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The Motivational Readiness to Change Leisure Time Physical Activity Behavior of Mississippi Community College Students

Jerry Phillip Crenshaw

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THE MOTIVATIONAL READINESS TO CHANGE LEISURE TIME
PHYSICAL ACTIVITY BEHAVIOR OF MISSISSIPPI
COMMUNITY COLLEGE STUDENTS

By

Jerry Phillip Crenshaw

A Dissertation
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy
in Community College Leadership
in the Department of Instructional Systems
Leadership, and Workforce Development

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The stages of motivational readiness to change leisure time physical activity behavior of students from two Mississippi community colleges were investigated. The Stages of Motivational Readiness to Change (SMRC) model postulates that behavior change is a longitudinal process described by five stages that assess an individual's motivational level relative to changing leisure time physical activity behavior. That is, individuals are positioned in one of the following five stages at any given point in time: (a) precontemplation (i.e., no intention to change); (b) contemplation (i.e., considering a change); (c) preparation (i.e., small changes already made toward an ultimate behavior goal); (d) action (i.e., a desired behavior has been adopted); or (e) maintenance (i.e., working to prevent a relapse). The Physical Activity Stages of Change Questionnaire (PASQ) was used for data collection in this study. The results revealed 35% were

completely sedentary (precontemplation, contemplation) and 64.9% were participating in occasional or regular leisure time physical activity (preparation, action, maintenance). To examine the dependency of stage position upon ethnicity, gender, age, and income, the chi-square test of independence was performed. Findings indicated stage position to be independent of ethnicity, but dependent upon the remaining independent variables. This study's conclusions indicated that stage-matched interventions are necessary to increase and maintain individual leisure time physical activity behavior.

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CHAPTER I

INTRODUCTION

Background

According to Plato, “Lack of activity destroys the good condition of every human being, while movement and methodical physical exercise save it and preserve it” (as cited in Hammar, 2004). The United States is currently facing a pandemic—obesity. The condition has proven to present a major risk factor for premature mortality, cardiovascular disease, Type 2 diabetes mellitus, osteoarthritis, certain cancers, and other serious medical conditions. Regardless, much of the American population, including clinicians and policy makers, continue to discount obesity as a health problem. Therefore, “obesity rates continue to climb, even as significant reductions in other risk factors have been achieved” (Manson & Bassuk, 2003, p. 229). Evidence confirms the crucial role of leisure-time physical activity in combating this pandemic (Crespo & Arbesman, 2003; Glendenning, Hearne, Segal, Juliano, & Earls, 2005) because most U.S. occupations fail to provide the necessary amount of vigorous or even moderate physical activity (U.S. Department of Health and Human Services, 2005).

Although a number of health organizations offer recommendations for pursuing a physically active lifestyle, the general consensus is toward 30 minutes of moderate-intensity physical activity at least 5 days per week, but preferably, all 7 days per week.

Those capable of incorporating vigorous-intensity exercise into their daily regimens are likely to derive proportionately greater benefits (American College of Sports Medicine, 2003; Corbin, Welk, Corbin, & Welk, 2006; Marcus & Forsyth, 2003; see Appendix A). For children, the recommendation is from 30 to 45 minutes of moderate to vigorous physical activity 3 to 5 days per week, but preferably 60 minutes each day of the week (Strong et al., 2005; U.S. Department of Agriculture, 2005). Regardless of the level, research overwhelmingly supports the health benefits associated with physical activity, even with small daily increases (U.S. Department of Health and Human Services, 2005).

A majority of adult Americans lead a highly sedentary lifestyle. According to *Healthy People 2010* (U.S. Department of Health and Human Services, 2005), only 23% of the U.S. adult population engage in vigorous physical activity for 20 minutes or longer, 3 or more days per week. Fifteen percent report moderate physical activity for 5 or more days per week, and a surprising 40% make no attempt to include such activity in their daily lives. Women report less physical activity than men, African Americans are less physically active than European Americans, older adults report a lower amount of physical activity than younger adults, and the less affluent devote less time to such activity than those of higher socioeconomic status. Consequently, the adult American population falls short of the *Healthy People 2010* goal of reducing the number of adults who do not engage in leisure-time physical activity to 20% (as cited in "Trends in Leisure-Time," 2005).

Through simply a reduction in physical activity, obesity rates for adult Americans have dramatically increased since the 1980s (Flegal, Carroll, Ogden, & Johnson, 2002).

Approximately one third of the individuals comprising this population group have a body-mass index (BMI) of 30 or greater (National Heart Lung and Blood Institute, 2005; U.S. Department of Agriculture, 2005; see Appendix B). According to the National Center for Health Statistics (2004), 15.1% were considered obese at the end of the 1980s, while 31.1% were labeled obese during 2002. These data are consistent with prior research in that 34.0% of females were considered obese in contrast to 28.1% of males. Additionally, 49.6% of African American women were reported as obese, which was the highest percentage among all gender and race categories. Unfortunately, no data even remotely indicate any decline in the prevalence of adult obesity within the United States (Hedley et al., 2005).

National data point to Mississippi as leading the nation in physical inactivity and obesity. According to the most recent statistics from the Centers of Disease Control and Prevention (2005a), 59.6% of the adult population residing within this state report that they do not participate in even moderate physical activity for 30 minutes or longer, 5 or more days per week. Adult African Americans were listed with the highest rate of physical inactivity at 63.8% for this same statistic, while 62.4% was recorded for the African American adult females surveyed. Glendening and colleagues (2005) also documented that Mississippi faces the problem of obesity and its effects more than any other U.S. state with 29.5% of its adult population labeled as obese, in contrast to the national average of 23.2%.

According to Glendening and colleagues (2005), all U.S. communities must encourage behavior supportive of regular physical activity. In Mississippi, the community

college can play a major role in reducing obesity throughout the state. Inherent to the mission of the community college is to aid in the creation of stronger, more vital communities (Vaughn, 2000). Therefore, the 15 community colleges throughout Mississippi are strategically positioned and organized to effectively join the “battle” against this debilitating condition as an essential, collective community resource toward health promotion (VanWagoner, Bowman, & Spraggs, 2005). If these institutions of higher learning are to successfully address the sedentary lifestyles evidenced by many of their matriculants, interventions toward leisure-time physical activity must be implemented within their educational realm (Marcus & Forsyth, 2003).

Purpose of the Study

The purpose of the current study was to investigate the motivational readiness of college students to change their behavior toward increased physical activity during leisure time. The data collected from a sample of community-college students within the state of Mississippi indicated the current positions of the participants along a continuum of stages of motivational readiness to change (SMRC), clarifying their levels of physical activity during leisure time. Specifically, this research determined if the recommended requirements for physical activity during leisure time, as set forth by the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996), are being met within the participating population of students.

Because participants of health-promotion programs possess differing attitudes toward their health, a standard, inflexible approach would not suffice. It is therefore imperative that community-college presidents are clearly informed as to the attitudes of

their students with regard to physical activity during leisure time. This will, in turn, allow these academic professionals to more effectively address obesity with disparate interventions that will efficiently target specific attitudes. This methodology will also serve to make optimal use of their limited financial capital as their efforts effectively target the prevailing attitudes, ultimately having a greater impact in the battle to reduce obesity among their student populations. Unless interventions toward increased physical activity are targeted to the individual stage of change readiness, they can only result in failure. This research sought to ensure that Mississippi community colleges continue to contribute human capital to the workforce of the state that is motivated toward the behavioral change necessary to increase their physical activity. This will concurrently reduce the related financial burden for their future employers.

The core mission of the community college is workforce development. According to Anthony Zeiss (2004), President of Central Piedmont Community College, “The goal is to keep employees’ skill sets on the cutting edge. By training and retraining workers, including students, emerging workers, entrepreneurial workers, and transitional workers, we can help America’s economy stay strong” (p. 1). President George W. Bush has acknowledged the vital role community colleges play in the development of the American workforce (as cited in Jamilah, 2004). These institutions are recognized as the most widely known and esteemed workforce providers within the country (American Association of Community Colleges, n.d.). It therefore becomes evident that Mississippi community colleges must address the prevalence of sedentary behavior among matriculants.

If community colleges of Mississippi continue to generate human capital that sets a low value on physical activity, employers throughout the state will continue to suffer the consequences. Glendening and colleagues (2005) stated,

Employers and businesses bear a sizeable portion of the costs associated with treating obesity-related conditions. These costs are primarily for lost productivity, paid sick leave, and the increased costs of health, life, and disability insurance. Obese employees are twice as likely to have high-level absenteeism—seven or more absences during a six month period. (p. 7)

A study conducted for the University of Michigan Health Management Research Center found a direct correlation between an increase in BMI and the number of sick days taken, medical claims filed, and health care costs incurred by respective employers (Burton, Chen, Schultz, & Edington, 1999). Specifically, a relationship exists between company productivity and employee health (Glendening et al., 2005). It therefore stands to reason that, due to the rate of obesity within the state, the likelihood that businesses will financially suffer as a direct result is high.

The magnitude of the Mississippi obesity epidemic, which has a highly negative economic impact, evidences that it is time for community-college presidents throughout the state to reach consensus on a proactive approach to this problem that is so devastating on various different levels. Currently, the Mississippi State Board for Community and Junior Colleges does promote physical fitness during leisure time via academic incentives (R. Bradberry, personal communication, January 9, 2006). However, if more is not done toward this end, community colleges of the state will continue to produce human capital with the knowledge to perform disparate work-related skills, but lacking in the

motivation necessary to pursue lifelong physical fitness. Ultimately, the cost to employers and taxpayers will be astronomical.

Intrapersonal factors (e.g., knowledge, attitudes, motivation, and skills) are of great influence to behavioral change (National Cancer Institute, 2005). As community-college leaders gain greater awareness of aspects surrounding student motivation to change behavior related to physical activity, these leaders will concurrently glean motivation of their own. They will be energized into investing institution capital toward ensuring their graduates exit their colleges “armed” with values inclusive of the pursuit of lifelong physical activity for optimal health. The mission of the community college obligates each institution to join the “fight” against obesity by addressing the sedentary lifestyles of its student population. As Dr. William Lewis, President of Pearl River Community College, stated,

As part of our mission, the Mississippi community college and Junior colleges have a responsibility to prepare our students for citizenry in the world in which they live. With this mission in mind, it is our responsibility to prepare students not only for their academic and vocational pursuits, but to enhance their understanding of the importance of personal well-being in achieving success in life. Creating an environment in which our students, many of whom are first generation college students, are exposed to the important role that nutrition, exercise, and quality of life habits play in their success is a critical role for our community colleges. *We are charged with enhancing the development of the total person* [italics added]. (personal communication, March 20, 2006, p. 1)

Statement of the Problem and the Research Questions

Effective health promotion necessitates the involvement of individuals, organizations, and community institutions (National Cancer Institute, 2005). Yet, the promotion of physical activity among postsecondary institutions has largely been ignored (DeVahl, King, & Williamson, 2005). To facilitate awareness among Mississippi community-college presidents of their responsibility to address the sedentary behavior of many of their matriculates, this current study addressed a pivotal gap in available data—the level of physical activity during leisure time among Mississippi community-college matriculants. Because maintaining a routine exercise regimen is an individual decision (Cancer Prevention Research Center, n.d.), the purpose of this study was to investigate the motivational readiness of college students to change their behavior toward increased physical activity during leisure time. The findings will increase awareness among community-college presidents of the necessity to employ disparate interventions toward the ultimate goal of graduates who enter the workforce maintaining a physically active lifestyle. These will be far reaching as they continue to preserve the health of the Mississippi workforce both now and into the future.

The following research questions guided this study:

1. How many study participants are found within each stage of motivational readiness to change their behavior toward increased physical activity during leisure time?
2. Does ethnicity appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?

3. Does gender appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?

4. Does age appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?

5. Does income appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?

Theoretical Background

This study was grounded in the concept of contemporary health promotion. Past health promotion has focused on social biological influences on behavior (Cancer Prevention Research Center, n.d.). Contemporary health promotion takes a cognitive-behavioral approach founded upon the following three concepts: (a) knowledge affects behavior; (b) knowledge alone cannot change behavior; and (c) perceptions, motivations, skills, and the social environment are key influences on behavior (National Cancer Institute, 2005). This study implemented the behavior construct known as the SMRC model. This theoretical foundation was conceived by DiClemente and Prochaska (1982) in a study of how smokers successfully and independently “kicked” the habit (see Table 1). Through their research, these researchers learned that behavior change is a process involving various stages of decision making, thus negating the misconception of a single intervention as suitable for all individuals seeking to change a specific behavior (Marcus & Forsyth, 2003; National Cancer Institute, 2005). Interventions based upon the SMRC model can accommodate individual motivational levels, as determined by the decision-making stage the respective individual

has reached (Cancer Prevention Research Center, n.d.; Marcus & Forsyth, 2003; Zimmerman, Olsen, & Bosworth, 2000).

Patient, steadfast motivation is the key to success for any intervention seeking to increase physical exercise (Zimmerman et al., 2000) because adherence to any exercise

Table 1
Stages of Motivational Readiness to Change

Stage	Description
Precontemplation	No desire to make a change
Contemplation	Considering a change
Preparation	Enacting some behavioral change, but not according to recommended guidelines
Action	Has enacted the recommended amount of behavioral change for a minimum of 6 months
Maintenance	Has maintained the recommended amount of behavioral change longer than 6 months

Note. From “The Stages of Motivational Readiness for Change Model,” by B. Marcus and L. Forsyth, 2003. In S. Blair (Ed.), *Motivating People to be Physically Active* (pp. 12–15), Champaign, IL: Human Kinetics. Copyright 2003 by Bess H. Marcus and Leigh Ann H. Forsyth. Adapted with permission.

regimen is contingent upon perpetual, internal decision making (Cancer Prevention Research Center, n.d.). Unfortunately, most intervention programs with such a target goal are designed for those already involved in some form of routine physical activity (Marcus

& Forsyth, 2003). Yet, research has shown that “people vary in their levels of motivation to change, from no intention to change to actually making behavior changes” (p. 12). In contrast, physical-activity interventions based upon the SMRC model seek to illicit incremental changes in the *attitude* toward physical activity (Prochaska, 1984). This is with the hope of ultimately establishing lifelong change (Zimmerman et al., 2000) characterized by the performance of physical activity according to established guidelines (Marcus & Forsyth, 2003).

The Stages of Motivational Readiness to Change Model

The SMRC model rests upon the assumption that individuals attempting to change personally undesirable behavior move through the following five stages further described in Table 1: precontemplation, contemplation, preparation, action, and maintenance. An individual within the precontemplation stage has no intention of taking action within the near future (i.e., typically measured as within the following 6 months). It is common for such an individual to be either uninformed or underinformed surrounding the consequences of his or her behavior, or demoralized due to past failure. The contemplation stage is characterized by a weighing of the pros and cons associated with a specific behavior change. The individual within this phase *intends* to effectuate the considered change within the following 6 months. Those within the preparation stage have taken some form of action toward a behavior change; however, the change does not meet the recommended requirements necessary to reap the desired benefits. The action stage characterizes adherence to an intervention that meets the standards set forth by the professional community (e.g., doctors and scientists) to reap the targeted benefits from

the behavior change instituted. The final maintenance stage demonstrates adherence to an established behavioral-change intervention that will motivate diligent work toward prevention of a relapse (Cancer Prevention Research Center, n.d.; Marcus & Forsyth, 2003).

Movement through the SMRC is not as systematic as it may appear on the surface. The majority of individuals will regress to an earlier stage at some point during the process. For example, an individual within the action phase of a behavior change to increase physical exercise may suddenly digress to the contemplation stage. Although the possibility of a complete relapse following passage through all five stages exists, the data indicate that, once the fifth stage is attained, the likelihood of relapse back to the precontemplation stage is low because the behavior has then become habitual (Cancer Prevention Research Center, n.d.; Corbin et al., 2006; Marcus & Forsyth, 2003).

According to Hoeger and Hoeger (2006), once a behavior is maintained for more than 5 years, the respective individual “exits the cycle of change without fear of relapse” (p. 36); however, few reach this point (Marcus & Forsyth, 2003). It is possible to become permanently stagnant within one of the SMRC, unable to progress to the next phase. An extreme example would be the smoker who dies from the habit after existing for years within the contemplation stage due to a lack of courage to progress through to changing the unwanted behavior (Prochaska, 1984).

Cognitive Versus Behavioral Processes

Because individuals are at different SMRC, treatment matching is the only viable option. That is, interventions should be carefully matched with the characteristics of an

individual or group. For example, individuals within the precontemplation stage will require an intervention distinct from those within the action stage. Specifically, treatment matching adheres to a targeted or “tailored” approach. A targeted approach directs the intervention to all individuals within a particular group such as all those within a specific stage of motivational readiness. A tailored approach will involve an intervention based upon individual characteristics (Marcus & Lewis, 2003).

Exposure to the proper intervention is vital to facilitate continuous movement through the SMRC. Selection must focus on the process necessary for behavioral change, which is a collection of cognitive and behavioral activities performed to progress through the stages (Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Prochaska, 1984). Cognitive processes involve thinking, awareness, and attitudes, while behavioral processes involve actions (Marcus & Forsyth, 2003). According to Prochaska, once individual readiness to change is determined, specific interventions can be implemented to enable the appropriate process for the particular stage to be applied, thus preventing administration of a desultory intervention.

Change processes explicate the manner in which individuals grow or change (Marcus & Forsyth, 2003). That is, they “are the independent variables that people need to apply, or be engaged in, to move from stage to stage” (Cancer Prevention Research Center, n.d., ¶ 1). As Marcus and Forsyth explained, individuals within Stage 1 or Stage 2 will need to rely upon cognitive processes, while individuals within Stage 2, Stage 3, or Stage 4 will focus on behavioral processes. Cognitive processes aid in motivating action toward changing a behavior, while behavioral processes consist of a compilation of

actions performed to actually effectuate and maintain a behavioral change (*Web02-01*, 2006). Thus, interventions toward increased physical activity should allow individuals to apply only those processes consistent with their stage positions (Pinto & Marcus, 1995; see Appendix C).

The guidelines promoted by the Cancer Prevention Research Center (n.d.) and Marcus and Forsyth (2003) address the necessity for interventions toward behavioral change to be appropriate for the respective process or stage within which the respective individual is positioned. The following intervention and change characteristics should be considered prior to selection:

1. To increase individual awareness of the causes, consequences, and cures for a particular harmful behavior, measures such as education, feedback, confrontation, bibliotherapy, and media campaigns should be employed. This will, in turn, motivate the individual to read and analyze the respective behavior.

2. To increase individual awareness of the risks associated with avoidance of changing a harmful behavior, role playing and personal testimonies can be employed. Regardless of the intervention, such activity must prompt an emotional response within the individual.

3. To encourage the initiation of the process of caring about the consequences behavior is presenting for others, interventions should be designed to allow the individual attempting change to assess the effects of his or her harmful behavior on others such as family, friends, and coworkers. Empathy training, documentaries, and family interventions can be effective with behavior modification involving other people.

4. To instill stronger comprehension of the positive impact of a behavioral change, a personal assessment of how life in general would change with or without the harmful behavior should be included in the intervention. For example, in terms of physical activity, the individual may assess an increase in energy compared to a “sluggish” feeling. Interventions involving value clarification and healthy role models are appropriate for motivating an individual seeking such change.

5. To encourage decisions that increase healthy options, awareness of societal factors promoting healthy behavior is necessary such as choosing smoke-free zones in restaurants, motels, and other environments offering this option when the behavioral change sought is to quit smoking, and to gain access to a fitness center for an individual seeking to end a sedentary lifestyle.

6. To increase the likelihood of substituting healthy behavior for problem behavior, interventions focused on weight loss should include such measures as restricting dietary intake to fat-free foods as opposed to high-calorie foods, counteracting stress with relaxation techniques, or exercising when tired as opposed to taking a nap.

7. To encourage abandonment of the “go-it-alone” mentality and acceptance of help from others, counselor calls or the “buddy system” are recommended interventions.

8. To encourage self-reward for reaching various interim goals, interventions involving contingency contracts and positive self-statements are effective.

9. To strengthen individual commitment toward maintaining healthy behavior, interventions providing multiple behavior choices are recommended.

10. To teach individuals to remind themselves to perform appropriate behaviors, thereby reducing the risk of relapse, self-help groups can be a highly beneficial intervention. Individuals within such venues share successful strategies such as keeping a gym bag in their office to remind them to incorporate physical activity into their day.

Definition of Terms

The following terms used throughout this study are defined for purposes of the research:

An *adult* is an individual 18 years of age or older (U.S. Department of Health and Human Services, 2005).

Anthropometric refers to the science of measuring the human body (e.g., body-fat estimation; Venes et al., 2001).

The *Behavioral Risk Factor Surveillance System* is the largest continuously conducted telephone health survey in the world. It enables the Centers for Disease Control and Prevention, state health departments, and other health and education agencies to monitor risk behavior related to chronic disease, injuries, and death (Centers for Disease Control and Prevention, 2005a).

Body fat is the substance created by the body to store excess energy from consumed calories (Advocate Health Care, n.d.).

Body-mass index (BMI) is the result of a mathematical formula comprised of the ratio of weight to height (i.e., weight in pounds/[height in inches]² x 703; Glendening et al., 2005).

Calories are the energy required for the body to function and are drawn from food consumed (*Caloric Expenditure*, n.d.). To clarify, food contains units of energy. The body breaks down food molecules to release that energy, and energy unused through physical activity is stored as fat (*Definition of Calorie*, n.d.).

Health promotion refers to the process of enabling individuals to increase control over and improve their health (National Cancer Institute, 2005).

Healthy People 2010 (U.S. Department of Health and Human Services, 2005) is a set of health objectives for the United States to achieve over the first decade of this new century and serves as the basis for the development of state and community health plans.

Leisure-time exercise “includes the elements of free choice, freedom from constraints, intrinsic motivation, enjoyment, relaxation, personal involvement, and self-expression” (Ainsworth, 2000, p. 39).

Moderate physical activity is equivalent to a brisk walk (Corbin et al., 2006).

Obesity is a BMI measurement greater than or equal to 30.0 (Mokdad et al., 2003).

Physical activity refers to any bodily movement resulting in the burning of calories (Marcus & Forsyth, 2003).

Processes are cognitive and behavioral strategies individuals apply to their lives to change personally undesirable behavior (Marcus & Forsyth, 2003).

Readiness to change equates to an attitude conducive to motivation toward changing an unhealthy behavior or maintaining healthy behavior. Thus, before a new behavior can be adopted, the respective individual must have adopted an attitude conducive to the desired behavior change (Marcus & Forsyth, 2003).

Sedentary refers to a lifestyle that does not include activity meeting the professional definition of leisure-time exercise, which is at least 30 minutes of moderate-intensity physical activity 5 or more days per week (Marcus & Forsyth, 2003).

Stage of change refers to the level at which an individual is ready to change an unhealthy behavior and includes intention as well as actions (Corbin et al., 2006).

Delimitations and Limitations

This study was delimited to two community colleges located within the state of Mississippi. Consequently, the results cannot be generalized to students attending other community colleges within the state or elsewhere. It was also delimited to members of this student population willing to complete the electronic survey. The research was limited by the self-reporting nature of the data collected. Survey participants may not have been truthful in all responses, thus prejudicing the data. The proposed research was also limited by the possibility of crossover responses. That is, students may have discussed their answers among themselves prior to completing the questionnaire, thus influencing the responses.

CHAPTER II

LITERATURE REVIEW

Facets of Obesity

Obesity is defined as excess body fat (American College of Sports Medicine, 1993; Bray, 2003; Brown et al., 2000) resulting from food consumption exceeding the energy demands of physical activity (American College of Sports Medicine, 1993; Treasure & Lox, 1997). This condition is a problem that is not confined by regional parameters. The World Health Organization has identified obesity as one of the 10 leading health risks throughout the world today (*Obesity Crisis*, 2004; *U.S. Representative*, 2004).

Rates of obesity are reaching epidemic proportions within the United States (Adams, Der Anian, Dubose, Kirtland, & Ainsworth, 2003; Bray, 2003), as is evidenced by the nearly 30%, or 61 million, Americans characterized as obese (Brown et al., 2000; “Most U.S. Adults,” 2005; Must et al., 1999; *Obesity Crisis*, 2004; U.S. Department of Health and Human Services, 2002; *U.S. Obesity*, n.d.; *U.S. Representative*, 2004). Prevalence of this condition has doubled (Brown et al., 2000; Must et al., 1999) since the 1980s (Baltrus, Lynch, Everson-Rose, Raghunathan, & Kaplan, 2005; Glendening et al., 2005; *Pharmacy Update*, 2005; *U.S. Obesity*, n.d.). Specifically, the average weight of American men increased by 12 pounds (i.e., 168 to 180), while the average weight of

American women increased by 10 pounds (i.e., 142 to 152; Cutler, Glaeser, & Shapiro, 2003). According to the Centers for Disease Control and Prevention (2005a), which is the primary source of health information within the United States, the most recent data indicate an increase in the prevalence of obesity in every state with the single exception of Oregon. Forty-one states report population statistics that reflect 20% to 25% obesity, while 10 states report rates exceeding 25% (Glendening et al., 2005; see Table 2). There is no U.S. state that is on track to meet the U.S. Department of Health and Human Services national goal of obesity reduction in adults by 20% or less by the year 2010 (Trust for America's Health, 2005).

The modernization of American society appears to be the catalyst for the obesity epidemic throughout this country (American College of Sports Medicine, 2003). Residents of the United States are consuming more food energy (i.e., calories) due to increased availability of food and food-production improvements (Cutler et al., 2003). Heavy advertising by the food industry is also a contributor (*Pharmacy Update*, 2005). Additionally, daily opportunities to burn calories have steadily decreased with automation, especially with the increased emphasis on mechanized transportation (Centers for Disease Control and Prevention, 2005b).

Determination of Obese Status

Researchers apply various anthropometric measures to ascertain body-fat percentage. BMI examines body weight relative to height and is the simplest manner of determining body-weight status in large populations (American College of Sports Medicine, 1993; Burton, Chen, Chin-Yu, Schultz, & Edington, 1998; Giardina, 1998;

Table 2
State Obesity Rankings During 2004

Rank	State / Reported percentage of adult obesity
1	Mississippi (29.5)
2	Alabama (28.9)
3	West Virginia (27.6)
4	Louisiana (27.00)
5	Tennessee (27.2)
6	Texas (25.8) ^a
6	Michigan (25.8) ^a
6	Kentucky (25.8)
9	Indiana (25.5) ^a
10	South Carolina (25.1)

Note. From “F as in Fat: How Obesity Policies are Failing,” by P. Glendening, S. Hearne, L. Segal, C. Juliano, and M. Earls, 2005, *Trust for America’s Health*, pp. 13–17. Adapted with permission.

^aExcludes southeastern region of the state.

Screening for Obesity, n.d.; U.S. Department of Health and Human Services, 2002). This method is supported by the American College of Sports Medicine and other health-related organizations such as the American Academy of Pediatricians, the American Family of Physicians, and the Trust for America's Health (as cited in Glendening et al., 2005). Although measurement of BMI is the recommended approach for assessing body size (*Obesity in Women*, 2003), it does present limitations. Primarily, BMI does not account for the difference between fat and muscle (*Body Mass Index Calculator*, n.d.; Glendening et al., 2005). Individuals with a BMI of 30 or more are considered obese (Fletcher, 1999; see Table 3).

Table 3
Weight Classification by Body-Mass Index

Classification	Body-mass index
Normal	18.5–24.9
Overweight	25.0–29.9
Obesity Class 1	30.0–34.9
Obesity Class 2	35.0–39.9
Obesity Class 3	40.0+

The waist-to-hip ratio measures upper-body and lower-body fat distribution. It is based upon the premise that waist circumference (i.e., upper-body fat distribution) should be smaller than hip circumference (i.e., lower-body fat distribution). This technique is

performed by measuring the waist 2 to 3 inches above the umbilicus (i.e., the “belly button”) and the hip at the point of largest buttock circumference. The average ratio for women 17 to 39 years of age is 0.80, while the average for men within this same age-group is 0.90 (American College of Sports Medicine, 1993).

According to the American College of Sports Medicine (1993), the skin-fold thickness measurement is the most practical technique for estimating body fat. This procedure is performed by utilizing a caliper to take a sample of the body fat that lies just under the skin. The measurements are taken from seven areas of the body, including the bicep and chest (B. Barr, personal communication, March 2, 2006). Bioelectrical impedance is a procedure based upon differences in resistance to electrical current in lean body mass and fat mass. Body water conducts an electrical current; consequently, the higher the body-water content, the less the impedance. The procedure involves attaching electrodes prior to sending a 50 k Hz current through the body, allowing impedance to be measured (American College of Sports Medicine, 1993; B. Barr, personal communication, March 2, 2006). Hydrostatic weighing is the standard by which all other anthropometric measures are validated. It is based upon the premise that fat has a density less than that of water (i.e., fat will float). Consequently, “fat people tend to float and weigh less underwater, whereas lean people tend to sink and weigh more underwater” (American College of Sports Medicine, 1993, p. 236). The difficult aspect of this method is that the individual must be weighed while submerged.

Related Health Concerns

Obesity is the most prevalent and fatal chronic disease of the 21st century (*Obesity Crisis*, 2004). As BMI increases, the risk of morbidity also increases proportionately (Dearden & Sheahen, 2002; Giardina, 1998). The health consequences associated with obesity are as significant or greater than smoking, problem alcohol consumption, and poverty (Dearden & Sheahen, 2002). The most common health consequences include, but are not limited to, various cancers, heart disease, stroke, Type 2 diabetes, osteoarthritis, sleep apnea, problematic pregnancies, and complications during childbirth (Bray, 2003; Brown et al., 2000; Must et al., 1999; *Obesity Crisis*, 2004; *Pharmacy Update*, 2005; U.S. Department of Health and Human Services, 2002; *U.S. Obesity*, n.d.; *U.S. Representative*, 2004). Obesity may cause some individuals to avoid seeking preventive health care due to the embarrassment of examination by care providers. For example, a Duke University study found that approximately 50% of the obese women participating in the research received an annual flu shot, and only one in three had a papanicolaou test within the preceding 2 years (“Obesity’s Double Whammy,” 2006).

Obesity is a leading cause of preventable death within the United States, second only to cigarette smoking (Brown et al., 2000; *Pharmacy Update*, 2005). It accounts for over 300,000 premature deaths each year (Adams et al., 2003; Matthews et al., 2001; Mokdad et al., 2003; Nies, Vollman, & Cook, 1999; *U.S. Obesity*, n.d.). A Harvard study (Fletcher, 1999) found that men exhibited lower BMI than women due to the routine practice of recommended amounts of leisure-time exercise, and they reportedly had a 25% lower risk of death from any cause.

Obesity Prevention: Physical Activity

The number of Americans with a BMI over 30 has doubled within the past 20 years (Giardina, 1998; *Screening for Obesity*, n.d.; U.S. Department of Health and Human Services, 2002). Those with a BMI over 40 have tripled in number within the past 10 years, and a 400% increase during the same period has been reported for the population group with a BMI greater than 50 (*Obesity Crisis*, 2004). Although these numbers are staggering, the obesity epidemic is treatable. The dominant independent variable that created this epidemic is a lack of physical activity (Adams et al., 2003), resulting in excess food energy following energy expenditure (American College of Sports Medicine, 2003; Glendening et al., 2005). Consequently, the solution lies in physical activity—the primary vehicle available to the body for energy expenditure (Jago et al., 2005). Basal metabolism—energy expenditure associated with keeping the body alive—and the thermic effect of food, which is the energy required to process consumed food, also burn calories (Cutler et al., 2003).

Numerous studies have shown that physical activity is paramount in reducing the likelihood of morbidity and early mortality (James, Hudson, & Campbell, 2003; Petersen & Sorensen, 2004). In fact, research has shown that loss of a mere 10% of body weight can significantly reduce these risks (“Most U.S. Adults,” 2005). Because physical activity burns stored energy (i.e., fat; Jago et al., 2005), lower BMI results (Treasure & Lox, 1997). This, in turn, reduces the risk for many chronic diseases such as coronary heart disease (CHD), hypertension, non–insulin-dependent diabetes mellitus, osteoporosis, colon cancer, anxiety, and depression (American Obesity Association, 2002; Meisler,

2002; Pate et al., 1995; Treasure & Lox, 1997; *U.S. Obesity*, n.d.; *U.S. Representative*, 2004).

Leisure Time

Although the perceived benefits of physical activity are clear, much of the U.S. population continues to lead a sedentary lifestyle (U.S. Department of Health and Human Services, 2002). According to the Centers for Disease Control and Prevention (2005c), one in four adults include no physical activity during leisure time, while *Healthy People 2010* (U.S. Department of Health and Human Services, 2005) place the number of sedentary Americans at 40% of the total population. According to the most recent data from the Behavior Risk Factor Surveillance System—the largest, continuously conducted telephone health survey in the world—24.4% of respondents 18 years of age and older, residing throughout the United States, include no physical activity during leisure time. In comparison, 32.5% of Mississippi respondents within this same age-group lead such a sedentary lifestyle (Centers for Disease Control and Prevention, 2005a; see Table 4).

It is noteworthy that research analyzing the physical activity of any population group will inevitably use leisure-time activity as the data collected, which consists primarily of aerobic exercise (e.g., walking and jogging) as opposed to occupational activity, typically involving heavy lifting during short intervals of time (Fransson, Alfredsson, Faire, Knutsson, & Westerholm, 2003). The rationale is that most occupations within industrialized nations do not require employees to expend large amounts of energy during any physical activity required in the performance of their jobs (Kriska, 2000). Work is commonly performed at a desk, in front of a computer, or behind

Table 4

Percentage of Population Excluding Physical Activity During Leisure Time

Year	Mississippi (%)	United States (%)
1990	39.2	28.7
1991	42.6	28.0
1992	48.1	27.4
1993	No data	No data
1994	38.5	28.8
1995	No data	No data
1996	39.5	27.8
1997	No data	No data
1998	33.8	27.7
1999	No data	No data
2000	33.3	26.9
2001	33.4	25.7
2002	32.5	24.4

Note. From *Behavioral Risk Factor Surveillance System Survey Data* [Electronic version] by Centers for Disease Control and Prevention, 2005, Atlanta, GA: Author. Reprinted with permission.

a steering wheel (“Leisure Time Exercise,” 2004). Therefore, “for most persons, the greatest opportunity for physical activity is associated with leisure time, because few occupations today provide sufficient vigorous or moderate physical activity to provide health benefits” (U.S. Department of Health and Human Services, 2005, p. 13).

According to Kriska, “It is assumed that assessment of leisure-time physical activity may provide the best representation of population-wise variance in physical activity” (p. 50).

Numerous studies have indicated the many health benefits garnered from physical activity during leisure time. A German study analyzed the association between the risk of CHD among patients 40 to 68 years of age and leisure-time and occupational physical activity. The findings revealed that the participating patients who reported practicing longer than 2 hours of leisure-time physical activity per week exhibited a 61% reduction in CHD. In contrast, a strong positive association has been found between work-related physical strain and CHD (“Leisure Exercise is Good,” 2003). Another study of 500 men and women, conducted by the Norwegian University of Science and Technology (as cited in “Leisure Time Exercise,” 2004), indicated leisure-time physical activity to be superior to occupational physical activity in reducing atherosclerosis (i.e., a blockage in the carotid arteries supplying blood to the brain).

The Norway Hunt Research Center (as cited in Droyvold, Holmen, Midthjell, & Lydersen, 2004) investigated the association between leisure-time physical activity and change in BMI using a healthy male population with normal body weight at baseline. An 11-year follow-up was conducted as part of the study. After surveying 74,977 men

between 20 and 69 years of age, the findings indicated that the respondents who participated in regular leisure-time physical activity actually gained weight over the 11-year period of the research, but less than those who were sedentary. Consequently, no inverse dose-response was found, which led these researchers to claim that no negative association exists between leisure-time physical activity and BMI.

Occupational

Related research has suggested that occupational physical activity can also result in health benefits. For example, Fransson and colleagues (2003) examined the association between leisure-time exercise and cardiovascular risk factors. The population sample was comprised of individuals employed within any one of 60 Swedish companies during the period of data collection between 1996 and 1998. Analysis of survey responses from 10,413 participants revealed that leisure-time physical activity was positively associated with higher levels of HDL cholesterol (i.e., good cholesterol). Additionally, both men and women who reported repetitive occupational lifting (i.e., 11 lbs or more for a minimum of 2 hours per working day) exhibited high HDL levels without engaging in leisure-time physical activity. This same result was evident in men who reported heavy lifting (i.e., carrying 66 lbs or more at least five times per working day) and women who reported heavy lifting (i.e., 44 lbs or more for at least 2 hours per working day). It is noteworthy that 51% of the men and 64% of the women reported being sedentary for at least 50% of the work day.

Another study exhibiting the positive health potential from occupational physical activity was conducted by King and colleagues (2001). These researchers analyzed data

collected from 4,889 adults over 20 years of age. Not only did obesity prevalence decrease with increased physical activity during leisure time, but individuals employed in highly active occupations, such as waiters and waitresses, cleaners, builders, movers, and farm workers, were less likely to be obese than study participants employed in sedentary fields of work. Therefore, King and colleagues concluded that “activity derived through a physically active occupation can reduce the likelihood of being obese, especially for those who [have] participate[d] in little or no physical activity during their lifetime” (p. 611).

Recommended Amount

Physical activity is defined as any bodily movement produced by skeletal muscles [i.e., muscle fibers attached to parts of the skeleton] that results in energy expenditure (Pate et al., 1995). With this in mind, the recommendation of both the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996) is that every adult accumulate 30 minutes or more of moderate-intensity physical activity on most—preferably all—days of each week. Individuals who incorporate vigorous physical activity into their daily regimens can expect greater health benefits (American College of Sports Medicine, 2003; Centers for Disease Control and Prevention, 2005c; Corbin & Franks, 2002; Heath, 2003; Meisler, 2002; Pate et al., 1995). Therefore, maintaining a constant caloric consumption while concurrently adhering to the recommended type and amount of physical activity will equate to a body-weight loss of approximately one third pound per week (U.S. Department of Health and Human Services, 2005). Since 1954, the exercise prescription recommended by the

American College of Sports Medicine has been the accepted norm throughout the exercise industry (as cited in Corbin & Franks, 2002).

Healthy People 2010 (U.S. Department of Health and Human Services, 2005) established the goal of increasing the number of Americans who engage in the recommended amount of leisure-time physical activity via a reduction in the number of individuals who do not participate in such physical activity to a total of 20% of the population by the year 2010. Research supports that the physical activity can occur in intervals of time such as three 10-minute segments (Pate et al., 1995; U.S. Department of Health and Human Services, 2002). However, it is important that the activity is at least equal to the intensity of a brisk walk at 3 to 4 mph in terms of increased breathing (Meisler, 2002; Pate et al., 1995). This moderate intensity can also be garnered from such activities as household chores, gardening, climbing stairs, and cutting grass (Adams et al., 2003; Centers for Disease Control and Prevention, 2005d; Corbin & Franks, 2002; see Appendix A).

Effects of Obesity

Gender and Race

Women are less likely to be physically active than men (Adams et al., 2003; Brownson et al., 2000; Pate et al., 1995; “Trends in Leisure-Time,” 2005). According to the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention, 2005a), 50.2% of American men and 55.3% of American women do not engage in the recommended amount of leisure-time physical activity. Comparatively, 56.6% of Mississippi men and 62.4% of Mississippi women do not engage in the

recommended amount of such activity. Although both genders experience barriers to getting the recommended amount of leisure-time physical activity, women succumb to obstacles more often than men (Henderson & Ainsworth, 2003; James et al., 2003). The most common are lack of social support, exercise facilities, safe walking areas, confidence, motivation, and interest; economic constraints; adverse weather; and physical challenges (Dearden & Sheahan, 2002; Henderson & Ainsworth, 2003; James et al., 2003).

Socioeconomic status, education level, and income also impact levels of physical activity within the lives of women (Matthews et al., 2001; National Women's Health Information Center, n.d.). However, lack of time is the most frequent reason reported for insufficient physical exercise (Heesch & Masse, 2004). "Women spend significant portions of their day in occupational, household, and family-care activities" (Ainsworth, 2000, p. 38). The result is substantial weight gain during midlife, which is pronounced among the African American community. Matthews and colleagues (2001) conducted a cross-sectional telephone survey of 16,065 midlife women between 40 and 45 years of age. The findings indicated that 23% of the European American and Hispanic American women among the sample were obese, while over 40% of the African American participants were classified as obese.

Minority groups consistently report lower physical-activity levels than European Americans (Centers for Disease Control and Prevention, 2005a; Kriska, 2000; "Most U.S. Adults," 2005; Pate et al., 1995; Wilson, Kirtland, Ainsworth, & Addy, 2004). As noted, numerous studies have shown obesity and physical inactivity to be highest among

African American women (Baltrus et al., 2005; “Black Colleges Battle,” 2005; Brownson et al., 2000; Cutler et al., 2003; James et al., 2003; Kriska, 2000; Must et al., 1999; National Center for Health Statistics, 2004; Nies et al., 1999; U.S. Department of Health and Human Services, 2002, 2005). In fact, African American women are nearly twice as likely as European American women to become obese (Matthews et al., 2001).

According to the National Center for Health Statistics (2005), 48.5% of African American women 20 years of age and older were characterized as obese in 2002, compared to 31.3% of European American women within the same age-group. During the same period, 33.9% of African American women 18 years of age and older reported they did not engage in the prescribed amount of physical activity (i.e., a minimum of 30 minutes of moderate-intensity, leisure-time physical activity, 5 or more days per week; Centers for Disease Control and Prevention, 2005a), compared to 21.6% of European American women within this same age-group. The National Center for Health Statistics (2005) also reported that 27.9% of African American men 20 years of age and older in 2002 were considered obese, compared to 28.7% of European American men within this same age-group. The Centers for Disease Control and Prevention (2005a) concurrently reported that 27% of African American men 18 years of age and older in 2002, and 18.4% of European American men within the same age-group, did not engage in the prescribed amount of physical activity.

Although little is known with regard to why African American women fail to adhere to a regimen of leisure-time physical activity (Meisler, 2002; Treasure & Lox, 1997), studies have attempted to explain the phenomenon. Nies and colleagues (1999)

conducted qualitative research with female, African American focus groups to determine factors motivating leisure-time physical activity for this population of women. Sixteen participants between 35 and 50 years of age attended one of two focus groups, with each session lasting approximately 3 hours. The findings revealed the following facilitators of leisure-time physical activity for this group of women: (a) convenience, (b) belief in ability, (c) safety concerns, (d) child care, (e) weight-loss goal, (f) stress-reduction goal, (g) knowledge of the importance of physical activity, (h) availability of a pet, (i) exercising with peers, and (j) climatic conditions.

Other studies have linked self-efficacy with adherence by African American females to a physical-activity regimen during leisure time. Treasure and Lox (1997) analyzed a sample of 30 African American Head Start employees. The research revealed a correlation coefficient of .35 ($p < .05$) between self-efficacy and adherence to a regimen of physical activity. Sharma, Sargent, and Stacy (2005) examined the relationship between self-efficacy and performance of moderate-intensity physical activity. Their sample of 240 women over 18 years of age completed a 45-item questionnaire. The findings indicated that self-efficacy is a significant predictor of the amount of moderate-intensity physical activity African American women will incorporate into their lives on a regular basis.

Heesch and Masse (2004) examined the time constraints to leisure-time physical activity faced by minority women. Their sample consisted of 249 African American and Hispanic American women between 45 and 70 years of age. The study procedures

consisted of participants maintaining a diary of physical activity during a 9-week period.

The researchers documented the results of their study in the following manner:

Over a week, African-American [*sic*] and Hispanic participants spent most of their time at work (median = 31.93 and 16.00 hours, respectively), doing housework (median = 8.96 and 16.75 hours, respectively), engaging in personal care tasks (median = 15.65 and 15.88 hours, respectively), and doing other tasks (median = 31.48 and 30.89 hours, respectively). *Little time was spent doing sports or exercise* [italics added] (median = 0.00 versus 0.50 hours, respectively). (p. 53)

Surprisingly, the Heesch and Masse study found that minority women are not as constrained by time as previously postulated. The research revealed that, on average, the participants had 28 hours of available leisure time, which they chose to use for sedentary activities such as watching television, pleasure reading, or sitting quietly.

Other studies have analyzed the association between socioeconomic status and the amount of physical activity incorporated into available leisure time. Most related research affirmed a positive association between these factors (Pate et al., 1995). Because African Americans are more likely to experience low socioeconomic status during their lifetimes, it is often postulated that racial differences exist in the amount of physical activity practiced as a consequence of socioeconomic disadvantage (Baltrus et al., 2005; Kriska, 2000; Sharma et al., 2005). For example, in the Treasure and Lox (1997) study of 30 African American Head Start employees, a positive correlation of 0.41 ($p < .01$) was found between education and the performance of leisure-time physical activity. Baltrus and colleagues (2005) conducted a longitudinal, population-based cohort study of 6,928 adults derived from a random household sample within Alameda County, California. The research investigated the association between socioeconomic status and behavioral factors typically linked to weight gain. The findings indicated that the African American

women of the sample gained a greater amount of weight than European American women and that the racial difference was primarily due to socioeconomic status.

Workforce

Employers have acknowledged that lack of physical activity and subsequent obesity are adversely affecting the health and productivity of their employees and ultimately business profit margins (Carlson, 2004; Ellin, 2003; Freudenheim, 1999; Moreau et al., 2004; U.S. Department of Health and Human Services, 2003; Wilcox, 2005). Specifically, an obese workforce results in increased medical claims, elevated insurance premiums, and decreased productivity (Arias, 2005; Carlson, 2004; Hammers, 2003; Hays, 2004; Hellmich, 2005; Merx, 2004; Thompson, Edelsberg, Kinsey, & Oster, 1998; U.S. Department of Health and Human Services, 2003), which concurrently drives up the amount businesses spend on workers' compensation (Hartwig & Wilkinson, n.d.).

Research has shown that obesity affects employee attitudes toward job satisfaction, working conditions, job security, and salary and fringe benefits (U.S. Department of Health and Human Services, 2001). The annual cost of obesity for a business with a minimum of 1,000 employees has been estimated at \$285,000 (Arias, 2005). The Washington Business Group on Health, comprised of both corporations and federal agencies, has estimated the total cost of an obese workforce to U.S. business at approximately \$13 billion per year (Hammers, 2003). According to Hellmich (2005), the average cost of health care and absenteeism associated with a male obese worker can reach \$2,027 more than a normal-weight male worker. This same average for an obese

female worker approaches \$2,485 over that expended for a normal-weight female employee.

Employer Health Care Costs. Studies have indicated that, as BMI increases, individual health care costs also rise (Burton et al., 1999; Moreau et al., 2004; U.S. Department of Health and Human Services, 2003; Wilcox, 2005). According to Hertz and McDonald (2004), “With obesity come[s] significantly increased rates of hypertension, dyslipidemia, [Type 2] diabetes, the metabolic syndrome, and arthritis” (p. 4). Thus, obese workers spend 36% more on health services than those of normal weight (Hartwig & Wilkinson, n.d.) and, in some cases, this cost comparison is fivefold (Merx, 2004). According to the National Business Group on Health (n.d.), when compared to normal-weight workers, obese employees exhibit the following health care utilization rates: (a) 36% higher inpatient and outpatient spending, (b) 77% higher medication spending, and (c) 45% more inpatient days.

Thompson and colleagues (1998) conducted the first study focused on the economic costs of obesity within the U.S. workforce. The findings indicated that the cost of obesity to U.S. businesses was \$12.7 billion during 1994. The study broke this cost down in the following manner: (a) \$7.7 billion for health insurance, (b) \$1.8 billion for life insurance, (c) \$2.4 billion for paid sick leave, and (d) \$0.8 billion for disability insurance. Burton and colleagues (1998) studied 3,066 employees and found that, as BMI increased, the number of sick days and amount of health care costs increased concurrently. Obese employees were out sick twice as often as normal-weight employees.

Specifically, 835 obese workers experienced an average of 8.45 sick days, while 2,231 normal-weight employees experienced an average of 3.73 sick days. When actual absenteeism was converted to a total dollar figure, medical leave paid to obese employees between 1989 and 1995 was \$863 per person. The average health care cost over 3 of these years for obese employees was \$8,799, in contrast to \$5,245 for healthy-weight employees. The mean health care cost associated with obese women was \$10,830, in contrast to \$3,606 with obese men. The discrepancy in average health care cost between obese and normal-weight employees continues to rise. According to Hellmich (2005), this cost associated with an obese employee was \$1,244 more than a normal-weight employee in 2002, compared to a cost discrepancy of \$272 in 1987.

The world's largest privately held printing company is located within the state of Wisconsin. In response to rising obesity rates throughout the state, the company conducted a study analyzing health data from its electronic medical-chart database to determine if obesity was a significant problem among its own workforce. The results indicated that health care costs associated with obesity were nearly twice the medical costs associated with normal-weight employees. In short, the data revealed that, if one third of all employees categorized as obese could lose enough weight to move into the overweight category, the result would equate to a savings of \$917,425 in health care costs over a 2-year period (Helwig, Schultz, & Quadracci, 2005).

Absenteeism and Work Limitations. Rates of absenteeism associated with obese employees reflect tens of millions of lost work days annually (Merx, 2004), which was

evidenced by a 1994 estimate of 39.3 million days of absence (U.S. Department of Health and Human Services, 2003). Research has indicated that short-term disability (i.e., 5 consecutive workdays) is significantly associated with BMI (Burton et al., 1998). Obese female workers accumulate a greater number of short-term disability absences than obese male workers (Burton et al., 1998; Merx, 2004). According to Leopold (2005), female workers accounted for 85% of all short-term disability claims over the 3-year period of his study.

A 2004 study conducted by the Centers for Disease Control and Prevention and a nonprofit “think tank” (as cited in Hellmich, 2005) reported that obese male workers lose an average of 5 days of work annually, compared to 3 days of work lost by normal-weight male workers. Obese female employees miss 8.2 days of work annually, compared to 3.4 days for normal-weight female workers. A Belgian study sought to analyze the effects of obesity on absenteeism in a sample of 20,463 workers—15,557 males and 4,906 females—between 35 and 59 years of age. The results revealed a high incidence of sick leave statistically associated with obesity. Specifically, the percentage of sick leave attributed to obesity was 4.9% in men and 7.8% in women. Thus, the researchers calculated that prevention of workplace obesity could save approximately 1,435 work days lost to illness (Moreau et al., 2004).

Obese workers are also more likely to present work limitations than normal-weight employees. Research conducted by Hertz and McDonald (2004) documented that 7% of the participating obese workers 20 years of age or older reported limitations, versus 3% of the normal-weight employees. Cardiovascular risks were also

prevalent among these obese workers. Specifically, 30.5% were affected by hypertension, compared to 8% of the normal-weight workforce, and 12% of the obese workers had developed Type 2 diabetes, compared to 4% of the normal-weight employees. Finally, testing indicated that 35% of the obese workers had developed dyslipidemia (i.e., a high LDL cholesterol level), compared to 22% of the normal-weight workers.

Employer Intervention. Workplace health promotion has become common throughout the U.S. business environment (U.S. Department of Health and Human Services, 2001, 2003). Research has indicated that this practice has reaped significant dividends for participating companies. For example, a study conducted by the National Business Group on Health (as cited in Carlson, 2004) reported that 56% of all surveyed businesses experienced increased morale, 27% incurred increased health care savings, and 20% gleaned increased workforce productivity. One major U.S. firm reported that medical costs had been cut five times as a result of health-promotion programs (Freudenheim, 1999). Other large American companies increased their benefit-to-cost ratio up to \$3.14 as a result of such programs (U.S. Department of Health and Humans Services, 2001).

U.S. companies are instituting disparate health-promotion measures to lower incidence of obesity among their respective workforces. Some are sponsoring weight-loss competitions while others encourage their employees to increase their daily walking distance. A Semi Valley, California religious organization issues pedometers to employees, while one of the largest corporations in the country encourages its employees

to walk at least 10,000 steps a day. A major health-insurance company based in New Jersey has mapped an outdoor walking path and organized walking sessions for its employees. Many large U.S. firms now have on-site fitness centers for employees that are equipped with expensive exercise machines (e.g., treadmills and stationary bicycles) and staffed with personal coaches. Others subsidize health-club memberships (Carlson, 2004; Ellin, 2003; Freudenheim, 1999). These companies are in agreement with the objectives of the U.S. Department of Health and Human Services (2001) toward increasing the number of workers who engage in regular, moderate physical activity for a minimum of 30 minutes per day.

The Stages of Motivational Readiness to Change Model

Prochaska, DiClemente, and Norcross (1992) devoted 12 years to determining how behavior can be changed without psychotherapy. They postulated that modification of unwanted behavior can be achieved without expert assistance. Prochaska and colleagues developed the SMRC model, which is based upon the concept of motivation. That is, change as a process that progresses from intention through to manifestation of the desired change and maintaining the targeted behavior (Dunn et al., 1999; Marcus & Forsyth, 2003; Marcus & Simkin, 1994; Prochaska et al., 1992). Thus, the level of motivation to change unwanted behavior coincides with the Prochaska and colleagues stage of motivation (DiClemente et al., 1991; Sutton, 1996). Their model has been successfully implemented within intervention settings focused on smoking cessation; alcoholism treatment; head-injury rehabilitation; weight control (DiClemente et al.,

1991); cocaine-addiction treatment; and the adoption of physical-exercise regimens (Pinto & Marcus, 1995), among others.

According to the SMRC model, individuals move through a series of stages as they attempt to eliminate unwanted behavior and adopt a desired behavior (Etter & Sutton, 2002; Marcus & Lewis, 2003; Prochaska et al., 1992; Velicer, Hughes, Fava, Prochaska, & DiClemente, 1995). Specifically, individuals are positioned in one of the following five stages at any given point in time (Etter & Sutton, 2002; Marcus, Rossi, et al., 1992; Prochaska et al., 1992; Velicer et al., 1995): (a) precontemplation (i.e., no intention to change); (b) contemplation (i.e., considering a change); (c) preparation (i.e., have made small changes toward an ultimate behavior goal); (d) action (i.e., have adopted a desired behavior); and (e) maintenance (i.e., working toward preventing a relapse).

Movement through the SMRC is cyclical with individuals typically making repeated attempts at behavior change while experiencing periodic relapses before attaining their behavioral goal (Marcus, Rossi, et al., 1992; Marcus, Selby, Niaura, & Rossi, 1992; Prochaska et al., 1992; Velicer et al., 1995). Relapse is regression to an earlier stage, but not back to the precontemplation stage. For example, an individual within the action stage of the model may regress to the contemplation stage, or an individual within the maintenance stage may regress to the preparation stage (Prochaska et al., 1992). It is therefore important to identify risk factors that can predict the probability of relapse (Marcus & Lewis, 2003).

Process of Change

Another key component of the SMRC model is the process of change (Marcus, Rossi, et al., 1992). According to Prochaska and Velicer (1997), such processes are the “covert and overt activities that people use to progress through the stages” (p. 39). They are characterized as cognitive (i.e., thought, attitudes, and awareness) and behavioral (i.e., actions). According to Marcus, Selby, and colleagues (1992), as well as Prochaska and Velicer, cognitive processes involve consciousness raising (i.e., increased awareness of the causes and consequences of, and cures for, a particular problematic behavior); dramatic relief (i.e., realization that the problem behavior has emotional consequences); self-reevaluation (i.e., assessment of self-image with and without the unwanted behavior); environmental reevaluation (i.e., assessment of how the problem behavior affects others); and social liberation (i.e., increasing awareness of alternative lifestyles). Behavioral processes involve counterconditioning (i.e., substituting healthier behaviors for the problem behavior); helping relationships (i.e., accepting the caring support of others); reinforcement management (i.e., consequences—punishments or rewards—to initiate steps in a particular direction); self-liberation (i.e., choosing to change undesired behavior due to the internal belief that change is possible); and stimulus control (i.e., avoiding situations that “trigger” the unwanted behavior).

Research has shown that the process of change varies according to stage position (Marcus, Rossi, et al., 1992; Marcus & Simkin, 1994; Prochaska et al., 1992). Marcus, Rakowski, and Rossi (1992) studied 1,172 male and female employees of two work sites to ascertain which processes are commonly implemented within which stage of the

SMRC. A 39-item questionnaire with items coinciding with the respective process of change was administered. Tukey tests indicated that participating individuals within the precontemplator stage applied one or more of the 10 processes of change outlined by Marcus, Selby, and colleagues (1992) and Prochaska and Velicer (1997) less often than those positioned further along the SMRC continuum. Additionally, cognitive processes were found to be implemented more by precontemplators, contemplators, and preparers than those within other SMRC, while behavioral processes were applied primarily by individuals within the action and maintenance stages. Consequently, significant differences exist between each stage and corresponding supportive process.

Stage-Matched Physical-Activity Intervention

Advocates of the SMRC model maintain that interventions should be tailored to respective stage positions (DiClemente et al., 1991; Marcus, Selby, et al., 1992; Marcus & Simkin, 1994; Pinto & Marcus, 1995; Prochaska et al., 1992; Velicer et al., 1995).

Although their research has supported this view, most interventions focused on physical activity continue to approach treatment as if all individuals within their target population are positioned within either the action or maintenance stage. In reality, approximately 15% to 20% of any given population is likely to be found within one of these two stages (Marcus, Selby, et al., 1992; Prochaska et al., 1992). Consequently, nearly 50% of those individuals who begin an exercise program discard the regimen within the first year (Meisler, 2002). Therefore, tailoring treatment according to stage position may “accelerate progress through the stages and thus increase adoption of exercise and improve maintenance” (Marcus, Rakowski, et al., 1992, p. 386).

Kim, Hwang, and Yoo (2004) conducted a study to determine the impact of a stage-matched intervention promoting physical exercise in participants with Type 2 diabetes. Each of the 45 participants was assigned to one of two groups according to their stage of change. A stage-matched intervention was administered to one study group for 3 months while the control group received solely generic education. The independent variable was the stage-matched intervention; the dependent variables were the SMRC. The findings exhibited significant increases in overall stage-of-change scores ($t = - 3.53$, $p < .001$) and levels of physical activity ($t = - 4.78$, $p < .001$) within the intervention group. A majority of the intervention group (77.4%) improved their performance of physical activity, in contrast to a low 4.3% of the control group. Additionally, the actual levels of physical activity within the intervention group increased significantly, in contrast to no significant change within the control group.

Bock, Marcus, Pinto, and Forsyth (2001) conducted a study to determine the impact of stage-targeted intervention on levels of physical activity. A study sample of 194 sedentary participants was recruited through newspaper advertisements and randomly assigned to either a treatment or control group. The intervention for the treatment group consisted of motivational, print-based material that was stage matched and focused on the processes appropriate for implementation within each stage of change. The control group received standard self-help manuals developed by the American Heart Association. At the end of 6 months, those within the treatment group had incorporated significantly more minutes of physical activity into their daily regimens than the

control-group participants ($F = 8.03, p < .01$). At a 12-month follow-up, 42% of the treatment group were meeting recommended guidelines with regard to leisure-time physical activity, compared to only 25% of the control group.

Another study with the same focus used four primary-care physicians to implement stage-targeted interventions along with standard interventions to sedentary patients 50 years of age or older (Marcus et al., 1997). The goal was to increase the amount of physical activity performed within a 6-week period. The treatment group received stage-matched counseling and written educational material on behavioral change that complimented information delivered by the physicians. The control group received the standard intervention of written material. The results revealed physical-activity scores for the treatment group that were 17.6 points over those of the control group ($t = 1.32, p = 0.19$). Consequently, the increase in physical activity was greatest for patients who received the stage-specific interventions.

Research conducted by Calfas, Sallis, Oldenburg, and French (1997) using a sample of 17 health care providers (i.e., 10 physicians in family practice, 2 in obstetrics/gynecology, 4 in internal medicine, and 1 nurse practitioner) indicated similar findings as the Marcus and colleagues (1997) study. Calfas and colleagues assigned 98 patients 18 years of age or older to a treatment group who received physician-based assessment and counseling to increase physical exercise. A control group consisted of 114 patients within the same age-group who received standard written educational material. The assessments conducted for participants within the treatment group resulted in physical-activity protocols agreed upon by the physician-patient teams. Each protocol

contained an activity log, examples of physical activity, and suggestions for overcoming barriers to the performance of physical activity. The findings of the study showed that, after 6 weeks of the intervention, 100% of the treatment group increased earlier amounts of walking, compared to only 27% of the control group. Additionally, use of the behavioral and cognitive processes of change increased significantly more among the treatment group than among the control group ($p < .001$, $p < .05$, respectively).

Another study analyzed 1,559 employees via distribution of printed self-help promotional material on physical exercise to a treatment group (Marcus et al., 1998). The material was matched to the specific motivational stage within which the participants were positioned. The control group received standard written material depicting the benefits of regular physical activity. The findings showed that 37% of the treatment group increased their physical activity, compared to 27% of the control group. Additionally, 11% of those within the treatment group regressed in stage position compared to 15% of the control group.

The Association Between Motivational Stage and Physical-Activity Level

When applied to leisure-time physical activity, the SMRC model predicts that the amount of such activity varies depending upon the stage position (Pinto & Marcus, 1995). That is, research has shown the motivational stages to be significantly associated with time spent in leisure-time physical activity (Bock et al., 2001; Kim et al., 2004). Consequently, individuals within the precontemplation and contemplation stages would be sedentary, those within the preparation stage would exhibit a limited degree of

leisure-time physical activity, and those within the action and maintenance stages would have attained levels of physical activity during leisure time that adhere to the guidelines set forth by the U.S. Department of Health and Human Services (1996) and the American College of Sports Medicine (1995).

Marcus and Simkin (1993) administered a stages-of-exercise behavior questionnaire, along with another survey measuring behavior related to physical activity, to a sample of 235 employees. An analysis of variance indicated significant between-group effect with total minutes of vigorous activity ($F = 20.57, p < .001$) and total minutes of moderate activity ($F = 9.09, p < .001$). In research conducted by Marcus, Pinto, Simkin, Audrain, and Taylor (1994), a sample of 431 women revealed similar results. Participants within either the action or maintenance stage were significantly more likely to engage in activities such as running, biking, dancing, and/or swimming than those within either the precontemplation or contemplation stage ($p < .05$). Participants who reported walking for exercise were significantly more likely to be positioned within the preparation, action, or maintenance stage ($p < .05$). Women who reported housework as their primary form of physical activity were significantly more likely to be positioned within the precontemplation or contemplation stage ($p < .05$).

Another study used a sample of mothers receiving assistance from the Women, Infants, and Children program (Fahrenwald & Walker, 2003). Spearman's rank correlation coefficients revealed significant relationships between the stage of behavioral change and two physical-activity expenditure indices ($r = 0.71-0.73, p < .01$) and daily minutes of physical activity ($r = 0.91, p < .01$). Hellman (1997) sought to validate the

SMRC model in a sample of 349 cardiac-rehabilitation patients 65 years of age or older. She found significant differences between the average daily energy expenditure and stage position ($F = 31.47, p < .0001$). Specifically, the higher the stage position, the higher the energy expenditure. Additionally, a significant difference was found between the minutes of physical-activity performance and stage position ($F = 76.11, p < .0001$).

Summary

As noted earlier, obesity is defined as a BMI of 30.0 or higher. Although Mississippi leads the nation in the percentage of obese adults residing within any one state, the problem is indeed evidenced within all U.S. states. Nevertheless, many adult Americans continue to lead highly sedentary lifestyles, even though extensive knowledge exists with regard to the increased morbidity associated with obesity. The obesity epidemic crosses gender and ethnic boundaries; however, it is most prevalent among African American females. The harm caused by this condition has manifested throughout the economy of the nation due to the impact it has on the entire U.S. workforce. Focusing on this national problem, research has used the SMRC model to adequately measure physical-activity levels and provide a basis for interventions toward increasing leisure-time physical activity.

Incidence of obesity among the U.S. adult population has risen considerably since 1980. It is evident that the solution lies in increasing the amount of physical activity adults perform during their leisure time on a daily basis. However, studies have shown that approximately one quarter of adult Americans adhere to the guidelines established by the U.S. Department of Health and Human Services (1996) and the American College of Sports Medicine (1995), which prescribe at least 30 minutes of moderate-intensity physical activity at least 5 days per week. In short, physical activity burns stored food energy (i.e., fat). This, in turn, decreases BMI, which concurrently decreases risk for chronic disease such as CHD, hypertension, non–insulin-dependent diabetes mellitus, and cancer.

As noted, the negative effects of obesity have manifested throughout the American workforce. The direct costs to employers are realized through employee health care claims, paid sick leave, and workman's-compensation claims. However, employers also pay the cost of obesity with low work productivity. Numerous studies have shown that, as employee BMI increases, incidence of absenteeism, health care claims, and worker limitations also rise. Consequently, major American businesses have resorted to instituting employee fitness programs as a method of protecting profit margins.

Numerous researchers within the field of physical fitness proclaim increasing awareness of the sedentary lifestyles of Americans. Many have conducted studies using the SMRC model. As described throughout this current research, the premise set forth by the model is that individuals move through various SMRC as they attempt to adopt a physically active lifestyle. These stages progress from no intention of behavioral change through actual adoption of a physical-activity regimen during leisure time that is in accordance with the guidelines set forth by the U.S. Department of Health and Human Services (1996) and the American College of Sports Medicine (1995). As individuals progress through the SMRC continuum, their motivation to perform physical activity increases, which is evidenced by the corresponding amount of time invested in their stage position and physical activity. All segments of American society, whether within the education, medical, business, or other community, are called to make a contribution toward decreasing the overall population of sedentary citizens. This equates to supporting interventions aimed at increasing leisure-time physical activity. Research has shown that

application of the SMRC model, matching specific interventions to stage positions, will glean higher results than the traditional “one-size-fits-all” approach.

CHAPTER III

METHODOLOGY

This research was conducted to ascertain the stages of motivational readiness to change leisure time physical activity behavior of a population obtained from matriculates at two Mississippi community colleges. This chapter will address the following aspects: (a) Research Design, (b) Instrumentation, and (c) Data Collection and Analysis. Finally, the researcher's utilization of repeated measures will be discussed.

Research Design

The purpose of this current study was to investigate the motivational readiness of college students to change their behavior toward increased physical activity during leisure time. The potential effects of gender, ethnicity, age, and income on each stage of the SMRC model was assessed. Self-reported data were gathered via a cross-sectional survey instrument. This questionnaire provided a valid source of data, as supported by Sallis and Saelens (2000) who found that the self-recall of facts does not alter the behavior under study. Other studies involving the positioning of participants within appropriate stages of motivational readiness for change have incorporated self-reported data effectively (Marcus & Simkin, 1993, 1994). For the current research, a Web-based

instrument was disseminated to student e-mail accounts via an alias provided by the participating institutions.

This study invited students from two community colleges ($N = 4,134$) to participate by completing the described online survey. Selection of the two institutions was based upon the similarity of student demographics, thus augmenting efforts toward the creation of equality for the independent variables of gender, ethnicity, age, and income. One community college served 2,156 students (i.e., 1,647 full time and 583 part time). Of this student population, 802 (35.9 %) were male and 1,428 were female (64%). Additionally, 775 (34.7%) were African American, 1,214 (54.4%) were European American, 226 (10.1%) were Native American, and 15 (0.6%) were characterized as Other. The second community college served 1,978 students (i.e., 1,607 full time and 371 part time). Of this student population, 816 (41%) were male and 1,166 (59%) were female. Lastly, 730 (36%) were African American, 1,237 (63%) were European American, and 15 (1%) were characterized as Other. The sampling method implemented in this research was a convenience sample composed of all students enrolled within the two community colleges serving as the study sites. This method was selected to sufficiently increase the sample base for proper statistical analysis.

Instrumentation

The Physical Activity Stages of Change Questionnaire (PASCQ) was used for data collection in this current study. Permission was obtained from the publisher of this self-report survey (Cancer Prevention Research Center, n.d.). The instrument addresses the various stages through which individuals progress as they adopt and maintain a

physical-activity regimen of at least 30 minutes per day of moderate-intensity exercise, 5 or more days per week (Marcus & Forsyth, 2003; Marcus & Lewis, 2003). As noted earlier, the specific stages are precontemplation, contemplation, preparation, action, and maintenance (Marcus & Lewis, 2003).

The PASCQ consists of four closed-end questions designed to characterize the stage position of the respondent through the reported level of leisure-time physical activity (Marcus & Forsyth, 2003). The first question determines if the respondent is physically active at the time of survey completion. The second question ascertains the intention of the respondent to increase physical activity within the following 6 months. The third query determines whether the participant is engaged in the prescribed amount of leisure-time physical activity at the time of survey completion, and the fourth question ascertains whether such activity has been consistent over the preceding 6 months (see Appendix D).

The scoring algorithm for the PASCQ (Marcus & Forsyth, 2003) is designed in the following manner (see Appendix E):

1. If the respondent answers “No” to Question 1 and “No” to Question 2, the participant is determined to be positioned within Stage 1—the precontemplation stage of change.
2. If the respondent answers “No” to Question 1 and “Yes” to Question 2, the participant is deemed to be positioned within Stage 2—the contemplation stage of change.

3. If the respondent answers “Yes” to Question 1 and “No” to Question 3, the participant is determined to be positioned within Stage 3—the preparation stage of change.

4. If the respondent answers “Yes” to Question 1, “Yes” to Question 3, and “No” to Question 4, the participant is characterized as within Stage 4—the action stage of change.

5. If the respondent answers “Yes” to Question 1, “Yes” to Question 3, and “Yes” to Question 4, the participant is categorized as within Stage 5—the maintenance stage of change.

In the event that a respondent violates the scoring algorithm included with the questionnaire, the data set is eliminated from the subsequent analysis as invalid (Marcus & Forsyth, 2003). While gender and ethnicity are necessary determinations toward measurement of the effects of the independent variables, the following demographic information was also obtained for purposes of the current and future research: (a) the community college attended; (b) age; (c) employment status (i.e., full time, part time, or unemployed); and (d) annual income range.

According to one of the coauthors of the study questionnaire, validity and reliability of the PASCQ is evidenced within existing literature (L. A. Forsyth, personal communication, March 8, 2006), specifically two studies (Marcus, Selby, et al., 1992; Marcus & Simkin, 1993). With regard to reliability, both studies revealed a kappa reliability over a 2-week period of 0.78. Concurrent validity was also established through

both studies. The research conducted by Marcus, Selby, and colleagues used a sample of 1,063 employees of a Rhode Island division of a government agency. A five-item self-efficacy questionnaire was administered to differentiate participants according to motivational stage toward increased physical activity. An analysis of variance revealed that self-efficacy was significantly related to the change process, while Tukey testing indicated that the total scores on the self-efficacy questionnaire differentiated the employees according to stage position ($F = 85.93, p < .001$).

The 7-day Physical Activity Recall Questionnaire was administered in research conducted by Marcus and Simkin (1993), along with the PASCQ to 235 male and female employees of two work sites—a retail outlet and an industrial manufacturer. According to the SMRC model, the amount of participation in physical exercise—moderate or vigorous—should be differential according to the respective stage. For example, the amount of physical activity practiced by individuals within the precontemplation and contemplation stages would be less than those within the preparation stage. Analysis of variance indicated a significant relationship between stage position and total amount of vigorous activity ($F = 20.57, p < .001$) and total amount of moderate activity ($F = 9.09, p < .001$).

Data Collection and Analysis

Permission to perform the current research was secured from the Mississippi State University Institutional Review Board (see Appendix G) the presidents of both community colleges selected as study sites (see Appendix H). An e-mail alias (i.e., a text file of all active students) was subsequently established with each institution. A

recruitment message, inviting students to participate was distributed on August 21, 2006. The message provided an online link that introduced the researcher, explained the nature and purpose of the research, discussed informed consent, and provided another link to the survey (see Appendix H). The questionnaire was available online for potential participants within both institutions for a period of 7 days. The researcher was also available via e-mail and telephone to respond to any questions concerning the survey. Completed questionnaires ($n = 505$) were returned via e-mail to the researcher who filed print copies according to the day and time received in a secure file within his office.

Two types of statistical analyses—descriptive and inferential—were performed in this study. Descriptive statistics were employed to describe the basic features of the research (i.e., what the data shows in simple summary form; *Descriptive Statistics*, n.d.). The descriptive approach involved frequencies and cross-tabulation. Frequencies allow the summarization of raw quantitative data displaying elements according to frequency of occurrence (*Go Math*, n.d.). In this study, the frequencies represented the numbers and percentages of respondents positioned within each of the five stages, which corresponded to the first research question. The cross-tabulation was necessary to determine and illustrate the relationship between the categorical variables (Fraenkel & Wallen, 2006b). It also indicated the frequency of stage distribution delineated by the independent variables of gender, ethnicity, income, and age.

Inferential statistics allow “inferences about the population based on findings from the sample” (Fraenkel & Wallen, 2006a, p. 220). The remaining four research questions posed in the current study were analyzed using the nonparametric test known as

the chi square of independence. There were three conditions that necessitated the use of nonparametric statistics. The first was the inability of the researcher to “satisfy the assumptions underlying the use of parametric techniques” (p. 232). That is, the population could not be summarized by a numerical value such as a mean, standard deviation, or correlation (*Population Parameter*, n.d.) due to the highly skewed nature of the dependent variable. The second condition was the unequal variances between groups (i.e., heterogeneity of variance; *Part VI*, n.d.). That is, the spread of the dependent variable was not consistent across all levels of the independent variables (*Selecting Statistics*, n.d.). The third condition related to the presence of nominal (i.e., categorical) data, which did not allow for the creation of parameters (*Part VI*, n.d.).

As noted, the nature of this current research necessitated use of nonparametric statistics. The mere fact that incidence of the dependent variable (i.e., the five SMRC) was dependent upon the motivation toward physical activity of each respondent made the likelihood of normality extremely unlikely. Research has shown the stage of change toward physical activity to be skewed toward Stage 1 and Stage 2 (Marcus & Forsyth, 2003). In fact, because normality cannot be assumed for many variables, such as the incidence of rare disease and car accidents, nonparametric statistics are often necessary (*Nonparametric Statistics*, n.d.). Additionally, the PASCQ was designed to produce nominal data. Consequently, the research determined the incidence of each level of the independent variable within each stage of change.

The inferential statistical measure for this study was the Pearson chi-square test for independence with a level of significance at .05. This analysis facilitated

determination as to whether a lack of association (i.e., independence) existed between the row factors (i.e., the SMRC) and the column factors (i.e., the categorical data). For example, if gender was independent of stage position, then knowledge of gender would not affect expectations regarding the stage position of any given respondent. Likewise, knowledge of stage position would not reflect whether the respondent was more likely to be male or female. Thus, when the chi-square statistic was larger than the critical value from the chi-square table, the variables were reported as dependent upon one another, evidencing an association (Siegel & Morgan, 1996). Furthermore, the strength of dependency (i.e., the effect size) was estimated using the Cramer's V statistic. Thus, an effect size of 0.1 or less was termed as small; an effect size of 0.3 was termed as medium, and an effect size of 0.5 or greater was considered large (Cohen, 1988).

As to whether the data was representative of the target population ($N = 4,134$), this was determined via repeated measures. Frequencies were analyzed in blocks of 50, with each additional block added to the preceding case. The intended purpose was to illustrate stabilization of the data, thus negating the necessity to collect additional data. Specifically, analysis revealed that the majority of respondents were European American ($M = 64.7\%$) (see Table 5) and the highest percentage ($M = 38.7\%$) were positioned within Stage 5 of the SMRC (see Table 6). In sum, the analysis did reveal a stabilization of the data.

Table 5

Repeated Measures Applied to Ethnic Background

Case		Frequency	Percentage
Case 1–50	African American	11	22.0
	European American	32	64.0
	Hispanic American	0	0.0
	Native American	5	10.0
Case 1–100	African American	28	28.0
	European American	61	61.0
	Hispanic American	1	1.0
	Native American	7	7.3
Case 1–150	African American	41	27.3
	European American	97	64.7
	Hispanic American	1	0.7
	Native American	8	5.3
Case 1–450	African American	124	27.6
	European American	297	66.1
	Hispanic American	1	0.2
	Native American	18	4.0
Case 1–505	African American	132	26.1
	European American	342	67.7
	Hispanic American	3	0.6
	Native American	18	3.6

Table 6

Repeated Measures Applied to Stage Position

Case		Frequency	Percentage
Case 1-50	Stage 1	3	6.0
	Stage 2	21	42.0
	Stage 3	3	6.0
	Stage 4	7	14.0
	Stage 5	16	32.0
Case 1-100	Stage 1	5	5.0
	Stage 2	31	31.0
	Stage 3	10	10.0
	Stage 4	12	12.0
	Stage 5	42	42.0
Case 1-150	Stage 1	8	5.3
	Stage 2	43	28.7
	Stage 3	17	11.3
	Stage 4	21	14.0
	Stage 5	61	40.7
Case 1-450	Stage 1	25	5.6
	Stage 2	129	28.7
	Stage 3	47	10.4
	Stage 4	68	15.1
	Stage 5	181	40.2

CHAPTER IV

RESULTS

As noted earlier, obesity is the most prevalent and fatal chronic disease of the 21st century (*Obesity Crisis*, 2004). It is also the leading cause of preventable death within the United States, second only to cigarette smoking (Brown et al., 2000; *Pharmacy Update*, 2005). The number of obese Americans has doubled since the 1980s (Giardina, 1998; *Screening for Obesity*, n.d.; U.S. Department of Health and Human Services, 2002), and the state of Mississippi evinces the highest proportion of obese adults, with 29.5% falling within this category (Glendening et al., 2005). The root of this major problem lies in the lack of leisure-time physical activity (Adams et al., 2003). Few occupations within this country provide a sufficient amount of physical activity to produce health benefits (U.S. Department of Health and Human Services, 2005).

According to the Centers for Disease Control and Prevention (2005b), one in every four adults exclude physical activity from their leisure time, while *Healthy People 2010* (U.S. Department of Health and Human Services, 2005) places the number of sedentary adult Americans at 40% of the total population. Consequently, the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996) recommends that every adult accumulate 30 minutes or more of

moderate-intensity physical activity on most—preferably all—days of each week. To reduce the number of sedentary adult Americans, disparate interventions, as opposed to the traditional “cookie-cutter” approach, are needed. Specifically, interventions should be tailored to individual motivational readiness to change behavior related to leisure-time physical activity (DiClemente et al., 1991; Marcus, Selby, et al., 1992; Marcus & Simkin, 1994; Pinto & Marcus, 1995; Prochaska et al., 1992; Velicer et al., 1995).

The SMRC model rests upon the assumption that individuals attempting to change personally undesirable behavior move through the following five stages: (a) precontemplation, (b) contemplation, (c) preparation, (d) action, and (e) maintenance. An individual within the precontemplation stage has no intention of taking action toward changing an undesirable behavior within the near future (i.e., typically measured as within the following 6 months). The contemplation stage is characterized by weighing the pros and cons of changing such behavior and analyzing the feasibility of taking appropriate action. Those within the preparation stage have taken some form of action; however, the change does not meet the recommended requirements necessary to reap the desired benefits. The action stage is characterized by meeting recommended requirements. In the current study, those requirements are set forth by the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996). The final maintenance stage depicts individuals who have been meeting the necessary requirements to achieve desired behavioral change, as set forth by the respective professional community, for a minimum of 6 months. In short, an individual

cannot adopt a positive health-related behavior until he or she possesses the attitude needed to fully embrace the new behavior.

This current study sought to ascertain the specific SMRC within which students enrolled at two Mississippi Community Colleges were positioned at the onset of the research. Toward this end, demographic information was collected from the respondents, as well as survey data analyzed to answer the following five research questions:

1. How many study participants are found within each stage of motivational readiness to change their behavior toward increased physical activity during leisure time?
2. Does ethnicity appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?
3. Does gender affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?
4. Does age appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?
5. Does income appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?

All data analyses were conducted using procedures from the Statistical Package for Social Sciences, Version 14.0.

Demographic Data

All research participants were enrolled within one of two Mississippi community colleges serving as the study sites during the 2006 fall semester. The demographics of the two institutions were very similar. For example, the enrollment figures of one college

indicated 1,978 students (i.e., 1,607 full time and 371 part time). Of this student population, 816 (41%) were male and 1,166 (59%) were female. Lastly, 730 (36%) were African American, 1,237 (63%) were European American, and 15 (1%) were characterized as Other. In comparison, the second college served 2,156 students (i.e., 1,647 full time and 583 part time). Of that student population, 802 (35.9%) were male and 1,428 were female (64%). Additionally, 775 (34.7%) were African American, 1,214 (54.4%) were European American, 226 (10.1%) were Native American, and 15 (0.6%) were characterized as Other.

Of the 4,134 students that comprised the student body of the study-site institutions, 505 participated in this research by completing the study survey, which represented a response rate of 12%. The demographics for this group of respondents are presented within Table 7 by ethnicity, gender, age, and income level. The majority exhibited the following characteristics: (a) Caucasian ($n = 342$), (b) female ($n = 361$), (c) aged between 18 and 20 ($n = 326$), (d) an annual income level up to \$10,000 ($n = 384$), and (e) not currently employed ($n = 257$). A total of 204 responses was received from one study site and 301 responses were received from the second institution.

Analysis of the Research Questions

Because the promotion of physical activity among postsecondary institutions has been largely ignored (DeVahl et al., 2005), this study sought to cultivate awareness among Mississippi community-college presidents of their need to enact disparate interventions aimed at decreasing the sedentary behavior of their matriculants—a pivotal gap in existing literature. To address the major problem related to motivational readiness

to change behavior toward increased physical activity during leisure time, this study collected data via an online survey that would effectively answer the five research questions (see Appendix D).

Table 7

Demographics of Study Respondents (N = 504)

Demographic	N	Percentage
Ethnicity		
African American	132	26.1
European American	342	67.7
Hispanic American	3	0.6
Native American	18	3.6
Other	9	1.8
Missing system	1	0.2
Total	505	100.0
Gender		
Male	143	28.3
Female	361	71.5
Missing system	1	0.2
Total	505	100.0
Age		
18–20	326	64.6
21–23	71	14.1
24–26	27	5.3
27–29	27	5.3
30 and over	54	10.7
Total	505	100.0
Annual income (\$)		
0–10,000	384	76.0
10,001–30,000	78	15.4
30,000–40,000	15	3.0
Over 40,000	20	4.0
Missing system	8	1.6
Total	505	100.0
Employment		
Full time	60	11.9
Part time	185	36.6
Not currently employed	257	50.9
Missing system	3	0.6
Total	505	100.0

Research Question 1

Research Question 1 asked, “How many study participants were found within each stage of motivational readiness to change their behavior toward increased physical activity during leisure time?” The study survey asked students to identify their current physical-activity level during leisure time, which was determined by answering according to the algorithm depicted in Appendix E. A numerical stage position was assigned to each respondent. Stage 1 (i.e., the precontemplation stage) represented respondents answering “No” to Question 1 and “No” to Question 2. Stage 2 (i.e., the contemplation stage) represented respondents answering “No” to Question 1 and “Yes” to Question 2. Stage 3 (i.e., the preparation stage) represented respondents answering “Yes” to Question 1 and “No” to Question 3. Stage 4 (i.e., the action stage) represented respondents answering “Yes” to Question 1, “Yes” to Question 3, and “No” to Question 4. Stage 5 (i.e., the maintenance stage) represented respondents answering “Yes” to Questions 1, 3, and 4.

The motivational readiness to change behavior toward increased leisure-time physical activity was determined for each respondent. Additionally, the SMRC model outlined specific behaviors for each stage position. Thus, the following associations were made: (a) respondents positioned within Stage 1 or Stage 2—the stages void of exercise—were physically inactive during their leisure-time; (b) respondents within Stage 3 were performing some type of leisure-time physical activity, but not an amount sufficient to satisfy the requirements set forth by the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996); and

(c) those within Stage 4 or Stage 5 met the leisure-time physical-activity requirements as set forth by the professional community (i.e., respondents within Stage 4 met those requirements for less than 6 months, while those within Stage 5 had been adhering to the prescribed requirements for 6 months or longer (see Table 8).

Table 8
Stage Positions of the Study Respondents

Stage	<i>N</i>	Percentage
1 (Precontemplation)	30	5.9
2 (Contemplation)	147	29.1
3 (Preparation)	50	9.9
4 (Action)	76	15.0
5 (Maintenance)	202	40.0
Total	505	100.0

Research Question 2

Research Question 2 asked, “Does ethnicity appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” The chi-square test of independence performed in this study revealed no significant difference between the stage of motivational readiness to change leisure-time physical activity and ethnic background ($\chi^2_{[16]} = 19.31, n = 504, p = 0.253$; see Table 9). Therefore, the stage presented was independent of ethnic background. Additionally, the

Cramer's V test revealed a correlation coefficient of .098, indicating a small effect size (Cohen, 1988; see Table 10). A within-group analysis revealed that European Americans were more likely to be positioned within Stage 3, 4, or 5 (67.6%), while African Americans were more likely to be categorized within Stage 1 or 2 (35.6%; see Table 11). Although instrument capabilities included the classification of Hispanic Americans and Native Americans, representation from these groups was not equitable when compared to African Americans and European Americans. Solely three Hispanic Americans and 18 Native Americans responded; consequently, these population groups were not included in this specific analysis.

Table 9

Pearson Chi Square for Independent Variables and Stage

Independent variable	Value	<i>df</i>	Asymptotic significance (2-sided)
Ethnic background	19.305	16	0.253
Gender	27.161	4	.000
Age	52.521	16	.000
Income	35.634	12	.000

Table 10

Cramer's V Test for Independent Variables and Stage

Independent variable	Value	Approximate significance
Ethnic background	.098	0.253
Gender	0.232	.000
Age	0.161	.000
Income	0.155	.000

Table 11

Stage Cross-Tabulation Applied to Ethnic Background

Ethnic background	Stage					Total
	1	2	3	4	5	
African American						
Count	9	38	17	16	52	132
Expected count	7.9	38.5	13.1	19.6	52.9	132.0
% within ethnic background	6.8	28.8	12.9	12.1	39.4	100.0
European American						
Count	18	93	32	55	144	342
Expected count	20.4	99.8	33.9	50.9	137.1	342.0
% within ethnic background	5.3	27.2	9.4	16.1	42.1	100.0
Hispanic American						
Count	0	2	0	0	1	3
Expected count	0.2	0.9	0.3	0.4	1.2	3.0
% within ethnic background	.0	66.7	.0	.0	33.3	100.0
Native American						
Count	2	11	0	3	2	18
Expected count	1.1	5.3	1.8	2.7	7.2	18.0
% within ethnic background	11.1	61.1	.0	16.7	11.1	100.0
Other						
Count	1	3	1	1	3	9
Expected count	0.5	2.6	0.9	1.3	3.6	9.0
% within ethnic background	11.1	33.3	11.1	11.1	33.3	100.0
Total						
Count	30	147	50	75	202	504
Expected count	30.0	147.0	50.0	75.0	202.0	504.0
% within ethnic background	6.0	29.2	9.9	14.9	40.1	100.0

Research Question 3

Research Question 3 asked, “Does gender appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” The chi-square test of independence performed in this study revealed a significant difference between the stage of motivational readiness to change leisure-time physical activity and gender ($\chi^2_{[4]} = 27.16, n = 504, p = .000$; see Table 9). Thus, an association existed between gender and stage position (i.e., gender was found to be a significant predictor of stage position). Furthermore, the Cramer’s V test revealed a moderate effect size of 0.232 (Cohen, 1988; see Table 10). Additionally, cross-tabulation revealed that male participants were more physically active than the females. Specifically, within-group analysis revealed that 88% of the males were within the three latter exercise stages, whereas 59.6% of the females were positioned within these SMRC. This same analysis indicated that 21.7% of the males were positioned within stages void of physical exercise, compared to 40.5% of the females (see Table 12).

Research Question 4

Research Question 4 asked, “Does age appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” The chi-square test of independence performed in this study revealed a significant difference between the stage of motivational readiness to change leisure-time physical activity and age ($\chi^2_{[16]} = 52.52, n = 505, p = .000$; see Table 9). Thus, an association existed between age and stage position (i.e., age was found to be a significant predictor of stage position). Furthermore, the Cramer’s V test revealed a correlation coefficient of 0.161, which

Table 12

Stage Cross-Tabulation Applied to Gender

Gender	Stage					Total
	1	2	3	4	5	
Male						
Count	7	24	17	15	80	143
Expected count	8.5	41.7	13.9	21.6	57.3	143.0
% within gender	4.9	16.8	11.9	10.5	55.9	100.0
Female						
Count	23	123	32	61	122	361
Expected count	21.5	105.3	35.1	54.4	144.7	361.0
% within gender	6.4	34.1	8.9	16.9	33.8	100.0
Total						
Count	30	147	49	76	202	504
Expected count	30.0	147.0	49.0	76.0	202.0	504.0
% within gender	6.0	29.2	9.7	15.1	40.1	100.0

indicates a low to moderate effect size (Cohen, 1988; see Table 10). Additionally, a within-group analysis revealed that participants 18 through 20 years of age were the most active during their leisure time. For example, 74.2% of this group were positioned within the three latter SMRC. In contrast, those 21 through 23 years of age exhibited the least physical activity during leisure time, with 56.3% of this group positioned within the first two stages (see Table 13).

Research Question 5

Research Question 5 asked, “Does income appear to affect the stage of motivational readiness to change behavior toward increased physical activity during

Table 13

Stage Cross-Tabulation Applied to Age

Age	Stage					Total
	1	2	3	4	5	
18-20						
Count	16	68	34	56	152	326
Expected count	19.4	94.9	32.3	49.1	130.4	326.0
% within age	4.9	20.9	10.4	17.2	46.6	100.0
21-23						
Count	5	35	11	5	15	71
Expected count	4.2	20.7	7.0	10.7	28.4	326.0
% within age	7.0	49.3	15.5	7.0	21.1	100.0
24-26						
Count	1	8	11	4	12	27
Expected count	1.6	7.9	7.0	4.1	10.8	27.0
% within age	3.7	29.6	7.4	14.8	44.4	100.0
27-29						
Count	2	13	2	5	5	27
Expected count	1.6	7.9	2.7	4.1	10.8	27.0
% within age	7.4	48.1	7.4	14.8	18.5	100.0
30 and over						
Count	6	23	1	6	18	54
Expected count	3.2	15.7	5.3	8.1	21.6	54.0
% within age	11.1	42.6	1.9	11.1	33.3	100.0
Total						
Count	30	147	50	76	202	505
Expected count	30.0	147.0	50.0	76.0	202.0	505.0
% within age	5.9	29.1	9.9	15.0	40.0	100.0

leisure time?” The chi-square test of independence performed in this study indicated a significant difference between the stage of motivational readiness to change leisure-time physical activity and income ($\chi^2_{[12]} = 35.63, n = 497, p = .000$; see Table 9). Thus, an association existed between income and stage position (i.e., age was found to be a significant predictor of stage position). Furthermore, the Cramer’s V test revealed a correlation coefficient of 0.155, which indicates a low to moderate effect size (Cohen, 1988; see Table 10). Respondents reporting an annual income between \$0 and \$10,000 represented the highest proportion of exercisers within the study sample. Specifically, 70.3% of this subgroup were positioned within the latter three exercise stages. In contrast, 50% of respondents reporting annual incomes between \$10,001 and \$30,000 were positioned within Stages 1 and 2 (see Table 14). The remaining income brackets are not noted due to the low level of respondents selecting these income ranges (\$30,001–\$40,000: $n = 15$; over \$40,000: $n = 20$).

Summary

This study analyzed the relationship between motivational readiness to change behavior toward increased leisure-time physical activity and three immutable determinants—ethnicity, gender, and age—as well as the mutable determinant of income. The study questionnaire determined the activity level of the participants at the onset of the research, as determined by the requirements set forth by the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996). The motivational readiness of each respondent to adopt improved behavior toward increased leisure-time physical activity was concurrently determined, as well as the

Table 14

Stage Cross-Tabulation Applied to Annual Income

Annual income (\$)	Stage					Total
	1	2	3	4	5	
0–10,000						
Count	16	98	37	64	169	384
Expected count	22.4	108.9	37.9	58.7	156.1	384.0
% within annual income	4.2	25.5	9.6	16.7	44.0	100.0
10,001–30,000						
Count	7	32	10	7	22	78
Expected count	4.6	22.1	7.7	11.9	31.7	78.0
% within annual income	9.0	41.0	12.8	9.0	28.2	100.0
30,001–40,000						
Count	3	1	0	3	8	15
Expected count	0.9	4.3	1.5	2.3	6.1	15.0
% within annual income	20.0	6.7	0.0	20.0	53.3	100.0
Over 40,000						
Count	3	10	2	2	3	20
Expected count	1.2	5.7	2.0	3.1	8.1	20.0
% within annual income	15.0	50.0	10.0	10.0	15.0	100.0
Total						
Count	29	141	49	76	202	497
Expected count	29.0	141.0	49.0	76.0	202.0	497.0
% within annual income	5.8	28.4	9.9	15.3	40.6	100.0

motivational readiness to maintain the level of physical activity for participants already positioned within Stage 5 of the SMRC (Marcus, Selby, et al., 1992; Marcus & Simkin, 1993). The findings supported prior research with regard to the prevalent stage position and associated motivational readiness to change stage position based upon gender, age, and income.

The results revealed that the majority of respondents participate in some leisure-time physical activity, while 35% were completely sedentary. These findings are consistent with those of the Centers for Disease Control and Prevention (2005a), which reported that 32.5% of the Mississippi population is completely sedentary. The chi-square test indicated that ethnicity is unrelated to stage position. This is consistent with research conducted by Suminski and Petosa (2002), which found that the ethnicity distribution of college students between 17 and 58 years of age did not differ significantly among the SMRC. Moreover, this current study found 67.6% of the participating European Americans to be the most physically active, followed by 64.4% of the African Americans, 11.7% of the Native Americans, and 1.9% of the Hispanic Americans. However, it is noteworthy that the low frequency of responses from Native Americans and Hispanic Americans did not warrant their inclusion in further analyses. The findings of past research (Eaton, Nafziger, Strogatz, & Pearson, 1994; He & Baker, 2004; Robert & Reither, 2004; Yancey et al., 2004) were also indicative of European Americans being the most physically active, followed by African Americans and other minority groups.

The literature indicates a significant difference in the exercise behavior between men and women, with women being less active than men (Berrigan, Dodd, Troiano,

Krebs-Smith, & Barbach, 2003; Brown & Frankel, 1993; Morrow, Jackson, Bazzare, Milne, & Blair, 1999; Netz & Raviv, 2004; Seefeldt, Malina, & Clark, 2002). The results of this current study repeated this trend. Specifically, a majority of the study sample were classified as positioned within the action or maintenance SMRC with 55.9% evincing habitual leisure-time physical activity. In contrast, the highest proportion of females (34.1%) was found to be merely “considering” the prospect of beginning a leisure-time physical-activity program (i.e., positioned within the contemplator stage).

The results of this research also exhibit a significant difference between the stage of motivational readiness to change such behavior and age. The data supported the literature in that the youngest age-group (i.e., 18–20 years) evinced the highest proportion of respondents positioned within the latter two SMRC (Bellocco, Vaida, & Wolk, 2002; Brown & Frankel, 1993; Rudman, 1989; Seefeldt et al., 2002; Yancey et al., 2004). Specifically, 17.2% were characterized as within the action stage, while 46.6% exhibited positioning within the maintenance stage. In contrast, respondents within the 21 to 23 age-group were primarily weighted within either the precontemplator or contemplator stage—a trend that was repeated within each age category, with the exception of those 21 to 23 years of age. Finally, the data revealed that the stage of motivational readiness to change behavior toward increased leisure-time physical activity is indeed dependent upon income. This finding is consistent with a study conducted by Yancey and colleagues with a population sample of adults residing within Los Angeles County ($n = 8,353$). Of the total sample, 32% of those with incomes above the federal poverty level were found to be

sedentary, while 52% of those with incomes below the federal poverty level practiced such a lifestyle void of physical activity.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

The purpose of this study was to investigate the motivational readiness of college students to change their behavior toward increased physical activity during leisure time. Specifically, the research sought to determine whether there was a significant difference in motivational readiness to change stage position and ethnicity, gender, age, and income. The population consisted of 4,134 students from two Mississippi community colleges.

Five research questions were addressed in the study. The instrument used to determine the motivational readiness stage position was the Physical Activity Stages of Change Questionnaire (PASQ) originally developed by Bess H. Marcus and Leigh Ann Forsyth (Marcus & Forsyth, 2003). The PASQ consisted of four closed-end questions designed to characterize the stage position of the respondent through the reported level of leisure-time physical activity (see Appendix D). The first question determined if the respondent was physically active at the time of survey completion. The second question ascertained the intention of the respondent to increase physical activity within the following six month. The third query determined whether the participant was engaged in the prescribed amount of leisure-time physical activity at the time of survey completion, and the fourth question ascertained whether such activity had been consistent over the

preceding six months. The Pearson chi-square test for independence was used to determine significant differences. Statistical significance was determined at $\alpha = .05$.

Examination of the data revealed significant findings. First, a significant difference was found between the stage of motivational readiness to change stage position and gender. Specifically, a majority of males were classified as positioned within the action or maintenance SMRC with 55.9% evincing habitual leisure-time physical activity. In contrast the highest proportion of females (34.1%) was found to be merely considering the prospect of beginning a leisure-time physical-activity program (i.e., positioned within the contemplator stage); although 33.8% exhibited positioning within the maintenance stage. This finding is consistent with prior studies linking stage position with gender (Berrigan, Dodd, Troiano, Krebs-Smith, & Barbach, 2003; Brown & Frankel, 1993; Netz & Raviv, 2004).

Next, the results of the research exhibited significant difference between the stage of motivational readiness to change such behavior and age. The data supported the literature in that the youngest age-group (i.e., 18-20 years) evinced the highest proportion of respondents positioned within the latter two SMRC (Bellocco, Vaida, & Wolk, 2002; Brown & Frankel, 1993; Rudman, 1989, Yancey et al., 2004). Specifically, 17.2% were characterized as within the action stage, while 46.6% exhibited positioning within the maintenance stage. In contrast, respondents within the 21 to 21 age-group were primarily weighted within either the precontemplator or contemplator stage—a trend that was repeated within each category, with the exception of those 21 to 23 years of age.

The analysis for the final research question revealed that stage of motivational readiness to change behavior toward increased leisure-time physical activity is dependent upon income. However, a deviation from previous findings did occur with analysis of the data related to the study group between 24 and 26 years of age. A greater proportion of this subgroup (59.6%) was positioned within either the action or maintenance stages than was the case with the subgroup between 21 and 23 years of age, where 28.1% were positioned. This finding is consistent with a study conducted by Yancey (et al., 2004).

Overall, stage of motivational readiness to change leisure time physical activity was dependent upon age, gender, and income. In contrast, stage position was found to be independent of ethnicity. Specifically, the study revealed that 41.5% of African Americans and 58.2% of European Americans were positioned within the action and maintenance stages.

Conclusions

Five research questions were investigated in this study with a population of community-college students aged 18 or above.

Research Questions 1 and 2

Research Question 1 asked, “How many study participants are found within each stage of motivational readiness to change their behavior toward increased physical activity during leisure time?” Although the majority of students appeared to adhere to the leisure time physical activity requirements set forth by the American College of Sports Medicine (1995) and the U.S. Department of Health and Human Services (1996), 35% of the students were completely sedentary. Consequently, there appears to be a need for

stage-matched interventions because all individuals do not possess the identical motivational readiness to change behavior leading to increased leisure-time physical activity (Bock et al., 2001; Calfas et al., 1997; DiClemente et al., 1991; Etter & Sutton, 2002; Kim et al., 2004; Marcus, Rossi et al., 1992; Marcus, Selby, et al., 1992; Prochaska et al., 1992; Velicer et al., 1995).

Research Question 2 asked, “Does ethnicity appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” The results of this study paralleled the findings of past research indicating the existence of no significant difference between stage position and ethnicity, thus rendering stage position independent of ethnic background (Suminski & Petosa, 2002). European Americans were found to be the most active, followed by African Americans, Native Americans, and Hispanic Americans (see Table 7). This was consistent with the results reported within past research (Eaton et al., 1994; He & Baker, 2004; Robert & Reither, 2004; Yancey et al., 2004). However, the population sample of the current study did represent an unequal distribution across ethnic backgrounds. Specifically, the vast majority (67.7%) of respondents were European American. One explanation for this could be the lack of computer access among minority groups. Another could be a general lack of interest in physical activity among minority groups, perhaps rooted in cultural differences with respect to ideal body weight and the importance of physical activity.

In retrospect, a major limitation of this study was the failure to address the possible impact that cultural differences may have on social support (e.g., family and friends) during maintenance of a leisure-time physical-activity regimen—a phenomenon

supported within past research (Baltrus et al., 2005; Suminski & Petosa, 2002). The study also failed to address barriers to leisure-time physical activity inherent to various ethnic groups. For example, the lower representation of minority groups found within the three latter exercise stages could be due to geographical location. Past study has shown that minorities tend to live within disadvantaged communities that evince a greater degree of environmental barriers to leisure-time physical activity. These communities provide less opportunity to exercise (e.g., fitness centers, outdoor walking tracks/fitness trails); exhibit higher crime rates and inadequately lighted streets, which results in a fear of exercising outside the home environment; and are deficient in the availability of health professionals (Robert & Reither, 2004; Tai-Seale, 2003). Consequently, another limitation of this study was the failure to ascertain participant residency, in addition to respondent perception of barriers to physical activity within that location.

Research Questions 3 Through 5

Research Question 3 asked, “Does gender appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” Stage position is dependent upon gender. In addition, a greater proportion of males (55.9%) were positioned within the maintenance stage, while the largest proportion of women (34.1%) was positioned within the contemplation stage. However, 33.8% of females were positioned within the maintenance stage. Therefore, males tended to be more active during their leisure time than females (Berrigan et al., 2003; Brown & Frankel, 1993; Morrow et al., 1999; Netz & Raviv, 2004; Seefeldt et al., 2002). This discrepancy could have been due to individual influences. For example, a study of 2,298

adults between 18 and 78 years of age indicated that self-efficacy was the major barrier to women participating in leisure-time physical activity (Netz & Raviv, 2004). A longitudinal study of 4,795 students 15 to 16 years of age, conducted over a period of 3 years, found low self-esteem to be a major predictor of leisure-time physical activity (“Physical Activity,” 2002). It is also possible that the significant discrepancy was rooted in a lack of physical-activity opportunities. Regardless, research has shown that types of leisure-time physical activity differ according to gender (Eaton et al., 1994; “Physical Activity,” 2002). Therefore, the failure to address gender-specific barriers to leisure-time physical activity proved to be a major limitation of this current study.

Research Question 4 asked, “Does age appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” Motivational readiness is indeed dependent upon age. This finding is consistent with the results of past research (Bellocco et al., 2002; Brown & Frankel, 1993; Rudman, 1989; Seefeldt et al., 2002; Yancey et al., 2004). However, a deviation from previous findings did occur with analysis of the data related to the study group between 24 and 26 years of age. A greater proportion of this subgroup was positioned within either the action or maintenance stages than was the case with the subgroup between 21 and 23 years of age. A skewed distribution of the population by age category is suspected (i.e., the 18–20 age-group = 64.6%; see Table 9).

It is also possible that the described data abnormality could have been the result of a failure to collect information on determinants the literature has shown to be associated with age and leisure-time physical activity. For example, research conducted by Netz and

Raviv (2004) indicated that self-efficacy—mainly in females—is inversely related to the association between physical activity and increased age, while Rudman (1989) reported that motivation, work, and family obligations negatively influence adherence to a physical-activity regimen as age increases. It therefore seemed plausible that the “abnormal” age category could have experienced fewer of the traditional barriers faced by other age-groups because it was composed of primarily single males with no dependent responsibilities. A questionnaire accounting for these variables could have eliminated this abnormality.

Research Question 5 asked, “Does income appear to affect the stage of motivational readiness to change behavior toward increased physical activity during leisure time?” Motivational readiness is dependent upon income; although leisure-time physical activity decreased with rising income. This is inconsistent with the results reported within the literature of leisure-time physical activity decreasing as income decreases. This decrease is explained as members of lower income brackets experiencing a greater degree of external barriers to participation in leisure-time physical activity such as insufficient funds, lack of transport, or illness/disability (Chinn, White, Harland, Drinkwater, & Raybould, 1999; Lindstrom, Hanson, & Ostergren, 2001; Steenland, 1992; Yancey et al., 2004). The discrepant finding of this current study is viewed as a reflection of the skewed distribution of the population by income categories (i.e., participants earning \$0–\$10,000 in annual income = 76% of the total population). Additionally, the inconsistency is speculated to be a result of the context of the study. Because the population sample consisted of community-college students, it is quite possible that the

majority of respondents could have been living on campus or at home with their monetary and health care needs provided for them, thus negating the traditional barriers faced by members of lower socioeconomic groups.

Recommendations

The following recommendations for future study would enhance current knowledge toward increasing motivational readiness to change leisure-time physical activity stage position:

1. Enacting a targeted intervention program based upon the SMRC model with support from the health care community, while tracking student participants to determine the effects of the interventions, would provide additional significant data. Concurrently determining barriers (i.e., behavioral, environmental, physical, and psychological) to participation in leisure-time physical activity would increase the potential for success of the interventions.

2. Ascertain the position within the SMRC of adults within a community-college district via conducting a telephone survey. Perceived barriers to leisure-time physical activity, such as physical-activity opportunities, could be drawn concurrently. The results could also determine how an on-campus fitness center might reduce the proportion of obese adults within the sphere of influence of the respective college.

3. Implement the SMRC model to conduct a longitudinal study of community-college students. Coupled with existing research indicating that leisure-time physical activity decreases with age, participants could be tracked for a period of 3 years to determine any change in motivational readiness to progress in stage position.

4. Extend the survey implemented in the current study to various industries within the same districts while also ascertaining the attitudes of employers toward the obesity issue. Such a study could facilitate workforce fitness programs sponsored by the workforce development center of the local community college.

5. Develop regression models to determine combinations of variables (e.g., residency, marital status, and dependents) likely to predict motivational readiness to change behavior leading to increased leisure-time physical activity.

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APPENDIX A
MODERATE AND VIGOROUS ACTIVITIES

APPENDIX A

Moderate and Vigorous Activities

The following is in accordance with CDC and ACSM guidelines.

Moderate activity*	Vigorous activity+
Walking at a moderate or brisk pace of 3 to 4.5 mph on a level surface inside or outside, such as Walking to class, work, or the store; Walking for pleasure; Walking the dog; or Walking as a break from work. Walking downstairs or down a hill Racewalking – less than 5 mph Using crutches Hiking Roller skating or in-line skating at a leisurely pace	Racewalking and aerobic walking – 5 mph or faster Jogging or running Wheeling your wheelchair Walking and climbing briskly up a hill Backpacking Mountain climbing, rock climbing, rappelling Roller skating or in-line skating at a brisk pace
Bicycling 5 to 9 mph, level terrain, or with few hills Stationary bicycling – using moderate effort	Bicycling more than 10 mph or bicycling on steep uphill terrain Stationary bicycling – using vigorous effort
Aerobic dancing – high impact Water aerobics	Aerobic dancing – high impact Step aerobics Water jogging Teaching an aerobic dance class
Calisthenics - light Yoga Gymnastics General home exercises, light or moderate effort, getting up and down from the floor Jumping on a trampoline Using a stair climber machine at a light-to-moderate pace Using a rowing machine – with moderate effort	Calisthenics – push-ups, pull downs, vigorous effort Karate, judo, tae kwon do, jujitsu Jumping rope Performing jumping jacks Using a stair climber machine at a fast pace Using a row machine – with vigorous effort Using an arm cycling machine – with vigorous effort
Wight training and bodybuilding using free weights, Nautilus- or Universal-type weights	Circuit weight training
Boxing – punching bag	Boxing – in the ring, sparring Wrestling – competitive
Ballroom dancing Line dancing Square dancing Modern dancing, disco Ballet	Professional ballroom dancing – energetically Square dancing – energetically Fold dancing – energetically Clogging
Table tennis – competitive Tennis – doubles	Tennis – singles Wheelchair tennis
Golf, wheeling or carrying clubs	---

Note. From *Physical Activity for Everyone: Measuring Physical Activity Intensity. Metabolic Equivalent (MET) Level* (p. 2), by Centers for Disease Control and Prevention, 2005d. Retrieved September 7, 2005, from <http://www.cdc.gov/nccdphp/dnpa/physical/measuring/met.htm>

APPENDIX B
BODY-MASS INDEX TABLE

Appendix B

Body-Mass Index Table

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)	Body Weight (pounds)																
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

Note. From *Body Mass Index Table* (p. 1), by National Heart Lung and Blood Institute, 2005. Retrieved August 24, 2005, from http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.htm

APPENDIX C
PROCESS OF CHANGE

APPENDIX C

Process of Change

Cognitive strategies**Increasing knowledge**

Encourage your client to read and think about physical activity.

Being aware of risks

Provide your client with the message that being inactive is very unhealthy.

Caring about consequences to others

Encourage your client to recognize how his inactivity affects his family, friends, and co-workers.

Comprehending benefits

Help your client to understand the personal benefits of being physically active.

Increasing healthy opportunities

Help your client to increase her awareness of opportunities to be physically active.

Behavioral strategies**Substituting alternatives**

Encourage your client to participate in physical activity when she is tired, stressed, or unlikely to want to be physically active.

Enlisting social support

Encourage your client to find a family member, friend, or co-worker who is willing and able to provide support for being active.

Rewarding yourself

Encourage your client to praise himself and reward himself for being physically active.

Committing yourself

Encourage your client to make promises, plans, and commitments to be active.

Reminding yourself

Teach your client how to set up Reminders to be active, such as keeping comfortable shoes in the car and at the office, ready to be used at any time.

From “The Stages of Motivational Readiness for Change Model,” by B. Marcus and L. Forsyth, 2003. In S. Blair (Ed.), *Motivating People to be Physically Active* (p. 18), Champaign, IL: Human Kinetics. Copyright 2003 by Bess H. Marcus and Leigh Ann H. Forsyth. Reprinted with permission.

APPENDIX D
STUDY QUESTIONNAIRE

APPENDIX D
Study Questionnaire

Physical Active Stages of Change Questionnaire

Please answer the following questions that evaluate your motivation to participate in leisure-time physical activity. Consequently, your honest answers will place you in a motivation to participate in leisure-time physical activity stage position.

Demographics:

1. Which community college do you attend? East Central Copenhague-Lincoln
2. What is your gender? Male Female
3. What is your ethnic classification?
 - African-American
 - Caucasian
 - Hispanic
 - Native-American
 - Other
4. What is your age?
 - 18-20
 - 21-23
 - 24-26
 - 27-29
 - 30 and over
5. Are you currently employed? full time part time not currently employed

6. What is your yearly income range?

- 0-10,000
 10,001-30,000
 30,001-40,000
 Over 40,000

7. In your opinion, which of the following applies:

- I feel I am underweight
 I feel I am overweight
 I feel I am normal weight

Leisure-Time Physical Activity Behavior

For each of the following questions, please check YES or NO.

Physical Activity includes activities such as walking briskly, jogging, bicycling, swimming, participating in sports, or any other activity in which the exertion (breathing rate) is at least as intense as these activities.

Leisure-Time is defined as time spent away from the workplace.

1. I am currently physically active. YES NO

If you marked "YES" to Question #1, proceed to Question #3.
 If you marked "NO" to Question #1, proceed to Question #2

2. I intend to become more physically active in the next 6 months. YES NO

If you answered Question #2, now proceed to the Voluntary Consent Box.

For activity to be regular, it must add up to a total of 30 minutes or more per day and be done at least 5 days per week. For example, you could take one 30-minute walk or take three 10-minute walks for a daily total of 30 minutes.

3. I engage in regular (see definition above) physical activity. YES NO

If you marked "NO" to Question #3, proceed to the Voluntary Consent Box.
 If you marked "YES" to Question #3, proceed to Question #4.

4. I have been regularly physically active for the past 6 months. YES NO

Proceed to the Voluntary Consent Box.

Voluntary Consent Box

My participation in this study is completely voluntary. There is no penalty for not participating. I have the right to withdraw from this study before submitting my answers.

I agree to submit my answers.

I choose to withdraw

Submit

Reset

Scoring Algorithm

If (question 1 = 0 and question 2 = 0), then you are at stage 1.

If (question 1 = 0 and question 2 = 1), then you are at stage 2.

If (question 1 = 1 and question 3 = 0), then you are at stage 3.

If (question 1 = 1 and question 3 = 1), then you are at stage 4.

If (question 1 = 1, question 3 = 1, and question 4 = 1), then you are at stage 5.

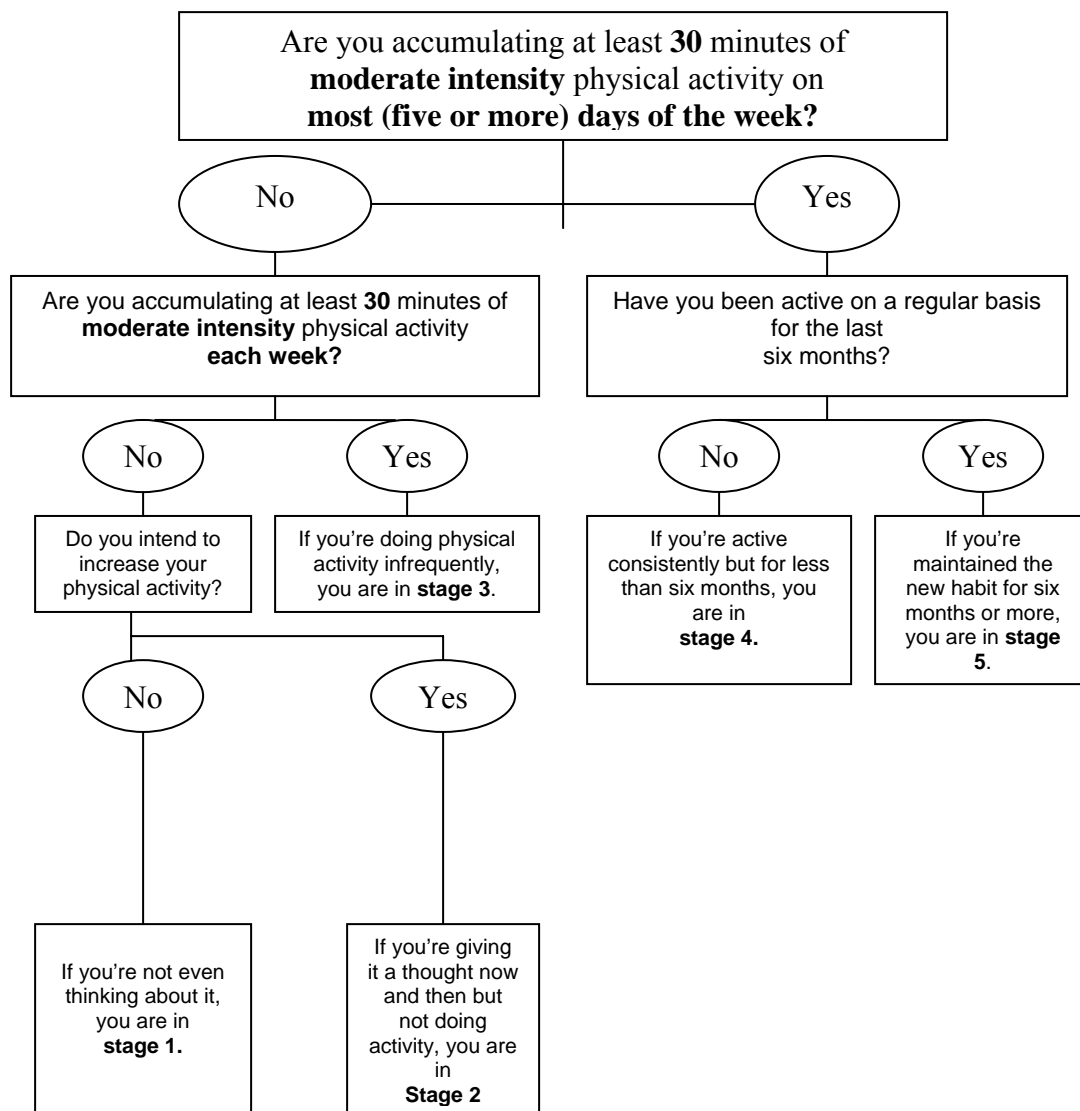
From “The Stages of Motivational Readiness for Change Model,” by B. Marcus and L. Forsyth, 2003. In S. Blair (Ed.), *Motivating People to be Physically Active* (p. 21), Champaign, IL: Human Kinetics. Copyright 2003 by Bess H. Marcus and Leigh Ann H. Forsyth. Reprinted with permission.

APPENDIX E

FLOWCHART FOR DETERMINING STAGE OF CHANGE

APPENDIX E

Flowchart for Determining Stage of Change



From “The Stages of Motivational Readiness for Change Model,” by B. Marcus and L. Forsyth, 2003. In S. Blair (Ed.), *Motivating People to be Physically Active* (p. 22), Champaign, IL: Human Kinetics. Copyright 2003 by Bess H. Marcus and Leigh Ann H. Forsyth. Reprinted with permission.

APPENDIX F
IRB PERMISSION LETTER

APPENDIX F

IRB Permission Letter



August 8, 2006

Phillip Crenshaw
3012 15th Place
Meridian, MS 39305

RE: IRB Study #06-196: The Obesity Epidemic Within the State of Mississippi: Motivational Readiness Toward Behavioral Change Increasing Physical Activity

Dear Mr. Crenshaw:

The above referenced project was reviewed and approved via administrative review on 8/8/2006 in accordance with 45 CFR 46.101(b)(2). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at anytime during the project period, to observe you and the additional researchers on this project.

Please refer to your IRB number (#06-196) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact me at jmiller@research.msstate.edu or 325-5220.

Sincerely,

A handwritten signature in black ink that reads "Jonathan E. Miller".

Jonathan E. Miller
IRB Administrator

cc: James E. Davis

Office of Regulatory Compliance

P. O. Box 6223 • 8A Morgan Street • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3294 • FAX (662) 325-8776

APPENDIX G
PERMISSION LETTERS

APPENDIX G

Permission Letters

EAST CENTRAL COMMUNITY COLLEGE

June 22, 2006

Mr. Phillip Crenshaw
East Central Community College
P.O. Box 129
Decatur, MS 39327

Dear Mr. Crenshaw:

After a review of your proposal, I grant permission for you to conduct your dissertation research at East Central Community College. Specifically, a cross-sectional survey that will seek to determine the physical activity levels of East Central students. I understand the survey instrument will be distributed via student e-mail accounts and that you have been assured by the web-based survey company that all responses will be anonymous.

Sincerely yours,



Phil A. Sutphin, Ed.D.
President

PAS/las

OFFICE OF THE PRESIDENT
P.O. BOX 129 • DECATUR, MISSISSIPPI • 39327
PHONE: 601-635-6200 • FAX: 601-635-4011

Jun 20 2006 2:50PM CoLin

643-8213

P. 1



Coppiah-Lincoln Community College

Office of the Executive
Vice President

TO: Mr. Phillip Crenshaw
FROM: *REN* Dr. Ronald E. Nettles, *Executive Vice President*
DATE: June 20, 2006
RE: Dissertation Research

This is to confirm our approval to allow you to perform an electronic survey via e-mail of Coppiah-Lincoln Community College students during the upcoming year. Your research has been approved for students enrolled on the Wesson Campus. It is my understanding that your research concerns obesity among community college students.

Please provide me with a copy of your survey instrument as soon as possible and prior to any contact with the students.

Good luck with your research.

REN:sla

cc: Dr. Howell C. Garner

Wesson Campus
P.O. Box 649
Wesson, Mississippi 39191
(601) 643-5101

Natchez Campus
11 Co-Lin Circle
Natchez, Mississippi 39120
(601) 442-9111

Simpson County Center
2612 Simpson Highway 49
Mendenhall, Mississippi 39114
(601) 849-5149

APPENDIX H
INTRODUCTION LETTER

APPENDIX H

Introduction Letter



Dear Student,

My name is **Phillip Crenshaw**. I am a doctoral student in the [Community College Leadership](#) program at [Mississippi State University](#). In addition, I am an instructor at [East Central Community College](#). If you are 18 years of age or above, I am inviting you to participate in a research project to study motivation to participate in leisure-time activities. Leisure-time physical activity consists of physical activity done while not at work, such as running, swimming, playing sports (e.g., basketball), and yard work, just to name a few. Along with this letter is a link to a [short questionnaire](#) that asks a variety of questions about your motivation to participate in leisure-time physical activity. I am asking you to look over the [questionnaire](#) and, if you choose to do so, complete it and click the submit button. It should take you about 5 minutes to complete the questionnaire.

The results of this project will be utilized to show the need of adult Mississippians to increase leisure-time physical activity participation in order to curb Mississippi's rising obesity rates. Through your participation - along with other Mississippi community college students - **I hope to show Mississippi community college presidents the need to implement various physical activity interventions at their respective institutions** that meet the various physical activity motivation levels of their student bodies; thus resulting in a healthier workforce.

I do not know of any risks to you if you decide to participate in this survey and I **guarantee that your responses cannot be linked to your e-mail addresses**. In other words, I will in no way have access to your identity, nor will anyone else. However, responses will be linked to individual schools and demographics (e.g., age). If you do not feel comfortable e-mailing your answers, then you may print the questionnaire after completion and mail it to the following address: Phillip Crenshaw, East Central Community College, P.O. Box 129, Decatur, MS 39327-0129.

Again, if you are 18 years of age or above, I hope you will take this brief moment of your time to complete the questionnaire and submit it. Your participation is voluntary and there is no penalty if you do not participate. In other words, the community college you are attending "does not" require you to complete this questionnaire. Also, once you begin to answer questions, you may choose to stop at any point. Again, your participation is completely voluntary and there is no penalty for refusing to participate.

It is very important that you complete this survey within the next 7 days. If you wish to contact me, I can be reached at East Central Community College at 601-635-6281, or pcrenshaw@eccc.edu.

Click the link below to begin the survey.

Sincerely,

Phillip Crenshaw

[LINK to Physical Activity Stages of Change Questionnaire](#)