness, and physical activity in minority populations, specifically African Americans. In the few studies that have explored racial differences in body image and motivational readiness, most have focused on African American women (Anderson & Libonati, 2012; Gradidge et al., 2015; Komar-Samardzija et al., 2012; Kruger et al., 2008; Mama et al., 2011). Little is known about the relationships between body image, motivational readiness, and weight-related behaviors (physical activity and diet) in African American men and women.

Understanding the associations among body image, motivational readiness, and weight related health behaviors may help inform interventions designed to increase physical activity and improve dietary habits in African American adults in an effort to reduce the prevalence and risk of overweight and obesity. Based on previous literature, a conceptual framework was developed to guide this research and better understand these interactions (Appendix A). The purpose of this study was to explore the associations among body image, motivational readiness and weight-related health behaviors (physical activity and dietary habits) in African American men and women. The specific aims and hypotheses were as follows:

AIM 1: To explore the relationship between body image and health behaviors (physical activity and diet) in African American men and women.

Hypothesis 1: As perceived and desired body image increases, health behaviors decrease.

Hypothesis 2: The relationship between body image and participant health behaviors will differ by gender.

AIM 2: To explore the relationship between body image and motivational readiness for exercise and weight loss in African American men and women.

Hypothesis 1: As perceived and desired body image increases, motivational readiness decreases.

Hypothesis 2: The relationship between body image and motivational readiness for exercise and weight loss will differ by gender.

AIM 3: To explore whether motivational readiness mediates the relationship between body image and health behaviors in African American men and women.

Hypothesis 1: Body image indirectly influences physical activity and diet through motivational readiness.

Chapter 3

Methods

Study Design

This study is a secondary analysis of the baseline data set collected from Project CHURCH (Creating a Higher Understanding of cancer Research and Community Health).

Primary Study

Project CHURCH is a longitudinal cohort study that analyzes the effects of social, behavioral, and environmental factors on cancer-related disparities and minority health in a sample of church-going African American adults in Houston, Texas. The study details of Project CHURCH have been previously published (Advani et al., 2014; Cuevas et al., 2014; Cuevas et al., 2013; Fisher et al., 2014; Lee, Mama, McAlexander, Adamus, & Medina, 2011; Reitzel et al., 2014; Savoy et al., 2014) and are summarized below. Project CHURCH received approval for all procedures and materials from the Institutional Review Board at The University of Texas MD Anderson Cancer Center (protocol ID: 2007-0970), and all participants provided written informed consent prior to participating in the study.

African American men and women were recruited through printed and televised media during church services and at a church health fair. Eligible participants were at least 18 years old, spoke English, had a valid home address and telephone number, and attended church at one of the partner churches in the Houston metropolitan area. Participants completed a baseline anthropometric assessment and a computer-based survey at the church between December 2008 and July 2009. Compensation was provided to participants upon completion of the assessment.

Current Study

The current study is a cross-sectional study of African American men and women that participated in Project CHURCH in Houston, Texas at baseline. The current study sample includes African American men and women who were at least 18 years old, spoke English, had a valid address and telephone number, attended church at a partner church in Houston, and participated in the Project CHURCH baseline health assessment.

Data Collection

The current study data was obtained from the Project CHURCH study team after approval from the Project CHURCH Ancillary Studies Committee (Appendix B). The Project CHURCH study team de-identified and cleaned baseline survey data prior to receipt. The data was imported into SPSS 24.0 for analyses (IBM SPSS Statistics, Armonk, NY).

Human Subjects Consideration

The primary study was approved by The University of Texas MD Anderson Cancer Center Institutional Review Board (IRB Approval #: 05217-01). All participants provided written informed consent prior to participation.

The current study is a secondary analysis and no human subjects were involved in this study. A Not Human Research Approval (STUDY00007465) was received from The Pennsylvania State University Institutional Review Board (Appendix C). No additional consent was obtained from study participants.

Measures

Sociodemographics. Participants reported age, gender, education, marital status, and annual household income. Height and weight were measured by trained personnel using approved protocol and were used to calculate body mass index (BMI= kg/m^2). Gender was categorized as 1=male or 2=female. Education was categorized as <Bachelor's degree=1, Bachelor's degree=2, or >Bachelor's degree=3. Annual household income was categorized as <$40,000=1, $40,000-$79,999=2, or ≥$80,000=3.

Body Image. Pulvers et al.'s culturally relevant body image questionnaire was used to measure perceived and desired body image (Pulvers et al., 2004). The scale of figures contains 9 silhouettes, labeled A-I, each representing a specific BMI ranging from 16 to 40 kg/m^2, increasing by increments of 3 kg/m^2 (Appendix D). While unaware of the corresponding BMI, participants were asked to select the figure that most resembles them currently (perceived body image) and to select the figure that they most desire to look like (desired body image). This questionnaire has been validated to assess body image in African American adults (Pulvers et al., 2004). Body image was analyzed as continuous and categorical data. Silhouette data was translated into quantitative BMI (kg/m^2) values using the corresponding scoring protocol for perceived and desired BMI (Pulvers et al., 2004). Measured BMI was calculated using the participant's height and weight and rounded to match the closest BMI value from the silhouette scale. The closest silhouette value was determined by rounding down for any BMI that was less than 1.5 kg/m^2 above a silhouette value or rounding up for any value that was at least 1.5 kg/m^2 above a silhouette value. For analysis purposes, these continuous variables are known as measured, perceived, and desired BMI.

BMI values were coded into weight status categories. Due to small cell counts, underweight and normal weight categories and overweight and obese categories were combined. Analyses used the following weight status categories:

Underweight/Normal: <18-24.9 kg/m^2

Overweight/obese: ≥25 kg/m^2

For analysis purposes, these variables are referred to as measured, perceived, and desired weight status. A summary of these variables can be found in Table 1.

Physical Activity. Physical activity was self-reported using the International Physical Activity Questionnaire short form (IPAQ-S) (Appendix E). Vigorous and moderate-intensity physical activity were reported as days per week and minutes and/or hours per day and then converted to minutes per week using standardized scoring protocol (Ainsworth et al., 2000; Craig et al., 2003; Sjöström, 2001). The IPAQ-S has been validated in measuring physical activity within diverse and minority populations (Belcher et al., 2015; Craig et al., 2003; Dyrstad, Hansen, Holme, & Anderssen, 2014; Graff-Iversen, Anderssen, Holme, Jenum, & Raastad, 2007; Palta et al., 2015; Wolin, Heil, Askew, Matthews, & Bennett, 2008). Total moderate and vigorous physical activity (MVPA) per week was calculated by adding total vigorous minutes per week and total moderate minutes per week measured by the IPAQ-S and excluded walking.

Dietary Habits. The National Cancer Institute's Fruit and Vegetable Screener (FVS) was used to measure dietary habits (Thompson et al., 2002). The FVS is a 19-item questionnaire that is used to determine the frequency of fruit and vegetable consumption (Appendix F). Participants reported frequency and portions of fruit and vegetable consumption over the last month (Peterson et al., 2008). Fruit and vegetable consumption was measured in terms of the 1992 Food Guide Pyramid ("The Food Guide Pyramid," 1996). One serving of fruit was equivalent to a whole fruit, ½ cup cut fruit, or ¾ cup of fruit juice. A serving of vegetables was equivalent to 1 cup raw leafy vegetables, ½ cup other vegetables, or ¾ cup vegetable juice. Analyses were performed using total servings per day.

Motivational Readiness for Change. The Exercise Stages of Change (ESC) short form was used to measure motivational readiness to engage in physical activity (University of Rhode Island Cancer Prevention Research Center, 2008a) (Appendix G). Participants were classified as being in the pre-contemplation, contemplation, preparation, action, or maintenance stage of behavior change based on their response to a 1-item questionnaire. The scores ranged from 1-5, with higher scores indicating greater levels of motivational readiness for exercise.

The Weight Stages of Change (WSC) short form was used to measure motivational readiness for weight loss and weight management (University of Rhode Island Cancer Prevention Research Center, 2008b) (Appendix H). The WSC contains 4 items that classify participants as being in the pre-contemplation, contemplation, action, or maintenance stage of change for weight loss. Scores range from 1-4, with higher scores indicating greater levels of motivational readiness for weight loss.

Data Analysis

Means, standard deviations, and frequencies were computed to describe participant characteristics of the study sample. Chi-square analyses were performed to determine the relationships between measured and perceived weight status, measured and desired weight status, and perceived and desired weight status categories. Due to small cell counts, the underweight and normal weight status and overweight and obese weight status categories were combined for all data analyses. Cell counts, frequencies, Pearson chi-squared values, degrees of freedom, and p-values were included in each cross tabulation.

For Aim 1, linear regressions were performed to analyze the relationships between the continuous measures of perceived BMI and desired BMI and weight-related health behaviors. Gender was tested as a moderator of the relationship between body image and weight-related health behaviors using the PROCESS macro (Hayes, 2012).

For Aim 2, linear regression analyses were performed to analyze the relationships between perceived and desired BMI and exercise stages of change and weight stages of change.

A test for moderation was performed to analyze the effects of gender on the relationships between body image and exercise stages of change and weight stages of change using the PROCESS macro (Hayes, 2012).

For Aim 3, mediation analyses were performed using the PROCESS macro (Hayes, 2012) to test the mediating effect of motivational readiness on the relationship between perceived and desired BMI and weight-related health behaviors. All statistical analyses were performed using SPSS 24.0 (IBM SPSS Statistics, Armonk, NY), with an alpha level set at 0.05.

Chapter 4

Results

Sample Characteristics

On average, participants were 48.0 years old (*SD*=14.8) and obese (*M* BMI=31.1 kg/m^2, *SD*=6.1). The majority (74.0%) of participants were female. Most (69.1%) participants reported an average annual household income of $40,000 or more, and less than half (43.1%) of participants had a Bachelor's degree. On average, participants self-reported 316.8 minutes (*SD*=400.9) of moderate-vigorous physical activity (MVPA) per week, and 53.8% of participants reported meeting physical activity recommendations. Participants reported eating less than the recommended number of daily servings of fruit and vegetables (*M*=3.1 servings/day, *SD*=2.6). Less than half (42.7%) of participants were in the action or maintenance stage of change for exercise, whereas 70.5% of participants were in the action or maintenance stage of change for weight loss. Table 2 describes sample demographics and characteristics.

Body Image

On average, participants perceived themselves as overweight (*M* perceived BMI=27.7 kg/m^2, *SD*=5.8) and desired to be normal weight (*M* desired BMI=24.0 kg/m^2, *SD*=3.9). A small proportion (18.2%) of participants were underweight or normal weight; and 81.8% of participants were overweight or obese.

The majority (80.7%) of participants perceived their BMI accurately. Of the participants who did not perceive their body image correctly, the majority (84.6%) perceived themselves smaller (Table 3). There was a significant association between measured weight status and perceived weight status (X^2=29.6, p<.001; Table 4).

Over half of participants (60.1%) desired their current measured body size. Normal weight participants desired to be normal weight 61.9% of the time and overweight/obese participants desired to be overweight/obese 59.9% of the time. Participants who desired to be different from their current body size desired to be smaller 90.1% of the time (Table 5). There was no statistically significant association between measured weight status and desired weight status (X^2=3.7, p=.056; Table 6).

Participants who perceived themselves as normal weight also desired to be normal weight 77.6% of the time, and participants who perceived themselves as overweight/obese desired to be overweight/obese 69.0% of the time. Of the participants who desired to be different from their perceived weight status, participants desired to be smaller 81.4% of the time (Table 7). There was a statistically significant association between perceived and desired weight status (X^2=33.1, p<.001; Table 8).

Body Image and Health Behaviors

Linear regression models were used for aim 1, to analyze the relationship between body image and weight-related health behaviors, using perceived and desired BMI as predictors and physical activity and fruit and vegetable consumption as health behavior outcomes. For both perceived and desired BMI, unadjusted and adjusted models are reported in Tables 9 and 10. In unadjusted models, perceived BMI was significantly associated with minutes of vigorous physical activity (β=-0.2, t=-2.7, p=.007), minutes of moderate physical activity (β=-0.2, t=-2.3, p=.023), total MVPA (β=-0.2 t=-2.9 p=.004), and fruit and vegetable consumption (β=-0.1, t=-2.1, p=.041). Results indicate that as perceived BMI increases, vigorous minutes of physical activity, moderate minutes of physical activity, total MVPA, and fruit and vegetable consumption decrease. When models were adjusted for gender and BMI, these associations were no longer statistically significant (*p*s>.05). Regression results are shown in Table 9.

Results from the unadjusted and adjusted linear regression models for desired BMI and weight-related health behaviors indicated that desired BMI was not significantly associated with vigorous minutes of physical activity, moderate minutes of physical activity, total MVPA, or fruit and vegetable consumption (*p*s>.05). Results are shown in Table 10. There was no significant moderating effect of gender on the relationship between perceived BMI or desired BMI and weight-related health behaviors (*p*s>.05; Table 11 and Table 12)

Body Image and Motivational Readiness

Linear regression analyses were used to address aim 2, to analyze the relationship between motivational readiness and weight-related health behaviors, with exercise stages of change and weight stages of change as predictors and physical activity and fruit and vegetable consumption as outcomes. Unadjusted and gender-adjusted models are reported in Tables 13-14. In the unadjusted models percieved BMI was signficantly associated with exercise stages of change (β=-0.3, t=-3.8, p<.001) and weight stages of change (β=0.2, t=3.0, p=.003). As perceived BMI increased, exercise stages of change decreased indicating participants with a higher percieved BMI were less willing to engage in physical activity. As perceived BMI increased, weight stages of change increased, indicating participants with a higher perceived BMI were more likely to be willing to lose weight. Desired BMI was significantly associated with exercise stages of change (β=-0.2, t=-2.7, p=.007). As desired BMI increased exercise stages of change decreased, indicating participants with a higher desired BMI were less willing to engage in physical activity. Desired BMI was not significantly associated with weight stages of change (p>.05). The gender-adjusted models revealed similar relationships between perceived and desired BMI and exercise stages of change and weight stages of change. Results from linear regression analyses can be found in Table 13 and Table 14.

Gender significantly moderated the relationship between perceived BMI and weight stages of change (b =-0.1, t=2.5, p=.014) and desired BMI and weight stages of change (b =-0.1, t=-2.4, p=.018). There was no significant moderating effect of gender on the relationship between perceived BMI and exercise stages of change or desired BMI and exercise stages of change (ps>.05; Table 15-16).

Motivational Readiness Mediation Analyses

Mediation analyses showed that stages of change for exercise significantly mediated the relationship between perceived BMI and vigorous physical activity (indirect effect=-3.5, 95% CI [-6.5, -1.5]), total minutes of moderate physical activity (indirect effect=-2.7, 95% CI [-5.6, -1.1]), and total MVPA (indirect effect=-6.2, 95% CI [-11.0, -2.7]). Individuals who perceived themselves as larger had lower levels of motivational readiness for exercise which was associated with lower levels of vigorous physical activity (Figure 2), moderate physical activity (Figure 3), and total MVPA (Figure 4). In addition, exercise stages of change significantly mediated the relationship between desired BMI and total minutes of vigorous physical activity (indirect effect=-3.8, 95% CI [-8.0, -1.0]), total minutes of moderate physical activity (indirect effect=-3.1, 95% CI [-7.0, -0.7]), and total MVPA (indirect effect=-6.2, 95% CI [-14.0, -1.9]). Individuals who desired to be smaller had higher levels of motivational readiness for exercise which was associated with higher levels of vigorous physical activity (Figure 6), moderate physical activity (Figure 7), and total MVPA (Figure 8). Exercise stages of change was not a significant mediator in the relationships between perceived BMI or desired BMI and fruit and vegetable consumption (Figure 5; Figure 9).

Results indicated that weight stages of change is a significant mediator in the relationship between percieved BMI and total minutes of vigorous physical activity (indirect effect=1.2, 95% CI [0.1, 3.4]). Individuals who perceived themselves as larger had higher motivational readiness for weight change which was associated with higher levels of vigorous physical activity (Figure 2). There were no other significant mediating effects. Mediation models and indirect effects are shown in Figures 2-9 and Tables 17 and 18.

Chapter 5

Discussion

The purpose of this study was to explore the associations among body image (perceived and desired), motivational readiness and weight-related health behaviors (physical activity and dietary habits) in African American men and women. We found that perceived BMI was directly associated with physical activity and fruit and vegetable consumption. Although there was no direct association between desired BMI and weight-related health behaviors, there was an indirect relationship, suggesting that increased motivational readiness for exercise mediated the association between desired BMI and physical activity.

Findings revealed that participants with a higher perceived BMI participated in less physical activity and ate fewer servings of fruits and vegetables than participants with a lower perceived BMI. This suggests that weight perception may be a barrier to physical activity and fruit and vegetable consumption in African American adults. Although there is an assumption that desired BMI is the driver of weight-related health behaviors (Paeratakul, White, Williamson, Ryan, & Bray, 2002), we did not find a statistically significant association between desired BMI and physical activity or fruit and vegetable consumption, which suggests that this relationship may vary between cultures. African American women have a different perception of body size and are accepting of larger body sizes, indicating that lifestyle behaviors, like physical activity and fruit and vegetable consumption, may not be driven by a desire to be smaller or thinner in African American women (Baruth, Sharpe, Magwood, Wilcox, & Schlaff, 2015). Obesity is more accepted among African Americans and is stigmatized less among African American women. When obesity becomes more accepted and less stigmatized, there may be a failure to understand the negative health outcomes associated with obesity. The desire becomes conforming to appearance norms as opposed to considering health consequences (Baruth, Becofsky, et al., 2014).

Although we did not find a direct relationship between desired BMI and weight-related health behaviors, there was an indirect association. As individuals increased their motivational readiness for exercise, individuals with a lower desired BMI participated in higher levels of physical activity. Previous research has identified many intrapersonal factors that promote or inhibit physical activity (Mama, McNeill, et al., 2015). However, the role of motivational readiness for exercise among African American adults reamins unclear (Mama, Diamond, et al., 2015; Mama, McNeill, et al., 2015). Increasing motivational readiness for exercise includes educational and counseling programs that often highlight the benefits of physical activity as well as the consequences of physical inactivity. In a culture that does not necessarily tie obesity to negative health outcomes, African American adults who have increased motivational readiness for exercise may be more aware of the importance of maintaining a healthy weight, thus establishing a relationship between desired BMI and physical activity.

Previous research has indicated that body image is a multidimensional construct that demands a biopsychosocial approach. This study used multiple dimensions of body image (perceived and desired BMI) to expand on current body image research. Findings from this study contribute to our understanding of how body image influences healthy behaviors in African American adults, whom have not been adequately included in the body image literature (Ruotsalainen et al., 2015; Zach et al., 2013). Our sample included men and women, further contributing to the body image literature, which has predominantly focused on body image in women. Although this study offers unique insight into the relationship between body image and weight-related health behaviors, several limitations should be considered when interpreting results. First, this study included African American men and women exclusively. Thus, findings may not be generalizable to other racial or ethnic groups. Second, we conducted a secondary data analysis of cross-sectional data, limiting our ability to make causal inferences. However, findings suggest that there is potential for a directional relationship between body image, motivational readiness, and physical activity, warranting further longitudinal research. Third, physical activity was measured via self-report, which is subject to recall bias. African American adults, in particular, have a tendency to over-estimate their physical activity (Welk, Beyler, Kim, & Matthews, 2017). Further research including objective measures of physical activity and energy expenditure, such as accelerometry, is needed to confirm these findings. Lastly, the Pulvers' culturally relevant silhouette scale used to assess body image includes silhouettes with predetermined BMI values that increase by 3 kg/m^2. Although this scale has been validated for use in African American adults, there are other aspects of body image that have not been explored in this study, such as appearance concerns specific to African American culture (Talleyrand et al., 2017). Previous research has found that there are many dimensions within body image that are culture-specific, and these areas need to be explored extensively to provide culturally relevant information.

Despite the noted limitations, this study contributes to our understanding of how body image influences motivational readiness and healthy behaviors in African American men and women. Because body image in African American adults has been shown to deviate from their White counterparts, understanding the role of body image and motivation in regards to physical activity and diet is important. Results from this study suggest that discussions around weight and body image or appearance may not be the most effective way motivate African American adults to engage in healthy behaviors to prevent and control obesity. Future studies should focus on educating African American adults on the benefits of physical activity and the consequences of a sedentary lifestyle. Additionally, education should elaborate on the different forms of physical activity that may be less vigorous or painful for individuals who perceive themselves larger in an effort to promote healthful behaviors. Education efforts should focus on connecting negative health outcomes to obesity, so that there is a better understanding of the importance of maintaining a healthy weight by clinical versus cultural or social standards. Just as weight perceptions and standards are different within the African American community as compared to their White counterparts, successful methods of increasing motivational readiness for exercise through education may differ by race. Further research is needed to address cultural differences in motivational readiness for exercise. These insights may influence health promotion efforts so that interventions can effectively address cultural differences.

Chapter 6

Tables

Table 1. Body image variables

Variable	Variable Type	Measure or Calculation
Measured BMI (kg/m^2)	Continuous	Calculated using the participant's height and weight and rounded to closest silhouette value
Perceived BMI (kg/m^2)	Continuous	Pulvers et al.'s (Pulvers et al., 2004) culturally relevant body image questionnaire
Desired BMI (kg/m^2)	Continuous	Pulvers et al.'s (Pulvers et al., 2004) culturally relevant body image questionnaire
Measured Weight Status	Categorical	Underweight/normal weight: <18.5-24.9 kg/m^2 Overweight/obese: ≥25 kg/m^2
Perceived Weight Status	Categorical	Underweight/normal weight: <18.5-24.9 kg/m^2 Overweight/obese: ≥25 kg/m^2
Desired Weight Status	Categorical	Underweight/normal weight: <18.5-24.9 kg/m^2 Overweight/obese: ≥25 kg/m^2

Table 2. Participant characteristics

Characteristic or Scale	Value
Characteristics [% (*n*)]	
Age [mean years (*SD*)]	48.0 (14.8)
BMI [mean kg/m^2 (*SD*)]	31.1 (6.1)
Underweight/Normal	18.2 (37)
Overweight/Obese	81.8 (166)
Perceived BMI [mean kg/m^2 (*SD*)]	27.7 (5.8)
Underweight/Normal	23.6 (48)
Overweight/Obese	76.4 (155)
Desired BMI [mean kg/m^2 (*SD*)]	24.0 (3.9)
Underweight/Normal	42.4 (86)
Overweight/Obese	57.6 (117)
Gender	
Male	26.0 (53)
Female	74.0 (151)
Annual Household Income	
<$40,000	30.9 (59)
$40,000-$79,999	27.2 (52)
≥$80,000	41.9 (80)
Education	
<Bachelor's degree	56.9 (116)
Bachelor's degree	30.4 (62)
>Bachelor's degree	12.7 (26)
Physical Activity Recommendations	
Yes	53.8 (107)
No	46.2 (92)
Physical Activity [mean mins/week (*SD*)]	
Total vigorous activity	155.9 (226.9)
Total moderate activity	160.9 (236.9)
Total MVPA	316. 8 (400.9)
Fruit and Vegetable Consumption [mean servings/day (*SD*)]	3.1 (2.6)
Stage of Change (scale range) [mean score (*SD*)]	
Exercise Stage of Change (1-5)	3.5 (1.1)
Weight Stage of Change (1-4)	2.9 (1.1)

Table 3. Cross tabulation of measured and perceived weight status

Measured Weight Status	Perceived Weight Status		
	Underweight/Normal	Overweight/Obese	Total
Underweight/Normal			
Count	15	6	21
% within measured	71.4%	28.6%	100%
% within perceived	31.3%	3.9%	10.3%
Overweight/Obese			
Count	33	149	182
% within measured	18.1%	81.9%	100%
% within perceived	68.8%	96.1%	89.7%
Total			
Count	48	155	203
% within measured	23.6%	76.4%	100%
% within perceived	100%	100%	100%

Table 4. Chi-square test for measured and perceived weight status cross tabulation

	Value	df
Pearson Chi-Square**	29.6	1
Likelihood Ration**	24.6	1
Linear-by-Linear Association**	29.5	1
N of Valid Cases	203	

**p<.01
*p<.05

Table 5. Cross tabulation of measured and desired weight status

Measured Weight Status	Desired Weight Status		
	Normal	Overweight/Obese	Total
Normal			
Count	13	8	21
% within measured	61.9%	38.1%	100%
% within desired	15.1%	6.8%	10.3%
Overweight/Obese			
Count	73	109	182
% within measured	40.1%	59.9%	100%
% within desired	84.9%	93.2%	89.7%
Total			
Count	86	117	203
% within measured	42.4%	57.6%	100%
% within desired	100%	100%	100%

Table 6. Chi-square test for measured and desired weight status cross tabulation

	Value	df
Pearson Chi-Square	3.7	1
Likelihood Ration	3.6	1
Linear-by-Linear Association	3.6	1
N of Valid Cases	203	

**p<.01

*p<.05

Table 7. Cross tabulation of perceived and desired weight status

Perceived Weight Status	Desired Weight Status		
	Normal	Overweight/Obese	Total
Normal			
Count	38	11	49
% within perceived	77.6%	22.4%	100%
% within desired	44.2%	9.3%	24.0%
Overweight/Obese			
Count	48	107	155
% within perceived	31.0%	69.0%	100%
% within desired	55.8%	90.7%	76.0%
Total			
Count	86	118	204
% within perceived	42.2%	57.8%	100%
% within desired	100%	100%	100%

Table 8. Chi-square test for perceived and desired weight status cross tabulation

	Value	df
Pearson Chi-Square**	33.1	1
Likelihood Ration**	33.7	1
Linear-by-Linear Association**	33.0	1
N of Valid Cases	204	

**p<.01
*p<.05

Table 9. Perceived BMI and weight-related health behaviors unadjusted and adjusted linear regressions

	Unadjusted		BMI and Gender Adjusted	
	β	t	β	t
Vigorous Minutes	-0.2	-2.7**	-0.1	-1.1
Moderate Minutes	-0.2	-2.3*	-0.1	-0.8
Total MVPA	-0.2	-2.9**	-0.1	-1.1
Fruit and Vegetable Consumption	-0.1	-2.1*		

**p<.01
*p<.05

Table 10. Desired BMI and weight-related health behaviors unadjusted and adjusted linear regressions

	Unadjusted		BMI and Gender Adjusted	
	β	t	β	t
Vigorous Minutes	-0.02	-0.3	0.1	1.3
Moderate Minutes	-0.001	0	0.1	1.4
Total MVPA	-0.01	-0.2	0.1	1.6
Fruit and Vegetable Consumption	-0.02	-0.3		

**p<.01
*p<.05

Table 11. Gender moderation analyses for perceived BMI and weight-related health behaviors

	Vigorous Minutes		Moderate Minutes		Total MVPA		Fruit and Vegetable Consumption	
	b	t	b	t	b	t	b	t
Gender	-99.7	-2.4**	-100.1	-2.2**	-199.8	-2.7**	-0.4	-0.8
Perceived BMI	-6.8	-2.4**	-5.8	-2.1**	-12.6	-2.5**	-0.1	-2.1*
GenderXPerceived BMI	10	1.4	9	1.1	19	1.4	0.1	1.8

**p<.01
*p<.05

Table 12. Gender moderation analyses for desired BMI and weight-related health behaviors

	Vigorous Minutes		Moderate Minutes		Total MVPA		Fruit and Vegetable Consumption	
	b	t	b	t	b	t	b	t
Gender	-114.9	-2.5*	-115.5	-2.3*	-230.4	-2.9**	-0.6	-1.1
Desired BMI	-3.0	-0.5	-0.9	-0.2	-4	-0.4	-0.04	-0.7
GenderXDesired BMI	18.9	1.3	11.9	0.7	30.8	1.1	0.2	1.3

**p<.01
*p<.05

Table 13. Body Image and Exercise Stages of Change unadjusted and adjusted linear regression models

	Unadjusted		Gender Adjusted	
	β	t	β	t
Perceived BMI	-0.3	-3.8***	-0.3	-3.7***
Desired BMI	-0.2	-2.7**	-0.2	-2.7**

**p<.01
*p<.05

Table 14. Body Image and Weight Stages of Change unadjusted and adjusted linear regression models

	Unadjusted		Gender Adjusted	
	β	t	β	t
Perceived BMI	0.2	3.0**	0.2	2.7**
Desired BMI	0.1	1.4	0.1	1.3

**p<.01
*p<.05

Table 15. Gender moderation analyses of perceived BMI and motivational readiness

	ESC		WSC	
	b	*t*	*b*	*t*
Gender	-0.1	-0.4	0.3	1.7
Perceived BMI	-0.1	-3.9**	0.04	2.8**
GenderXPerceived BMI	0.03	1.1	-0.1	-2.5*

**p<.01
*p<.05

Table 16. Gender moderation analyses of desired BMI and motivational readiness

	ESC		WSC	
	b	*t*	*b*	*t*
Gender	-0.2	-0.9	0.4	2*
Desired BMI	-0.05	-2.5*	0.04	2.1*
GenderXDesired BMI	-0.03	-0.5	-0.1	-2.4*

**p<.01
*p<.05

Table 17. Indirect effects through Exercise Stages of Change mediator

	b	95% CI
Perceived BMI -> Vigorous Minutes**	-3.5	-6.5, -1.5
Perceived BMI -> Moderate Minutes*	-2.7	-5.6, -1.1
Perceived BMI -> Total MVPA**	-6.2	-11.0, -2.7
Perceived BMI -> FV Consumption*	-0.002	-0.01, 0.01
Desired BMI-> Vigorous Minutes	-3.8	-8.0, -1.0
Desired BMI-> Moderate Minutes	-3.1	-7.0, -0.7
Desired BMI-> Total MVPA	-6.9	-14.0, -1.9
Desired BMI-> FV Consumption	-0.01	-0.02, 0.01

**p<.01
*p<.05

Table 18. Indirect effects through Weight Stages of Change mediator

	b	95% CI
Perceived BMI -> Vigorous Minutes**	1.2	0.1, 3.4
Perceived BMI -> Moderate Minutes*	0.4	-0.7, 2.5
Perceived BMI -> Total MVPA**	1.6	-0.1, 4.9
Perceived BMI -> FV Consumption*	0.01	-.001, 0.03
Desired BMI-> Vigorous Minutes	0.5	-0.3, 2.6
Desired BMI-> Moderate Minutes	0.1	-0.8, 1.5
Desired BMI-> Total MVPA	0.6	-0.5, 4.3
Desired BMI-> FV Consumption	0.004	-0.003, 0.03

**p<.01
*p<.05

Chapter 7

Figures

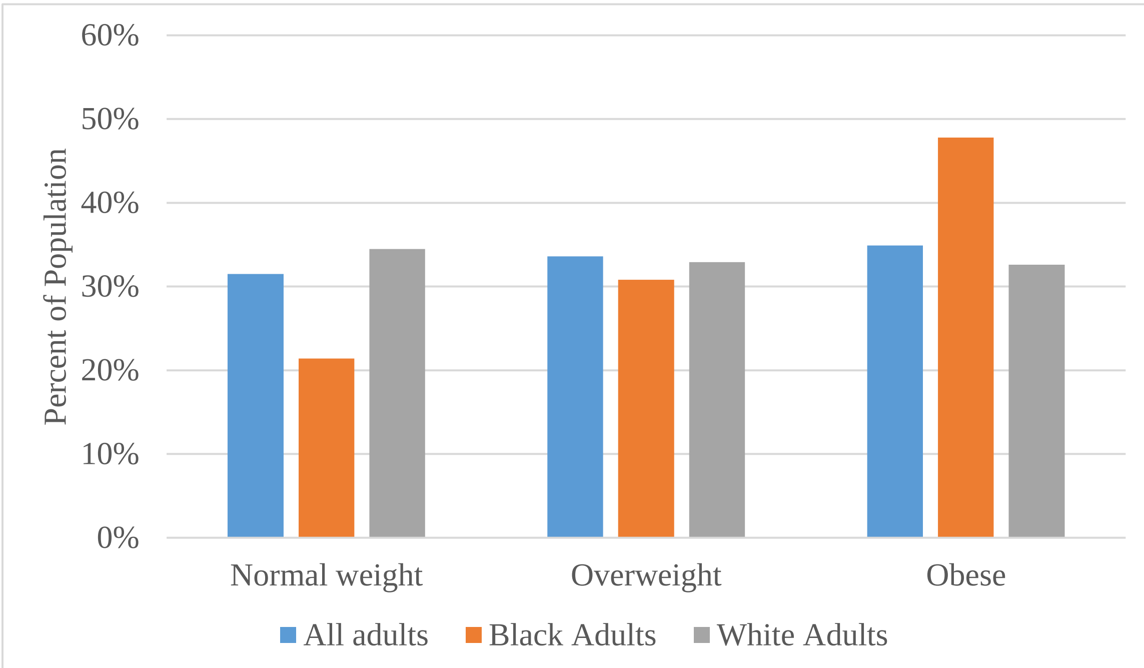

Figure 1. Normal weight, overweight and obese rates by race (National Center for Health Statistics, 2017)

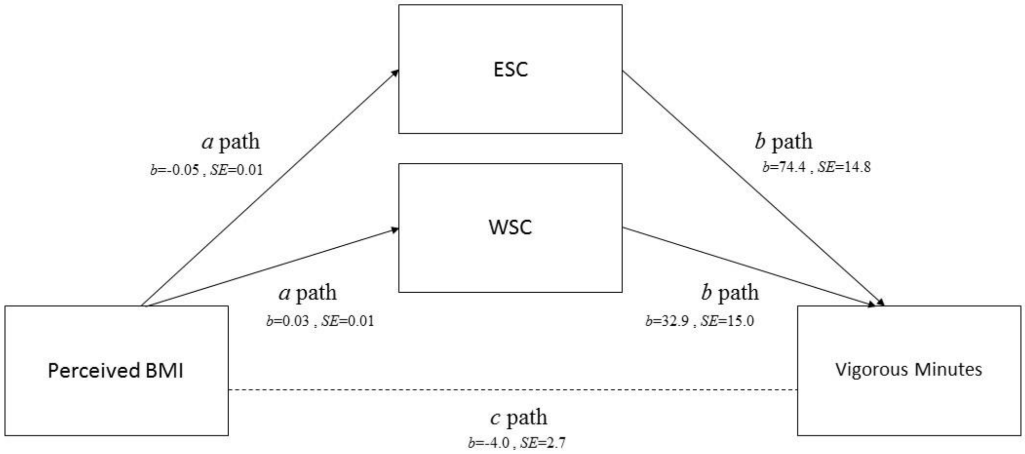

Figure 2. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between perceived BMI and vigorous minutes of physical activity[1,2]

[1] All mediation models in this study were carried out separately, combined for accessibility
[2] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

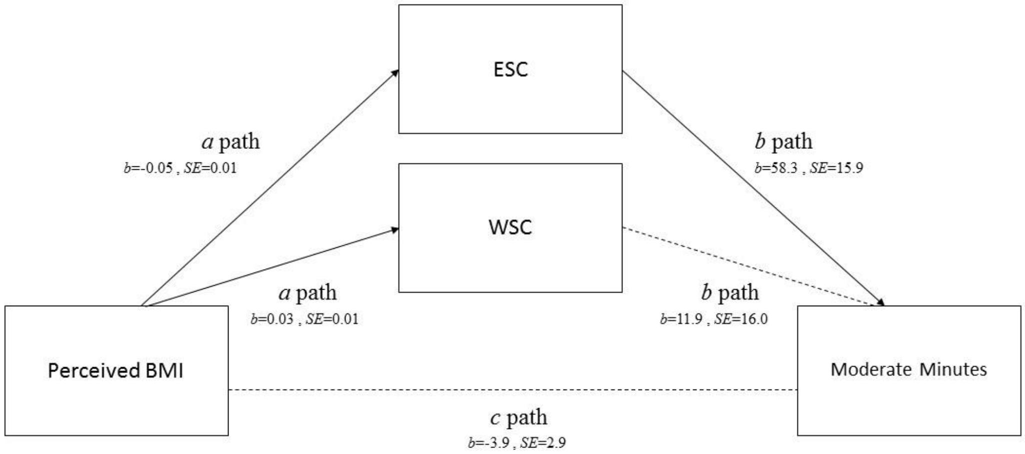

Figure 3. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between perceived BMI and moderate minutes of physical activity[3,4]

[3] All mediation models in this study were carried out separately, combined for accessibility
[4] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

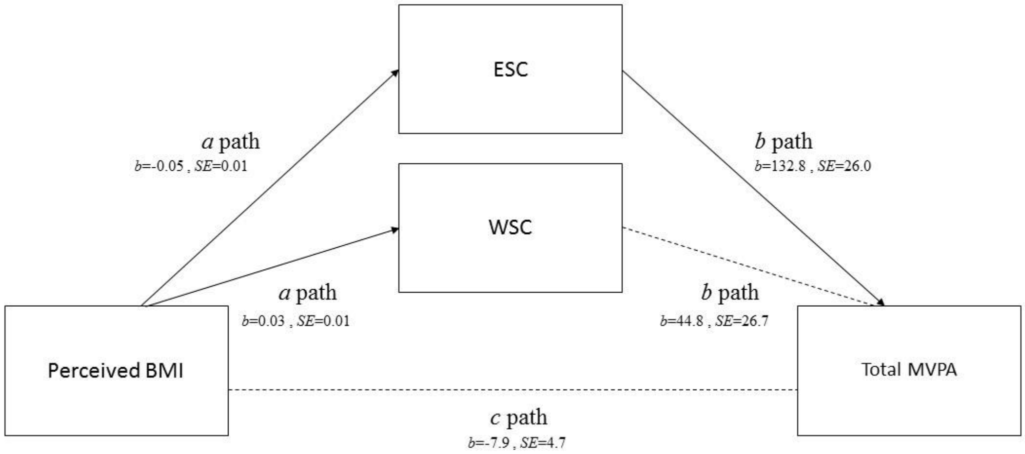

Figure 4. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between perceived BMI and total moderate-vigorous physical activity (MVPA)[5,6]

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[5] All mediation models in this study were carried out separately, combined for accessibility
[6] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

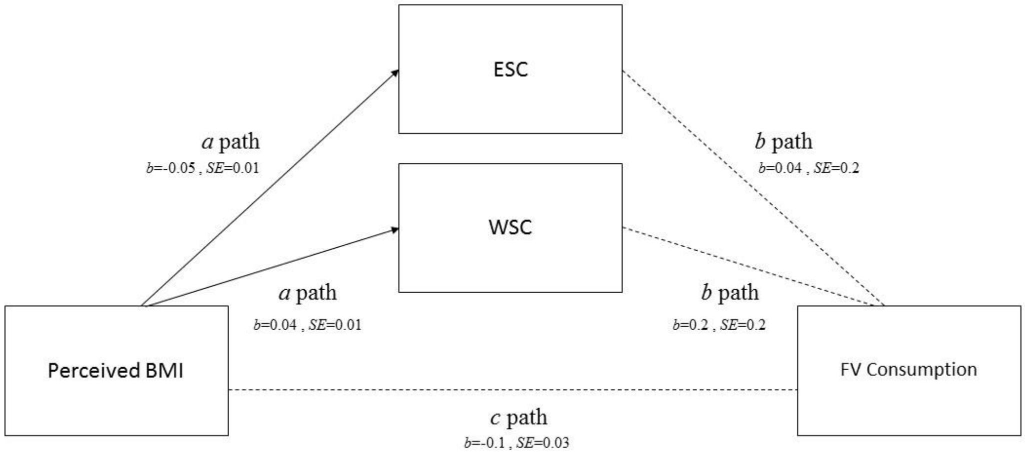

Figure 5. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between perceived BMI and fruit and vegetable consumption[7,8]

[7] All mediation models in this study were carried out separately, combined for accessibility
[8] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

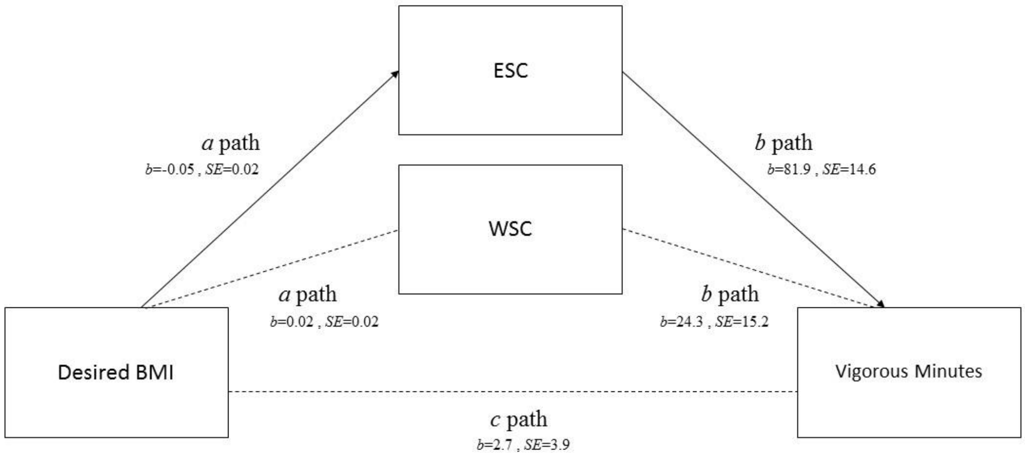

Figure 6. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between desired BMI and vigorous minutes of physical activity[9,10]

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[9] All mediation models in this study were carried out separately, combined for accessibility
[10] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

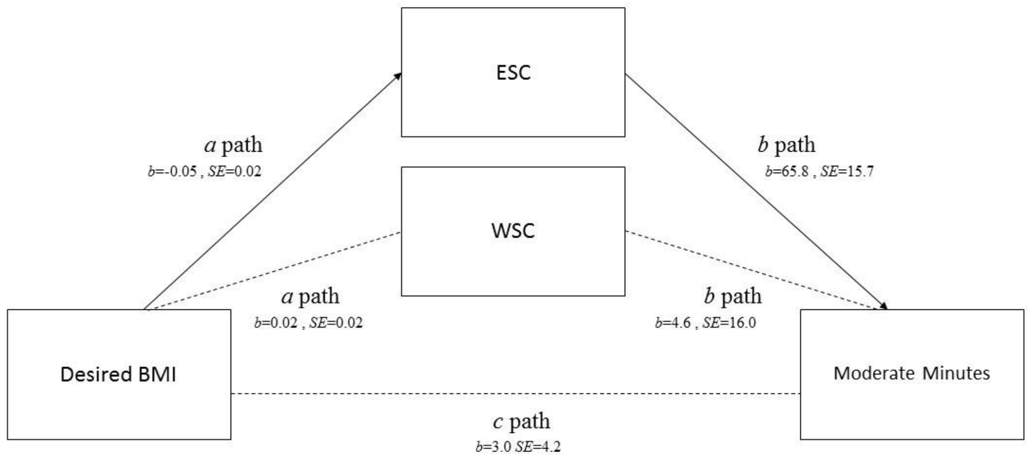


Figure 7. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between desired BMI and moderate minutes of physical activity[11,12]

[11] All mediation models in this study were carried out separately, combined for accessibility
[12] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

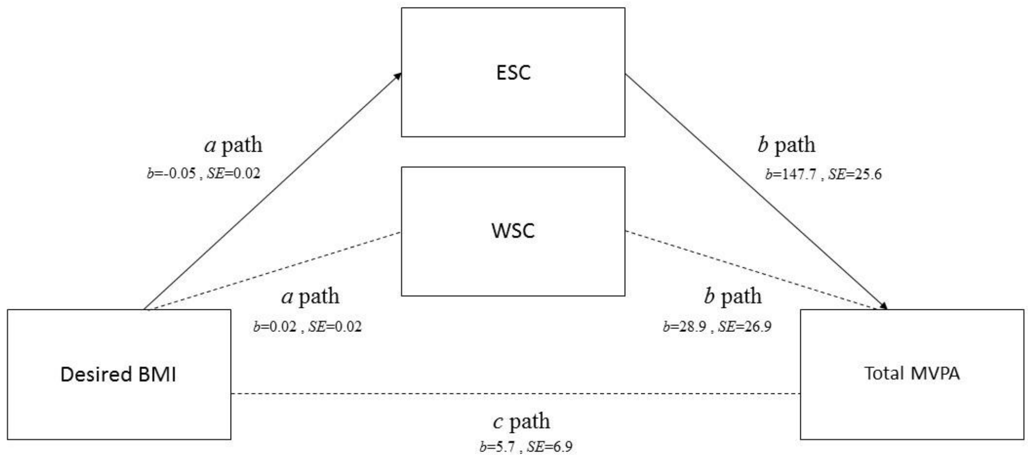


Figure 8. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between desired BMI and total moderate-vigorous physical activity (MVPA)[13,14]

[13] All mediation models in this study were carried out separately, combined for accessibility
[14] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

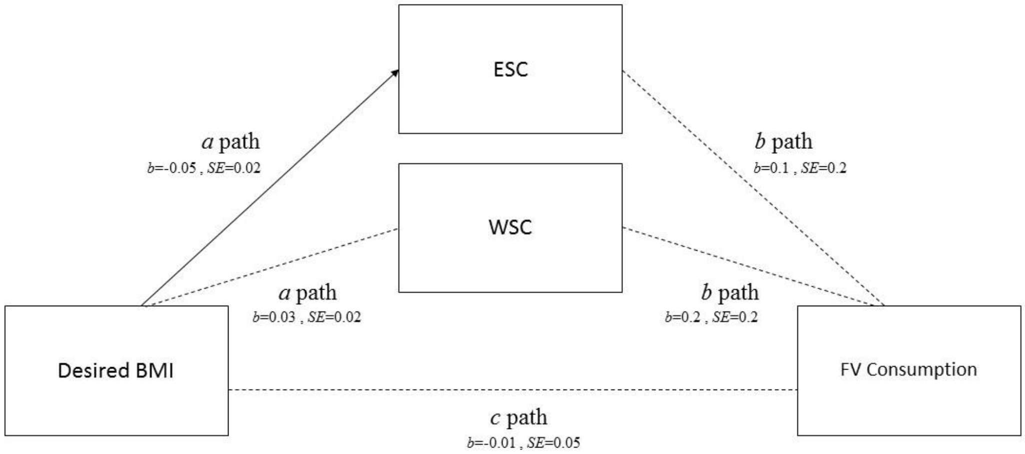
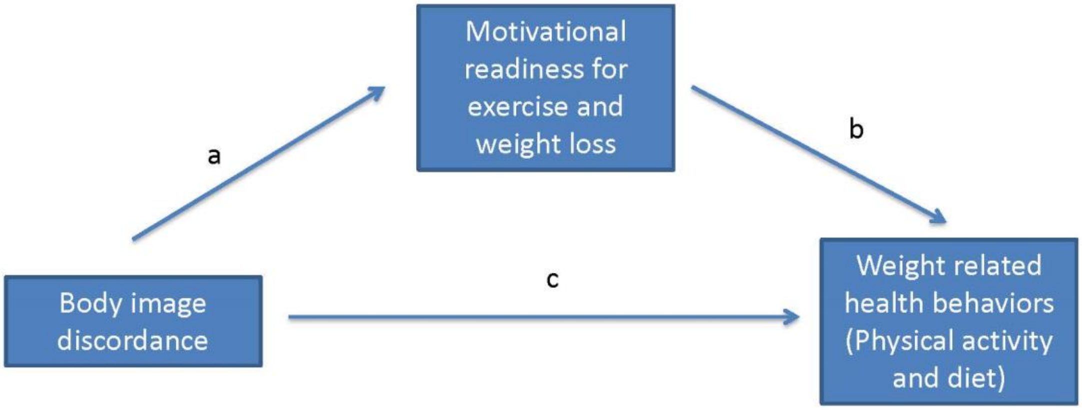


Figure 9. Direct effects of the mediation of exercise stage of change and weight stage of change on the relationship between desired BMI and fruit and vegetable consumption[15,16]

[15] All mediation models in this study were carried out separately, combined for accessibility
[16] Solid lines indicate a significant relationship and dashed lines indicate no significant relationship between two connected variables

Appendix A

Theoretical Framework



Appendix B

CHURCH Study Approval

MD Anderson
Project CHURCH

FROM: Project CHURCH Ancillary Studies Committee
Department of Health Disparities Research, Unit 1440

TO: Dr. Scherezade Mama

CC: Dr. Lorna McNeill, Ms. Achala Limaye

RE: CHURCH2016-005 “Understanding the influence of body image discordance on motivational readiness to perform weight-related health behaviors in African American adults”

DATE: 10/21/16

On 10/21/16, the Project CHURCH Ancillary Studies Committee granted approval to your request titled “Understanding the influence of body image discordance on motivational readiness to perform weight-related health behaviors in African American adults.” The Committee has granted you access to the requested **de-identified data** from the first year of the CHURCH Study (New Faith) data collection.

Please follow the procedures below to obtain access to the data:

- You have already completed and returned the data use agreement, signed in September 2015.
- To access the data, please contact Ms. Achala Limaye, Department of Health Disparities Research, at ARLimaye@mdanderson.org.

Variables requested/included:

<u>Outcomes:</u>
- ADIETI1-ADIETI6, FV_consumption_1n, FV_consumption_2n, Five_A_Day, Dietary Intake Questionnaire, New Faith, Year 1
- NCI01-NCI16, ADIETI8-9, FFOOD1-3, ADIETI7A-D, ADIETI11-13, RedMeat, NCI Screener Questionnaire, New Faith, Year 1
- BIPAQ1-6, VigTotalMin_n, VigTotalMet_n, ModTotalMin_n, ModTotalMet_n, WalkTotalMin_n, WalkTotalMet_n, TotalActivityMin_n, TotalMetMin_n, IPAQcat, International Physical Activity Questionnaire, New Faith, Year 1
- NHANES01-03, Sitting NHANES Questionnaire, New Faith, Year 1
- SEDEN1-4, Sedentary Behaviors, New Faith, Year 1

<u>Predictors:</u>
- APAFR2, SIL1-SIL2, Body Image, New Faith, Year 1
- BMI, BMI of Participant, New Faith, Year 1

- AWTLSA1, WSC1-4, Motivational Readiness for Weight Loss, New Faith, Year 1
- ESC, Motivational Readiness for Exercise, New Faith, Year 1

Demographic/Other Variables:

- SUBJECT, Subject ID, New Faith, Year 1
- AAGE, Age of Participant, New Faith, Year 1
- ASRDHL and ASRD, Race and Ethnicity, New Faith, Year 1
- ASSOCI2, Education, New Faith, Year 1
- ASOCI3, Marital Status, New Faith, Year 1
- ASOCI6, Living Children, New Faith, Year 1
- ASOCI7, Number Living in Household, New Faith, Year 1
- ASOCI8, Number under 18, New Faith, Year 1
- ASOCI10, Income, New Faith, Year 1
- ASOCI11, Employment Status, New Faith, Year 1

Please note that you will be responsible for the following:

- You will need to **apply for an extension of this research project before 10/21/17**, if your project will continue beyond that date. Application procedures will include the provision of information on current research progress, relevant findings, and future work to be completed. Please apply at least one month before the expiration of this approval. Please contact Dr. Diep for the Project CHURCH Ancillary Study Extension Form. Failure to apply for this extension means that approval for this project expires on that date and no further analyses shall be conducted using these data.
- You must inform the Project CHURCH Ancillary Studies Committee if the project will conclude on or before the expiration date by contacting Dr. Diep for the Project CHURCH Ancillary Study Termination Form, and submitting it back to her via e-mail before the expiration date.
- You must acknowledge Project CHURCH funding in any publications. Contact Dr. Diep for information regarding the language you should use. Please be sure that the Project CHURCH Ancillary Studies Committee receives a copy of any publications emerging from these data.
- You may not use data for any purpose outside of the scope of the study for which you have been approved.
- You must notify the Project CHURCH Ancillary Studies Committee via Dr. Diep immediately of any occurrences of adverse events related to this project.

Your receipt of this memorandum of approval indicates your agreement with the terms indicated above. If you have any questions about this memo or the data, please contact Dr. Diep for assistance.

Appendix C

IRB Not Human Research Approval

PENNSTATE

IRB Program
Office for Research Protections

Vice President for Research
The Pennsylvania State University
205 The 330 Building
University Park, PA 16802

Phone : (814) 865-1775
Fax: (814) 863-8699
Email : orprotections@psu.edu
Web : www.research.psu.edu/orp

NOT HUMAN RESEARCH

Date: May 20, 2017

From: Philip Frum, IRB Analyst

To: Hannah Jones

Type of Submission:	Initial Study
Title of Study:	Understanding the role of motivational readiness in the association between body image and weight-related health behaviors in African American adults
Principal Investigator:	Hannah Jones
Study ID:	STUDY00007465
Submission ID:	STUDY00007465
Funding:	Not Applicable

The Office for Research Protections determined that the proposed activity, as described in the above-referenced submission, does not meet the definition of human subject research as defined in 45 CFR 46.102(d) and/or (f). Institutional Review Board (IRB) review and approval is not required.

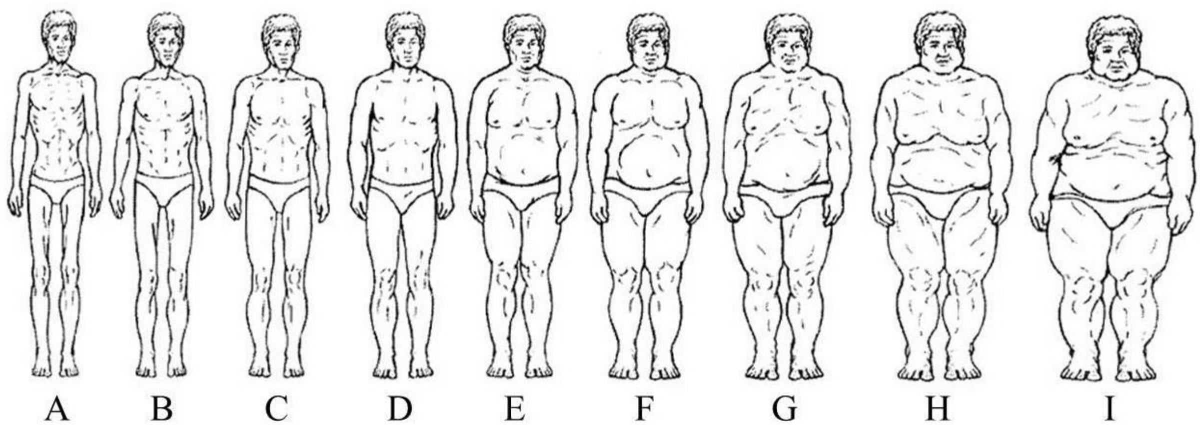
The IRB requires notification and review if there are any proposed changes to the activities described in the IRB submission that may affect this determination. If changes are being considered and there are questions about whether IRB review is needed, please contact the Office for Research Protections.

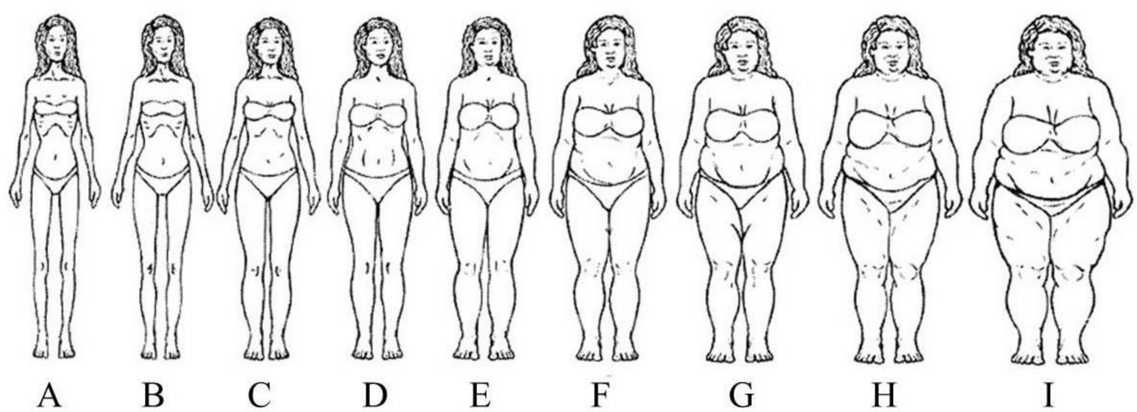
This correspondence should be maintained with your records.

ID00000037

Appendix D

Pulvers' Culturally Relevant Silhouette Scale





Select the figure that most closely resembles you <u>currently</u>:

A	B	C	D	E	F	G	H	I
O	O	O	O	O	O	O	O	O

Which figure would you most prefer to look like:

A	B	C	D	E	F	G	H	I
O	O	O	O	O	O	O	O	O

Appendix E

IPAQ Short Form

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____ **days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Appendix F

Fruit and Vegetable Screener

INSTRUCTIONS

- **Think about what you usually ate last month.**
- **Please think about all the fruits and vegetables that you ate last month. Include those that were:**
  - **raw and cooked,**
  - **eaten as snacks and at meals,**
  - **eaten at home and away from home (restaurants, friends, take-out), and**
  - **eaten alone and mixed with other foods.**
- **Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.**
- **If you mark "Never" for a question, follow the "Go to" instruction.**
- **Choose the best answer for each question. Mark only one response for each question.**

1. Over the last month, how many times per month, week, or day did you drink **100% juice** such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 2)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

1a. Each time you drank **100% juice**, how much did you usually drink?

○	○	○	○
Less than ¾ cup (less than 6 ounces)	¾ to 1¼ cup (6 to 10 ounces)	1¼ to 2 cups (10 to 16 ounces)	More than 2 cups (more than 16 ounces)

2. Over the last month, how many times per month, week, or day did you eat **fruit**? Count any kind of fruit—fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all mealtimes and for snacks.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 3)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

2a. Each time you ate **fruit**, how much did you usually eat?

○	○	○	○
Less than 1 medium fruit	1 medium fruit	2 medium fruits	More than 2 medium fruits

OR

○	○	○	○
Less than ½ cup	About ½ cup	About 1 cup	More than 1 cup

3. Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 4)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

3a. Each time you ate **lettuce salad**, how much did you usually eat?

○	○	○	○
About ½ cup	About 1 cup	About 2 cups	More than 2 cups

4. Over the last month, how often did you eat **French fries** or **fried potatoes**?

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 5)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

4a. Each time you ate **French fries** or **fried potatoes**, how much did you usually eat?

○	○	○	○
Small order or less (About 1 cup or less)	Medium order (About 1½ cups)	Large order (About 2 cups)	Super Size order or more (About 3 cups or more)

5. Over the last month, how often did you eat **other white potatoes**? Count **baked, boiled**, and **mashed potatoes, potato salad,** and **white potatoes that were not fried.**

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 6)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

5a. Each time you ate **these potatoes**, how much did you usually eat?

○	○	○	○
1 small potato or less (½ cup or less)	1 medium potato (½ to 1 cup)	1 large potato (1 to 1½ cups)	2 medium potatoes or more (1½ cups or more)

6. Over the last month, how often did you eat **cooked dried beans**? Count **baked beans, bean soup, refried beans, pork and beans** and **other bean dishes.**

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 7)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

6a. Each time you ate **these beans**, how much did you usually eat?

○	○	○	○
Less than ½ cup	½ to 1 cup	1 to 1½ cups	More than 1½ cups

7. Over the last month, how often did you eat **other vegetables**?

DO NOT COUNT:
- Lettuce salads
- White potatoes
- Cooked dried beans
- Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
- Rice

COUNT:
- All other vegetables—raw, cooked, canned, and frozen

○ Never (Go to Question 8) ○ 1-3 times last month ○ 1-2 times per week ○ 3-4 times per week ○ 5-6 times per week ○ 1 time per day ○ 2 times per day ○ 3 times per day ○ 4 times per day ○ 5 or more times per day

7a. Each of these times that you ate **other vegetables**, how much did you usually eat?

○ Less than ½ cup ○ ½ to 1 cup ○ 1 to 2 cups ○ More than 2 cups

8. Over the last month, how often did you eat **tomato sauce**? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

○ Never (Go to Question 9) ○ 1-3 times last month ○ 1-2 times per week ○ 3-4 times per week ○ 5-6 times per week ○ 1 time per day ○ 2 times per day ○ 3 times per day ○ 4 times per day ○ 5 or more times per day

8a. Each time you ate **tomato sauce**, how much did you usually eat?

○ About ¼ cup ○ About ½ cup ○ About 1 cup ○ More than 1 cup

9. Over the last month, how often did you eat **vegetable soups**? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.

○ Never (Go to Question 10) ○ 1-3 times last month ○ 1-2 times per week ○ 3-4 times per week ○ 5-6 times per week ○ 1 time per day ○ 2 times per day ○ 3 times per day ○ 4 times per day ○ 5 or more times per day

9a. Each time you ate **vegetable soup**, how much did you usually eat?

○ Less than 1 cup ○ 1 to 2 cups ○ 2 to 3 cups ○ More than 3 cups

10. Over the last month, how often did you eat **mixtures that included vegetables**? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

○ Never ○ 1-3 times last month ○ 1-2 times per week ○ 3-4 times per week ○ 5-6 times per week ○ 1 time per day ○ 2 times per day ○ 3 times per day ○ 4 times per day ○ 5 or more times per day

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Thank you very much for completing this questionnaire. Please return it in the enclosed, postage-paid envelope or to the address listed on the front page.

Appendix G

Exercise Stages of Change Short Form

Regular Exercise is any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 to 5 times per week for 20-60 minutes per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

Do you exercise regularly according to that definition?

O Yes, I have been for MORE than 6 months.
O Yes, I have been for LESS than 6 months.
O No, but I intend to in the next 30 days.
O No, but I intend to in the next 6 months.
O No, and I do NOT intend to in the next 6 months.

Appendix H

Weight Stages of Change Short Form

1. In the past month, have you been actively try to lose weight?

O Yes O No

2. In the past month, have you been actively trying to keep from gaining weight?

O Yes O No

3. Are you seriously considering trying to lose weight to reach your goal in the next 6 months?

O Yes O No

4. Have you maintained your desired weight for more than 6 months?

O Yes O No

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EDUCATION

The Pennsylvania State University | University Park, PA   Jan. 2015 – May 2018
Schreyer Honors College
B.S. in Biobehavioral Health
Dean's List Achievement all semesters

ACADEMIC AND PROFESSIONAL EXPERIENCE

Health Disparities and Physical Activity Research Lab   May 2016 – May 2018
University Park, PA
Research Assistant – Data management for 50 participants and over 100 clinical assessments, REDCap survey production and over 200 mail survey distributions.

Strawberry Fields Inc.   April 2016 – June 2017
State College, PA
LifeLink Apartment Coach – Taught independent living skills to young adults with developmental disabilities and documented and administered medication.

Women's Leadership Initiative   Aug. 2016 – May 2017
University Park, PA
Nurtured leadership skills through developing a greater understanding of myself and others and applied leadership skills through service projects and presentations.

CERTIFICATIONS

Good Clinical Practice for Social and Behavioral Researchers | NIH	July 2017
Youth Mental Health | National Council for Behavioral Health	Feb. 2017
Adult First Aid/AED/CPR | American Red Cross	June 2016
Blood Processing | PSU Clinical Research Center	June 2016

AWARDS AND PRESENTATIONS

Society of Behavior Medicine Annual Meeting & Scientific Session	April 2018
Health and Human Development Summer Research Award	May 2017
Pennsylvania Public and Community Health Annual Conference	April 2017, 2018
The Pennsylvania State University's Undergraduate Research Exhibition	April 2017