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The Relationship Among Psychosocial and Environmental Determinants of Physical Activity, Physical Activity Levels, and Body Mass Index in Adolescent African American Females

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THE RELATIONSHIP AMONG PSYCHOSOCIAL AND ENVIRONMENTAL DETERMINANTS OF PHYSICAL ACTIVITY, PHYSICAL ACTIVITY LEVELS, AND BODY MASS INDEX IN ADOLESCENT AFRICAN AMERICAN FEMALES

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Dear friend,

I pray that you may enjoy good health and that all may go well with you,

even as your soul is getting along well.

3 John: 2

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Abstract

This study examined personal, social, and demographic factors related to physical activity (PA) level and body mass index (BMI) in adolescent African American (AA) females. The participants were 211 AA females from selected parochial schools in a city in the southern U.S. Participants completed the Physical Activity Determinant Scale (PADS: Mitchell & Kontos, 2002), the Three Day Physical Activity Recall (3DPAR: Weston, Petosa & Pate, 1997), the Leisure Time Exercise Questionnaire (LTEQ: Godin & Shepard, 1985), and demographic items. Height and weight measures were taken to assess BMI. Results from logistic regression indicated that the personal factor was a significant ($p<.001$, $ExpB=4.65$) predictor of PA level, and the social factor ($p<.05$, Exp$B=1.43$), age ($p<.05$, $ExpB=.74$), and age at menarche ($p<.05$, $ExpB=.80$) were significant predictors of low BMI for age. Results from ANOVA revealed that late maturers had significantly ($p<.05$) lower BMI scores, but were no more physically active than early and average maturers. Findings suggest that female adolescent AAs exert more control over personal PA factors, than social PA factors, such as peer pressure and sport socialization. Additionally, BMI was not related to PA for this sample, suggesting that BMI may be influenced by other factors not investigated in the current study. Based on these findings, potential interventions should focus on aspects of the personal factor for increasing PA in adolescent AA females. Future investigations are needed to further explore the relationship between personal, social, and demographic factors, and PA and BMI for adolescent AA females.

Chapter 1

Introduction

This study examined the relationships among personal and social factors that influence physical activity (PA), PA levels, and body mass index (BMI) in adolescent African American (AA) females in selected parochial schools in the southern U.S. Physical activity was used to describe both PA and exercise, as exercise is a subset of PA and much of adolescent AA females' PA is not represented by exercise. This chapter presents the problem, explains the purpose of this study, provides hypotheses, and limitations, as well as a definition of terms.

Statement of the Problem

Adolescence has been recognized as a critical period for overweight development in AA females (Wadden et al., 1990). Approximately 70% of overweight adolescent AA females become overweight adults (Felts, Tavasso, Chenier, & Dunn, 1992). The U.S. Department of Health and Human Services (1999) reported that as many as 16% of adolescent AA females are overweight. Becoming overweight is reflective of the overall shift towards positive energy balance (Troiano & Flegal, 1998), where dietary caloric intake equals or surpasses PA related caloric expenditure. Decreased levels of PA are an important contributor to overweight in adolescents (Kohl III & Hobbs, 1998).

Being overweight can lead to a number of social and health consequences for adolescents, many of which can continue into adulthood. Social consequences may include weight prejudice, a decreased number of years of advanced education, decreased family income, increased rates of poverty, and significantly lower rates of marriage (Dietz, 1998). Health

consequences may include unusual growth (e.g., increased height, advanced bone age, and maturation), hyperlipidemia, type II diabetes, hepatic steatosis, and cholelithiasis. Less common medical consequences like hypertension, pseudotumor cerebri, sleep apnea, orthopedic complications, and polycystic ovary disease may also be related to being overweight for adolescents (Dietz).

Regular PA has been promoted for adolescents under the assumption that such behavior will become part of their lives and will be continued into adulthood (Kohl III & Hobbs, 1998). Participation in PA can provide adolescents with many health and psychosocial benefits, such as (a) improved cardiovascular fitness, (b) improved bone and musculoskeletal health, (c) improved self-esteem and mental health, (d) decreased risk for becoming a school dropout, (e) decreased likelihood of becoming pregnant, and (f) decreased risk for becoming overweight (Patrick, Spear, Holt, & Sofka, 2001; U.S. Department of Health and Human Services, 1996). Despite these recognized PA benefits, during adolescence, PA levels diminish. Researchers have reported significantly less PA for adolescent females compared to males (Garcia et al., 1995; Kann et al., 1999; U.S. Department of Health and Human Services, 1996). Among female adolescents, AAs are less active than Caucasians (Troiano, Flegal, Kuczmarski, Campbell & Johnson, 1995; Brunner, 1996; Kann et al.; U.S. Department of Health and Human Services).

Nature of the Problem

Several possible explanations exist for why AA females become physically inactive during adolescence. One explanation relates PA to a variety of personal and social factors that influence PA in adolescence. Social Cognitive Theory (SCT: Bandura, 1986) has provided a useful perspective for understanding these personal and social factors. SCT contends that human behavior is determined by the interaction of people, behaviors, and the environment. These

personal and social factors shape the knowledge, attitudes, and most importantly, the behaviors of adolescent AA females. The attitudes and behaviors developed during adolescence influence the life-style and health habits of adulthood, creating long-term health implications (Elders & Hui, 1993). Knowledge, attitudes, and behaviors may affect numerous health habits, including PA participation (Sallis et al., 1992).

The current study on adolescent AA females examined the utility of SCT related to PA determinants. Bandura (1986) posits that multiple factors within SCT framework influence human behavior. Six key SCT constructs provided the theoretical framework for the development of the Physical Activity Determinant Scale (PADS: Mitchell, & Kontos, 2002), a 21-item personal and social scale (see Appendix A). The personal items of the questionnaire were devised using self-efficacy, behavioral capability, and environment. The social items were devised using observational learning, reinforcement, and outcome expectations. Using these constructs, SCT explains human behavior, based on adolescent's experiences (by observing the actions of others, and the results of those actions) and cognitions (personal, emotional, and biological events).

This study also investigated demographic factors as predictors of PA. They included (a) maturation status, (b) age, (c) socioeconomic status (SES), and (d) sports participation (see Demographic Information section of PADS in Appendix A). Demographic factors can also shape the behaviors of adolescent AA females. Malina (1996) suggests that maturation status is a determinant of PA for adolescent AA females due to a number of biological factors (e.g., including physique, stature, body weight, strength, and motor performance) and the influence of these factors on social circumstances related to PA. Specifically, early maturing adolescent females may be socialized out of sports/PA and late maturing adolescent females may be

socialized into sports/PA. This socialization reflects the linear physique, longer period of childhood extremity growth, and delayed or nonexistent social pressures of late maturers (LMs) compared to early maturers (EMs). Late maturers are also in developmental sequence with early maturing boys, who are likely to be physically active. In regard to BMI, late maturing girls are reported to have lower BMIs than early maturing girls (Malina). This assertion is based directly on late maturing girls' linear physiques and indirectly on their inclination toward PA. Physical activity has been found to be inversely related to age, and therefore, age can be a barrier to PA (Kann et al., 1999; U.S. Department of Health and Human Services, 1996). PA behaviors can be facilitated by higher SES (Lee & Cubbin, 2002; Tuinstra, Groothoff, van den Heuval, & Post, 1998) and sports participation (Bungum et al., 1999).

Significance of the Study

Tappe, Duda and Ehrnwald (1989) recommended that PA be an integral part of all adolescents' daily lives, and adolescence has been suggested as an important period for learning health-related behaviors that carry over into adulthood (Desmond, Price, Lock, Smith & Stewart, 1990; Anderssen & Wold, 1992). Moreover, PA and fitness have been important factors in the primary prevention of chronic disease in youth (Trost et al., 1996). Troiano & Flegal (1998) asserted that diet and PA represent modifiable behavioral aspects of overweight. Despite the multiple factors that contribute to overweight, and the complexity of the disease, intervention is possible.

Based on these recommendations, awareness and intervention during adolescence is important. Saunders et al. (1997) asserted that a better understanding of psychosocial and environmental determinants of PA for adolescents could improve interventions that promote lifelong PA. However, developing interventions for adolescent AA females is difficult, because

very little research has been conducted with this group. Before interventions can be tailored for adolescent AA females, identifying the factors that determine PA must occur.

Purpose of the Study

This study examined the relationships among personal, social, and demographic factors that influence PA, PA levels, and BMI in adolescent AA females in selected parochial middle and high schools in the southern U.S. Predictor variables were the determinants of PA and included personal and social factors. Relevant demographic factors were also assessed as predictors of PA and included maturation status (retrospective self-report of age at menarche), age, SES (based on eligibility for a free or reduced price lunch at school), and sports participation (defined as organized varsity, junior varsity, club, and recreational sport). Maturation status (see Definition of Terms) has been argued to be a potential predictor of PA based on the following reasons: (a) socialization into sport, (b) socialization away from sport, and (c) biological factors (Malina & Bouchard, 1991, chap. 11). Consequently, LMs were expected to be more physically active and of normal weight more than EMs. The outcome variables were PA level, and BMI.

The current study was designed to augment the limited body of knowledge and research related to the determinants of PA for adolescent AA females. This study also attempted to improve physical educators' understanding of the factors that could be used to design interventions (i.e., facilitation or removal of barriers) to increase PA among adolescent AA females. Ultimately, the results of the current study and its subsequent application may help frame new efforts to combat the rising overweight rates in the U.S. AA female population.

Hypotheses

The following hypotheses were tested in this study:

1. There will be a positive relationship between both personal and social factor scores that influence PA, and PA levels among adolescent AA females.
2. There will be a negative relationship between both personal and social factor scores that influence PA and BMI among adolescent AA females.
3. Adolescent AA females with high personal and social factor scores that influence PA will be more physically active than adolescent AA females with low personal and social factor scores that influence PA.
4. Adolescent AA females with high personal and social factor scores that influence PA will have lower BMI for age scores than adolescent AA females with low personal and social factor scores that influence PA.
5. Late maturing adolescent AA females will be more physically active and have lower BMI scores than both early and average maturing adolescent AA females.

Exploratory Research Questions

The following research questions were explored in this study:

1. Which demographic factors (i.e., age, SES, or sport participation) will be predictive of high PA level and low BMI for age?
2. Which of all the factors (i.e., continuous and categorical predictor variables) will be most predictive of high PA level and low BMI for age (i.e., categorical outcome variables)?

Limitations

The following factors were potential limitations to this study:

1. This study employed a cross-sectional design, which lacks the ability to show changes over time, making it weaker than longitudinal and true experimental designs.
2. Participant selection was voluntary and non-random, which creates the possibility of a subject self-selection effect, and therefore decreases the generalizability of findings.
3. All data, excluding BMI measures, were collected using self-report methods, which may not accurately reflect real values.
4. This study only suggested possible interventions based on the findings, and did not test an intervention.

Delimitations

The following factors delimited the scope of this study:

1. This study confined itself to data collection from adolescent AA females, aged 11 to 18 years in selected parochial schools in an urban area in the southern U.S.
2. Measurement of all predictor and descriptive variables was limited to a single, cross-sectional assessment.

Assumptions of the Study

The following assumptions were made for this study:

1. The written measures of self-reported determinants of PA and PA participation were valid for this adolescent AA female sample.
2. Social Cognitive Theory was valid for explaining adolescent AA female PA behaviors.
3. Adolescent AA females responded to all self-report measures honestly and accurately.

Abbreviations

3DPAR	Three Day Physical Activity Recall
AA	African American
AGFI	Adjusted Goodness of Fit Index
AMs	Average Maturers
BMI	Body Mass Index
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EMs	Early Maturers
GFI	Goodness of Fit Index
HBM	Health Belief Model
LMs	Late Maturers
LR	Logistic Regression
LTEQ	Leisure Time Exercise Questionnaire
MET	Metabolic Equivalent
MR	Multiple Regression
NFI	Normed Fit Index
NHANES	National Health and Nutrition Examination Survey
PA	Physical Activity
PADS	Physical Activity Determinants Scale
PDPAR	Previous Day Physical Activity Recall
RMSEA	Root Mean Square Error of Approximation
SCT	Social Cognitive Theory

SES	Socioeconomic Status
SI PA	Sweat-inducing Physical Activity
SMC	Squared Multiple Correlation
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action

Definition of Terms

Adolescence	The period of life beginning with puberty and ending with completed growth and physical maturity, typically comprising the ages between 8 and 19 years for females (Malina & Bouchard, 1991, chap. 1).
Body Mass Index (BMI)	The ratio of body weight in kilograms to height in meters squared (Ellis, Abrams, & Wong, 1999).
Determinants	Multiple influences on PA, and are either facilitators or barriers to PA (Sallis, Zakarian, Hovell, & Hofstetter, 1996). Determinants can be classified into three categories: physiological, environmental, and psychosocial.
Maturation Status	Maturity can be classified into three levels. Early Maturing is reaching menarche at 10 years of age or younger. Average Maturing is reaching menarche at 11 to 12 years of age. Late Maturing is reaching menarche at 13 or more years of age.
Metabolic Equivalent (MET)	The energy expenditure for sitting calmly, which is approximately equal to 3.5 ml oxygen per kg of body weight (Trost et al., 1996).

Overweight	Adolescents with BMIs greater than or equal to the 95th percentile (*P*) of a reference population based on age, gender, or other group characteristics (Troiano & Flegal, 1998).
Personal Factors	Determinants of PA that are particular to an individual.
Physical Activity (PA)	Any activity that results in hard breathing and a rapid heart rate (Kohl III & Hobbs, 1998).
Social Factors	Determinants of PA that are influenced by an individual's social surroundings.

Chapter II

Review of Literature

This literature review provided support for this study on determinants of PA among adolescent AA females. This chapter explored and summarized relevant literature related to determinants of PA in children and adolescents, determinants of PA in adolescent AA females, and demographic determinants of PA. Next, the theoretical perspective including SCT was presented and followed by a comparison of SCT to other theories of behavior change. Lastly, measurement of PA was explored, specifically measurement of children and adolescents, and measurement issues with children and adolescents. Following the initial review, a follow-up literature review was conducted to include recently published literature, however, no relevant literature was located.

Review of Relevant Literature

Determinants of physical activity. Determinants of PA are either facilitators or barriers to PA (Sallis et al., 1996). As facilitators or barriers, determinants can encourage or limit PA. Facilitators include factors that promote PA (e.g., providing access to sporting facilities or equipment), or may involve the reduction of factors that limit PA (e.g., taking television time away from an adolescent). A barrier is an obstacle or impediment to PA participation.

Several categories of determinants of PA exist, and they are complex and multifactorial (Gottlieb & Chen, 1985). Determinants may be classified into one of three categories: (a) physiological, (b) environmental, and (c) psychosocial. Research has demonstrated the importance of the physiological determinants of PA such as age and gender; however, less is

known about the modifiable psychosocial and environmental determinants of PA in adolescents (Pate et al, 1997). Fewer studies have focused on AAs, therefore even less is known regarding determinants in adolescent AA females.

Trost, Pate, Ward, Saunders, & Riner (1999) recognized the paucity of research among AAs and suggested the psychosocial and environmental factors associated with PA participation in other groups of children and adolescents are equally influential for AAs. To further examine what is known and understood about psychosocial and environmental determinants of PA in adolescent AA females, this review included findings from various groups that are similar in age, and gender to adolescent AA females.

Determinants of physical activity in children and adolescents. Kohl III & Hobbs (1998) reviewed evidence of potential determinants of PA for children and adolescents. They suggested that self-efficacy is correlated to PA behavior and has been shown to predict weekly PA involvement in school-based adolescents up to four months after initial measurements. Kohl III and Hobbs also indicated that personal beliefs (including perceived benefits and risks to attempting the behavior), as well as perceived barriers (which impede behavior), are closely related to self-efficacy. If identified, they argued, perceived barriers could provide a foundation for the development of targeted interventions. Tappe et al. (1989) examined the perceived barriers toward PA among a sample of youth and found that females were more likely than males to report unsuitable weather, lack of desire or interest, and school or schoolwork as barriers to PA.

Kohl III and Hobbs (1998) and Zakarian, Hovell, Hofstetter, Sallis and Keating (1994) noted that parents appear to be a strong influence on their children's PA behavior. This influence may be due to either a supportive, nurturing environment (directly), modeling

(indirectly), or an interaction of the two (Kohl III & Hobbs). Children with two physically active parents were reported to be almost six times more active than children with two inactive parents (Moore et al., 1991). In fact, PA among girls may be more highly correlated with parental activity than PA among boys (Gottlieb & Chen, 1985). However, during adolescence, parental influence on PA in children may be replaced by peer influence (Kohl III & Hobbs). Anderssen and Wold (1992) found that for females, the influence of a best friend was more strongly associated with PA behavior than parental influence. According to Kohl III & Hobbs, peer influence may be more available to boys, which would help to explain the rapid decline in PA involvement among girls as they move into adolescence. Conversely, Pate et al. (1997) found that for rural youth, perceived activity levels of parents and peers where not significantly associated with moderate or vigorous PA.

Pate et al. (1997), Kohl III & Hobbs (1998), and Trost et al. (1999) found similar results related to self-efficacy. They observed that low-level self-efficacy was associated with low PA status. Comparably, Zakarian et al. (1994) tested psychological, social, and environmental determinants of vigorous PA in multi-ethnic high school students. For females, they found that high self-efficacy, family support, and perceived benefits of PA were all significant variables which related positively to measures of vigorous PA. Similarly, Biddle and Goudas (1996) tested relationships between adult encouragement of PA, key SCT variables and self-reported strenuous PA. The authors reported that strenuous PA was significantly associated with adult encouragement, intentions, and perceived sports competence in youth. Knowledge of benefits of PA was not reported to be a predictor of PA or PA intentions in the study.

Ferguson, Yesalis, Pomrehn and Kirkpatrick (1989) attempted to determine whether students' attitudes toward PA and beliefs about themselves were related to current PA behavior

and PA intent. Their results contradict Biddle and Goudas (1996). Ferguson et al. reported that students' perceived benefits of PA, self-esteem, perceived athletic ability, and belief in one's ability to maintain commitments all correlated significantly and positively with PA intent.

Determinants of physical activity in adolescent African American females. To address the gaps in the literature related to the lack of studies specifically focusing on determinants of PA for urban, AA children, Trost et al. (1999) compared determinants of PA in active and low-active 6th grade AA students. Psychosocial variables included self-efficacy, social influences regarding PA, and beliefs regarding PA outcomes. Perceived PA behavior of parents and peers (active vs. low-active) were included as environmental variables.

Trost et al. (1999) found that compared to low-active girls, active girls demonstrated significantly higher levels of self-efficacy, and significantly higher marks on beliefs regarding PA outcomes. Findings suggested that the psychosocial and environmental elements associated with PA participation in other groups of children and adolescents are also important to AA 6th graders.

Bungum, Pate, Dowda, and Vincent (1999) reported that family support and enjoying physical activities were significant predictors of moderate intensity PA among adolescent AA females. They also found that self-efficacy was not a predictor of vigorous PA for adolescent AA females, but was a predictor of moderate intensity PA among the same group of females.

Demographic determinants of physical activity. Maturation status, age, SES, and sports participation were assessed as predictors of PA for adolescent AA females. According to Malina (1996), EMs may be socialized out of sports due to new and influential social roles (e.g., sexual/dating pressure), as well as novel interests (e.g., status in an older social group that may be dependent upon femininity). In addition, EMs have physiques that are not ideal for success in

sports. They have a lateral build, shorter legs, broader hips, more breast development, and higher BMIs. Conversely, LMs may be socialized into sports because they tend to be more skilled, due to the opportunity to continue in sport. Their physiques are more linear with longer legs, narrower hips, and they have lower BMIs. Late maturers may also have higher self-esteem levels, because of early success in sports, which heighten motivational levels for PA.

Several studies indicated PA level decreases with age in adolescent AA females (Kann et al., 1999; U.S. Department of Health and Human Services, 1996). Lee and Cubbin (2002) and Tuinstra et al. (1998) found that lower SES was associated with less PA in adolescents than higher SES adolescents. Bungum et al. (1999) reported that school sport participation was associated with vigorous PA among adolescent AA females. Given the aforementioned studies, one could hypothesize the following regarding demographic determinants of PA and adolescent AA females: (a) as age at menarche increases, PA level increases; (b) as age increases, PA level decreases; (c) as SES increases, PA level increases; and (d) as sports participation increases, PA level increases.

Summary. Reviewed literature demonstrated that there is a limited body of knowledge regarding psychosocial and environmental determinants of PA in children and adolescents. It is thought that a variety of factors may affect PA participation in adolescent AA females. Likely determinants of PA in adolescents included self-efficacy, peer influences, enjoying PA, and beliefs and benefits related to PA outcomes. Other possible determinants of PA included maturation status, age, SES, and sport participation. Clearly, adolescent AA females are under-represented in the research literature.

Theoretical Perspective

Social Cognitive Theory. Social Learning Theory (Bandura, 1977) introduced the idea of cognition into the early theories of behaviorism, which previously focused on observable and measurable variables (e.g., response consequences) rather than what was internal or unobservable (e.g., mental states). These cognitions regulate human behavior, and response consequences of human behavior are used to form outcome expectations.

Social Cognitive Theory (Bandura, 1986), which was the result of an expansion from Social Learning Theory, posits that human behavior is determined by the dynamic, bi-directional interaction of the person (cognition, emotion, and biological events), the behavior, and the environment in which the behavior is performed or changed. Bandura believed that people are active shapers of their environments rather than merely inactive reactors to their environments, and that people and the world shape each other. He argued that people build, modify, and destroy environments, and they produce changes in environmental conditions which affect both behavior and the nature of their upcoming lives. Reciprocal determinism refers to the triadic relationship between behavior, the environment, and cognitive factors as they operate interactively as determinants of each other. These interactions are dependent upon one another, but are not necessarily equal in strength and magnitude. In fact, these interactions may be different based on each person, behavior, and environmental situation (Bandura, 1986).

Individuals are defined within the SCT perspective in terms of five basic capabilities. Symbolizing capability creates internal models that serve as guides for future action. Forethought is purposive or goal-directed behavior, which allows individuals to guide their actions anticipatorily. Self-regulatory capability allows direct control over one's behavior, and self-reflective capability allows one to analyze and evaluate their own thoughts. Lastly,

vicarious capability allows learning by observation, rather than by performing and experiencing effects. These capabilities provide the basis for observational learning, behavioral capability, outcome expectations, environment, reinforcement, and self-efficacy (see Table 1).

Comparison of SCT to Other Theories Explaining Behavior Change

Although several theories of health behavior (e.g., Health Belief Model, Theory of Planned Behavior, Theory of Reasoned Action, & Transtheoretical Model) could have been applied to this study, SCT (Bandura, 1986) was the most applicable and comprehensive. SCT has been widely used to explain human behavior and has been applied in a variety of health promotion and health behavior studies (Biddle & Goudas, 1996; Bungum & Vincent, 1997; Ferguson et al., 1989; Pate et al., 1997; Reynolds et al., 1990). A critical comparison of SCT to other health behavior change theories follow, providing the rationale for employing SCT in this study.

Health Belief Model. The Health Belief Model (HBM) attempts to predict and explain health behaviors by concentrating on individual's attitudes and beliefs. The model was developed in the 1950s as part of an effort by the United States Public Health Service to explain the lack of communal participation in health screening and prevention programs (e.g., a free and conveniently located tuberculosis screening project; Janz & Becker, 1984). According to the model, an individual's behavior depends primarily upon three variables: (a) the value placed by an individual on a particular goal, (b) an individual's appraisal of the likelihood that a given action will achieve that goal, and (c) an individual's appraisal of the likelihood of getting a health condition. In 1988, self-efficacy was added to the HBM to improve its explanatory power (Rosenstock, Strecher, & Becker, 1988).

Table 1

Summary and Description of Social Cognitive Theory Constructs

Construct	Summary & Description
Observational Learning	Enables people to expand their knowledge and skills based on information exhibited and authored by others.
Behavioral Capability	Is accomplished through mastery learning. Provides cognitive knowledge for the behavior, practice in performing the behavior, and feedback to refine positive behavioral performance until the person can perform at an acceptable level (Glanz, Lewis, & Rimer, 1997).
Outcome Expectations	Judgments of the likely consequences that a behavior will produce.
Environment	Originally a component of reciprocal determinism and is an external stimulation for individuals (Bandura, 1978).
Reinforcement	Responses to personal behavior that increase or decrease the likelihood of reoccurrence (Glanz et al.).
Self-Efficacy	Judgment of what one can accomplish with one's skills. Past performance accomplishments are the most influential source of self-efficacy information since they are based on one's own mastery experiences of behavior. If experiences are viewed as successes, self-efficacy beliefs will increase.

Note. Adapted from "Social Foundations of Thought and Action: A Social Cognitive Theory," by A. Bandura, 1986, New Jersey: Prentice-Hall Inc.

There are several limitations to the HBM. The model does not account for the environmental and economic factors that may influence health behaviors, and in terms of decisions on health behaviors, the model does not include social norms or peer influences (Rosenstock, Strecher, & Becker, 1994). However, if the present study on adolescent AA females had tested an intervention, and compliance to that intervention was low, the model could potentially be employed to explain the occurrence.

Theory of Reasoned Action. The Theory of Reasoned Action (TRA: Ajzen & Fishbein, 1980) posited that the intent to adopt a given behavior by an individual is determined by both the individual's attitude towards performing the behavior in question, and the influence of perceived social norms upon performance of the behavior. Attitude is a function of the beliefs concerning the perceived consequences of carrying out a specific action and a personal evaluation of each of these consequences. Social norms are determined by the perceived expectations of salient referent individuals or groups (the normative belief), and by the individual's motivation to comply with the expectations of significant others (friends, spouse, family physician, etc.). The TRA was expanded with the addition of perceived behavioral control and re-named the Theory of Planned Behavior (Ajzen, 1988). Perceived behavioral control reflects personal beliefs as to how beliefs about resources and opportunities may be viewed.

Despite the addition of perceived behavioral control, the theory still has limitations. It does not address the dynamic nature of behavior. The theory only accounts for the societal influence of the environment, thus neglecting the individual's behavior, personal knowledge, and the environment as a whole. Additionally, the constructs of SCT encompass those of the TPB. For example, attitude would be referred to as outcome expectations, and perceived behavioral control would be a component of self-efficacy.

Transtheoretical Model. The fundamental principles of the Transtheoretical Model (Prochaska, Norcross, & DiClemente, 1994) are that behavior change is not a process or an event, and that individuals are at varying levels of motivation for readiness to change. It describes change as a circular model, where individuals can exit and enter the readiness cycle at any point and can move forward and backward at any time in the cycle. Individuals at different points in the process of change can benefit from different interventions, matched to their stage of readiness. The general limitation of the model is that it does not attempt to explain human behavior, but merely assesses individual's readiness to change. The model may be used to tailor interventions for those identified in a particular stage of behavioral change.

Summary. Social Cognitive Theory (Bandura, 1986) is one of the most comprehensive theories of human behavior. It posits that human functioning is determined by the dynamic interaction of individual's behavior, personal factors (cognition, emotion, and biological events), and the environment. The concepts of SCT encompass those of the HBM and the TPB, thus providing an appropriate framework for this study on determinants of PA for adolescent AA females.

Measurement of Physical Activity

Kohl III and Hobbs (1998) stated that there is a lack of available data on predictors of PA in children and adolescents. They asserted that of what does exist, there are weak associations in PA behavior determinants research. One likely reason for limited research on children and adolescents is the difficulty of precise assessment of PA (Kohl III & Hobbs).

Measurement in children and adolescents. Valid and reliable assessment of PA in children and adolescents has been essential to research the determinants of PA. Physical activity has been a complex construct to measure due to its varied nature, making it extremely difficult to

characterize and quantify (Goran, 1998). According to Goran, important elements to consider when defining PA assessment include: (a) type and purpose of PA, (b) intensity, (c) efficiency, (e) duration, (f) frequency, and (g) specific energy cost of the performed activity. A variety of methods are available for assessment of PA. They include self-report and proxy report measures, observational measures, motion sensors, and heart rate monitors.

Self-report measures such as self-administered questionnaires, interview questionnaires, and diaries have been the most common form of assessment (Pate, 1993). They have been used to gather recall information about PA, across time frames such as such as the past one or seven days, or the past month or year. Also, time, frequency of participation, and estimated energy expenditure for PA have been derived from these assessments. Self-report measures have also been carried out by proxy reports completed by parents and teachers (Pate).

An advantage to self-report measures is their low cost, which makes them feasible to use with large samples. The disadvantages of self-report measures include recall limitations, subjectivity in responses to the instrument (Pate, 1993), and difficulties associated with translating qualitative information (e.g., 15 minutes basketball) into quantitative data (e.g. kcal per PA session; Goran, 1998). Kohl III & Hobbs (1998) have recommended against the use of self-report measures with children, however, Weston, Petosa & Pate, (1997) have demonstrated promising results with validation efforts of the Previous Day Physical Activity Recall (PDPAR). They concluded that the instrument yields reliable and valid scores for samples of children and adolescents, and can be used in PA assessment.

Observational measures are costly and time-consuming, yet they typically yield reliable data. These involve systematic observations of children conducted in home, school, or recreational settings (Pate, 1993). Physical activity is rated using categories and is either

manually recorded on a coding form or entered directly into a computer file. Observational methods furnish the opportunity to record information on the specific mode of the activity, as well as the physical and social environment in which the activity occurred (Pate).

One approach to measuring PA involves the direct analysis of motion. Pedometers and accelerometers represent two common measures used in the direct analysis of motion (Goran, 1998). Pedometers record the number of steps taken by a person, but are not very reliable when measuring slow and fast walkers. Accelerometry is based on the theoretic relationship between muscular force and body acceleration that takes place during distinct physical movements.

Heart rate has been linearly related to power output making heart rate monitors a potentially useful measure of PA. This measure avoids problems with recall and subjectivity, and is cost efficient (Pate, 1993). According to Pate, heart rate is easily measured using lightweight telemetry devices that transmit a pulse to a storage receiver which may be worn on the wrist. However, it is necessary to calibrate it for each individual, as heart rate varies with body size, age, and physical fitness.

Although a variety of methods are available for assessment of PA, none can be considered reliable measures by the six aspects previously mentioned by Goran (1998). Observational measures have been identified as the preferred method to assess PA type, but lack the ability to measure intensity due to the variety of levels of physical fitness in individuals. Observational measures also do not measure specific energy cost of the performed activity. Motion sensors and heart rate monitors are not very efficient (children tamper with or do not consistently wear them), cannot record type and purpose of PA, and are of limited use in converting the movement information into energy expenditure (Goran). Self-report measures are limited in how they measure intensity, efficiency, duration, frequency, and specific energy cost

of the performed activity because of subjectivity. Furthermore, Kohl III & Hobbs (1998) noted that it is difficult to assess PA accurately in children and adolescents, and Pate (1993) added that there are definite gaps in the research about how to best assess this behavior in children and adolescents.

Measurement issues with children and adolescents. The first consideration in selecting a measurement method should be the extent to which the method yields valid and reliable scores (Baranowski et al., 1992). A problem and major limitation of PA assessment in children and adolescents is the lack of accurate, well-validated measures of PA (Pate, 1993; Weston et al., 1997). Contributing to the validation problem has been the lack of an ideal standard (Goran, 1998). With an identified "gold standard," attempts to validate instruments could be more successful (Pate).

Assessment validity and reliability are associated with many challenges, including (a) understanding questions, (b) estimating duration, (c) estimating intensity, (d) estimating frequency, (e) adding & averaging, (f) selective recall, (g) parental recall, (h) incompleteness of activity menu, and (i) discrimination at high values (Baranowski et al., 1992). Trost et al. (1999) acknowledged problems associated with self-report measures of PA and utilized a uniaxial accelerometer device in their research. Moore et al. (1991) also utilized an accelerometer, because similar studies reported problems with self-report measures. Anderssen and Wold (1991), and Biddle and Goudas (1996) both used self-report measures in their studies, and both reported the use as a limitation in their studies. Biddle and Goudas reported the limitation because of the possibility of recall bias. Baranowski et al. (1992); Goran (1998); Kohl III and Hobbs, (1998); and Moore et al. (1991) all reported self-report measures as inappropriate for children.

Beyond the assessment problems related to validity and reliability, challenges include (a) precision issues (e.g., method sufficient for study purpose), (b) sufficient time periods are sampled to provide reliable estimates of habitual behavior, (c) human behavior being reactive to the method, (d) appropriateness issues (i.e., developmental, ethnic, regional characteristics of the sample), (e) implementation concerns (i.e., theoretical protocols & procedures, and respondent & staff burdens), and (f) cost (Baranowski et al., 1992).

Conclusion. It is realized that the level of knowledge and understanding needed for accurate measurement of PA will not be attained without careful consideration given to the many issues related to assessment that this review has revealed. For determinant research to advance, the problems (e.g., understanding questions, & precision issues) associated with all measures (i.e., self-report, observational, analysis of motion, & heart rate) will require future researchers to devote time and effort to the validation of these instruments. All methods of PA assessment have shortcomings, however, self-report methods appear to be the most common and practical method used with children and adolescents, because they are easy to use, cost-efficient, and various instruments have demonstrated validity and reliability (see Measurement of Physical Activity section of Chapter III) among the many assessment challenges.

Chapter III

Research Design

This study employed a cross-sectional design. This chapter describes the research design for this study, including the pilot study, all measures, procedures, and statistical analyses. The personal and social determinants of PA among adolescent AA females were explored using self-reported questionnaires. The predictor variables were personal, social, and demographic factors. The personal factor was devised from the SCT constructs self-efficacy, behavioral capability, and environment. The social factor was devised from the SCT constructs outcome expectations, reinforcement, and observational learning. Demographic factors included maturation status, age, SES, and sports participation. The outcome variables were self-reported PA level, and BMI determined by objective measure of the participants' weight and height.

Pilot Study

The purpose of the pilot study was to evaluate the measures and procedures utilized in this study. Instruments were evaluated to assess clarity, readability, cultural and age appropriateness, and approximate time for completion with participants from the study's proposed sample. The piloted instruments included: the Physical Activity Determinants Scale (PADS: Mitchell & Kontos, 2002); the Demographic Information Questionnaire; the Three Day Physical Activity Recall Scale (3DPAR: Weston et al. 1997); the Leisure-Time Exercise Questionnaire (LTEQ: Godin & Shepard, 1985); and the maturation (age at menarche) and BMI (height and weight) measures. A trained female assistant conducted all height and weight measures using a field anthropometer and digital weight scale.

Participants. Participants were (n=15) adolescent AA females currently enrolled in 8th and 11th grade physical education classes at an urban girl's parochial school in the southern U.S. The mean age was 14.33 (SD=1.68) with a range of 12 to 16 years. Consent and measurement procedures were approved by the University of New Orleans Human Subjects Committee. Parental/guardian and subject consent were obtained for each participant before participation in the pilot study.

Procedures. The 15 participants were divided into two groups based on their grade classification. The investigator provided instructions for the 11th graders (n=8), and they were asked to complete the questionnaire booklet. After completion of the booklet, participants were then asked to complete a post-test questionnaire, and to participate in a focus group for debriefing. Participants were asked a series of open-ended questions to evaluate administration procedures and content (Vaughn, Schumm, & Sinagub, 1996, chap.3). The female assistant completed height and weight measures for each participant. On the next day, the procedures were repeated for the 8th graders (n=7). Frequency counts were used to analyze post-test questionnaires. Focus group information was transcribed, categorized, and summarized. Data were presented to a dissertation committee co-chair for expert opinion.

Results. In general, all 15 participants indicated that the questionnaire and instructions were easy to understand and follow. However, two of the 8th grade participants indicated that the questionnaire took longer than they expected to complete. The 15 participants completed the questionnaire within 45 minutes of commencement, which was within the expected time parameters. One participant completed the questionnaire in 15 minutes. The majority (n=14) of participants completed the questionnaire within 25 minutes.

When asked, “How frustrating was it to complete the questionnaire?”, the majority of the participants responded that it was not frustrating. When asked, “On a scale from one to five, with five being the hardest; how hard was it?”, all respondents stated, “one,” thus the majority of participants indicated that the questionnaire was easy. The majority of respondents also indicated that the way the investigator explained the instructions was “good.” Based on the responses, “The way you did it,” and “You gave examples,” they were indicating that they understood the mix of examples, instruction reading, and instruction interpretation. When asked, “If there was anything that you could change about the questionnaire, what would you change?”, some of the participants said “Nothing should be changed,” however, other participants stated, “[You] could have had everything on one page,” and “There was a lot of looking back and forth.” Participants were referring to pages 8 and 9 of the questionnaire booklet, the intensity scale and the coding instructions sheet, respectively. They were instructed to refer to these pages when completing the 3DPAR.

Implications. Based on the results, the questionnaire appeared to be clear and readable, age appropriate for the proposed sample, and able to be completed in a timely manner. Based on participant comments regarding changing the questionnaire, along with having to frequently refer to pages 8 and 9 to complete the questionnaire, these pages were removed from the questionnaire booklet and presented as a handout. These amendments were discussed with participants and they agreed that this change would be an improvement. There were no major height and weight measurement issues for the assistant or participants, and measures and procedures were reliable. Results were shared with a dissertation committee co-chair for expert opinion. It was agreed that these results met the necessary requirements to continue with the study.

Participants

Participants were (*N*=217) middle and high school AA females enrolled in two urban girl's parochial schools in the southern U.S. Participants were voluntarily recruited and selected. Students were informed that participation was voluntary and confidential, and that they could withdraw at any time without penalty. Prior to involvement, all participants and parent/guardians were asked to read and sign consent forms indicating the study purpose and procedures. The mean participant age was 15.26 (*SD*=1.72) with a range of 10 to 18 years. Participant school grade classification ranged from 6 to 12 years. Inferential statistical analyses were conducted with data from participants who met the inclusion criteria. Five participants were eliminated from the study due to partial completion of the questionnaire booklet or being younger than 11 years of age (i.e., pre-menarcheal). One participant was eliminated due to reporting Latina as her racial/ethnic group.

Measures

Demographics. Participants were classified into three groups based on their maturation status: (a) EM, (b) AM, and (c) LM adolescent AA females (see Table 2). Maturity was assessed using a retrospective self-report of menarche (i.e., age of first menstrual cycle; Malina, 1996; see Appendix A). Four questionnaire items (see Appendix A) were used to assess the following demographic information regarding participants: (a) age, (b) SES (based on eligibility for a free or reduced price lunch at school), and (c) sport participation (organized such as varsity, junior varsity, club, or recreational sport. Based on SES and sports participation, participants were classified in low and high SES groups, and yes and no sports participation groups (see Table 2).

Determinants of physical activity. The PADS was developed for this study and used to measure personal and social factors related to PA. The 21-item scale required participants to rate

their responses on a six-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*). This scale range was selected to reduce the tendency of respondents to select the central response. The scale contained 16 personal items and 5 social items.

Table 2

Group Classification and Description for Demographic Factors

Demographic	Group Classification (description)
Maturation Status	1) EM (reaching menarche at 10 years of age or younger). 2) AM (reaching menarche at 11 to 12 years of age). 3) LM (reaching menarche at 13 or more years of age).
SES	1) Low SES (eligible to receive free or reduced price lunch at school). 2) High SES (not eligible to receive free or reduced price lunch at school).
Sports Participation	1) Yes Sports Participation (student presently participates in sports, or has participated in sports in the past). 2) No Sports Participation (student has not and is not participating in sports).

Note. EM = early maturers; AM = average maturers; LM = late maturers; SES = socioeconomic status.

The results of the preliminary investigation that developed the PADS revealed sufficient factor loadings (λ: see Tables 3-4) for two first-order factors. The factors were named personal and social, respectively. The personal factor significantly contributed to the variance of 16 items (see Table 3), and the social factor II significantly contributed to the variance of 5 items (see Table 4). Using Cronbach's Alpha, the internal reliability of the scale for the sample was .88.

The reliabilities were .89 for the personal factor, and .74 for the social factor. Inter-item correlations ranged from .14 to .54 for the personal factor, and from .26 to .48 for the social factor.

Table 3

Personal Factor Loadings (λ)

Item	λ
I am confident that I can do PAs 3 times per week for the next 6 months.	.58
I am capable of doing most PAs.	.53
My physical surroundings provide me with the opportunity to do PAs.	.42
I am confident that I can do PAs even when I'm feeling down.	.59
I can do PAs when the weather is bad.	.55
I am confident that I can do PAs no matter how stressed I feel.	.60
I can safely do PAs at these facilities (gym, park, recreation center).	.59
I am confident that I can do PAs no matter how busy I am.	.47
I can do PAs when it is hot outside.	.63
I am confident that I can do PAs even when my friends criticize me for it.	.53
I am confident that I can do PAs even when I'd rather be doing something else.	.69
I can safely do PAs in my neighborhood.	.45
I am confident that I can do PAs 5 times per week for the next 6 months.	.61
I can safely do PAs at my school.	.59
I can do PAs when it is cold outside.	.68
I can travel (by car, bike, bus, or walk) to places where I can be physically active.	.53

Note. PA = physical activity.

Table 4

Social Factor Loadings (λ)

Item	λ
I do PAs to be popular.	.61
I do PAs to gain the approval of others.	.66
My PAs are influenced by my neighbors.	.64
My PAs are influenced by the media (TV, radio, magazines).	.46
I do PAs to impress others.	.58

Note. PA = physical activity.

Measurement of physical activity. A modified version of the self-report PDPAR (Weston et al. 1997) scale was used to measure PA for this study (see Appendix A). Utilizing the 3-Day version of the Physical Activity Recall scale may reduce some of the recall limitations of self-report, as adolescents are more likely to accurately report shorter-term recall (e.g., 1-, 3-, or 7-day) as opposed to longer-term recall (e.g., 6-month or 1-year). The three day Previous Day Physical Activity Recall (3DPAR) utilizes a standardized form organized into 30-minute blocks beginning at 7:30 AM and continuing through 12 midnight. For each of the 30-minute blocks, participants entered the code number of the primary activity (from a list of 60 activities) that they participated in on the three previous days. The 60 activities were grouped into the following categories: eating, after school/spare time/hobbies, sleeping/bathing, school, transportation, work, physical activities. For each 30-minute block interval, the participant rated the intensity of the specified activity as light (slow breathing and little to no movement), moderate (normal breathing along with regular movement), hard (increased breathing with moderate movement), or very hard (hard breathing and quick movement). Based on participant's 3DPAR activity type

and intensity responses, and the corresponding number of metabolic equivalents (METs) taken directly from PA expenditure lists, estimates of total energy expenditure were derived. Participants were then classified into one of the two following groups: (a) low PA (less than four METs), or (b) moderate to vigorous PA (four or more METs).

The one-day version of the 3DPAR has established validity with motion sensors (r=.88) and heart rate monitors (r=.77), as well as test-retest (r=.98) and interrater (r=.99) reliability (Weston et al. 1997). The 3DPAR has established validity with AA females based on an unpublished preliminary analysis by Trials of Activity for Adolescent Girls (TAAG; Mark Loftin, personal communication, December 4, 2002). However, there were concerns regarding the validity of the 3DPAR. Based on preliminary trials for this study, the instrument may not have detected PA differences. Therefore, the Leisure Time Exercise Questionnaire (LTEQ; Godin & Shepard, 1985) was employed as a supplementary measure in the event that the 3DPAR did not function properly. In addition, the LTEQ was successfully pilot tested with this study's population.

The LTEQ is a self-report questionnaire that was designed to be completed quickly and easily (see Appendix A). It assesses PA level by frequency of weekly strenuous, moderate, light, and sweat-inducing (SI) PA. The LTEQ has established validity with subjective and objective data related to reported strenuous PA and VO2 max percentile (*P;* r=.38, p<.001), and to self-rating of SI PA and body fat *P* (r=.21, p<.001). In addition, the LTEQ has established two week test-retest reliability coefficients (r=.94, .46, .48, and .80) for self-reports of strenuous, moderate, light, and SI PA, respectively. The LTEQ is a valid self-report questionnaire, therefore its utility was high as a support instrument.

Body mass index. Body mass index is the recommended method to determine overweight in adolescents (NHANES, 1999). Body weight in kilograms and height in meters was used to calculate BMI (kg/m²). Body weight was calculated using a portable precalibrated digital weight scale. Height was measured using a Harpenden portable field anthropometer. Participants were classified into one of two groups based on their BMI for age scores (see Table 5): (a) overweight (BMIs ≥ 95th *P* based on age and gender; Troiano & Flegal, 1998), or (b) non-overweight (BMIs < 95th *P* based on age and gender).

Table 5

Female Body Mass Index for Age Percentiles (P)

Age	Non-overweight (BMI in kg/m² < 95th *P*)	Overweight (BMI in kg/m² ≥ 95th *P*)
11	24.1	24.2
12	25.1	25.2
13	26.2	26.3
14	27.2	27.3
15	28.0	28.1
16	28.8	28.9
17	29.5	29.6
18	30.2	30.3

Note. BMI in kg/m² = weight in kilograms to height in meters squared. Adapted from "National health and nutrition examination survey: Overweight among U.S. children and adolescents," by U.S. Department of Health and Human Services, 1999, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

An AA female was trained in weight and height measurement procedures by the dissertation committee co-chair to assist with the study. An assistant of the same racial/ethnic group and gender was selected to increase comfort levels of the adolescent AA female participants. The assistant measured every 10th participant twice as a measure of intra-rater reliability. All repeated weight and height measures were within the accepted intra-rater error ranges of 0.1 lbs, and 0.5 mm, respectively (NHANES, 1999). The dissertation committee co-chair reviewed all weight and height procedures and training, thereby providing expert validity.

Procedures

All procedures and materials were submitted to the University of New Orleans Human Subjects Committee for review and approval prior to the study's commencement. Meetings were arranged with administrators at the middle and high schools to obtain permission to collect data from adolescent AA female students in physical education classes. Administrators and physical education teachers were informed of the purpose of the study, all procedures, confidentiality, and that they would have access to the questionnaire booklet. Upon approval from administration and staff, the investigator attended physical education classes to inform students regarding the purpose of the study, and to request their consent to participate. Informed consent was also obtained from parents/guardians.

Data collection occurred in the middle and high school classrooms during regular physical education or classroom hours. After students returned completed participant and parent/guardian consent forms, participants were asked to complete the questionnaire booklet on a Tuesday or Wednesday to measure PA participation for the prior Saturday, Sunday, and Monday, and to obtain demographic, maturation status, and personal and social factor information related to PA. At each questionnaire administration, the principal investigator

explained instructions to participants, assisted participants with any problems, and answered any questions. A master code list was developed to match each participant with her respective completed questionnaire booklet. The list included each participant's names and assigned identification number. The master code list was stored in a secured location, and destroyed upon study completion. On the same day or a subsequent day following completion of the questionnaire booklet, the female assistant collected height and weight measures from participants.

After data collection was completed, a written debriefing sheet was provided to administrators, physical education teachers, and participants. The sheet explained the research project purpose and was augmented with a presentation by the principal investigator. After completion of the study, all involved individuals were provided with a study summary.

Statistical Analyses

Analyses procedures included descriptive and inferential statistics calculated using SPSS version 9.0. Pearson Product-Moment Correlations were used to assess intercorrelations among study variables. To test hypotheses 1 and 2, a series of multiple regression (MR) analyses were conducted to determine the relationship between both personal and social factors that influence PA, and PA level and BMI among adolescent AA females. To test hypotheses 3 and 4, logistic regression (LR) analyses were conducted to determine the predictive validity of the personal and social factors on the outcome variables (PA level or BMI for age). To test hypothesis 5, ANOVA with post hoc multiple-comparison analyses (using the Tukey HSD) were used to determine if there were any differences among maturation groups on PA level and BMI. Regarding hypothesis 5, any participants that were 12 years of age or younger, and had not reached menarche were excluded from the analysis, as it was not yet known if they were late

maturing. Furthermore, if participants were 13 years of age, and had not reached menarche, it was assumed that they were late maturing. To test exploratory question 1, LR analyses were conducted to determine the predictive validity of age, SES, and sports participation on PA and BMI for age. To test exploratory question 2, LR analyses were conducted to determine the predictive validity of all continuous and categorical predictor variables) on the categorical outcome variables (PA level or BMI for age; see Table 6). In addition to what was investigated in hypotheses 1 - 5, and exploratory questions 1 and 2, ANOVAs were conducted to determine if there were any significant differences in current sports participation categories and the continuous dependent variables (age at menarche, 3DPAR, LTEQ, SI PA, and BMI). Current sports participation was defined as currently participating in organized varsity, junior varsity, club, or recreational sports. Based on current sports participation responses, participants were categorized into current or non-current sports participation groups.

A confirmatory factor analysis (CFA) using maximum likelihood extraction on a Pearson correlation matrix was conducted to determine the validity of the 2-factor structure of the PADS. The CFA included a sample of (n=214) adolescent AA females, and was conducted using LISREL 8.2 (Joreskog & Sorbum, 1998). Several solution indices and indices of fit were utilized to assess the CFA outcome. Solution indices included factor loadings, correlations, t values, and R^2. Indices of fit included the χ^2, the Normed Fit Index (NFI), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), and Adjusted Goodness of Fit (AGFI), and the root mean square error of approximation (RMSEA).

Table 6

Continuous and Categorical Predictor and Outcome Variables

Variable	Continuous	Categorical (measure)
Predictor	P	-
	S	-
	Age	-
	-	SES (High/Low)
	-	Sports Participation (Yes/No)
	Age at Menarche	-
Outcome	3DPAR	3DPAR (High/Low)
	LTEQ	-
	SI PA	-
	BMI	BMI for age (Overweight/Non-overweight)

Note. P = personal; S = social; SES = socioeconomic status; 3DPAR = the 3-Day Previous Recall Scale; LTEQ = the Leisure Time Exercise Questionnaire; SI PA = sweat-inducing physical activity; BMI = Body Mass Index.

Chapter IV

Results

This chapter contains the results from this study on adolescent AA females. Descriptive statistics are presented first, followed by inferential statistics, and a summary of hypothesis testing. Descriptive statistics are provided for demographics, determinants of PA, measurement of PA, BMI, and BMI for age. Inferential statistics are provided for correlations, and results from hypothesis testing, exploratory questions, and the CFA.

Descriptive Statistics

Demographics. The majority (97%) of participants (*n*=204) had reached menarche. Mean age at menarche was 10.96 years (*SD*=2.86) with a range of 6 to 15 years. About one-fifth (19%) (*n*=40) of participants were classified as EMs (≤ 10 years of age), 57% (*n*=121) of participants were classified as average maturers (AMs: 11 or 12 years of age), and 21% (*n*=45) of participants were classified as LMs (≥ 13 years of age). More than half (56%) of participants reported that they were eligible for free or reduced lunch, and were classified in the low SES group. The remaining 44% of participants were classified in the high SES group. Over half (54%) of participants reported current sports participation, and 30% of participants reported past sports participation. Participants (*n*=178) who indicated current and past sports participation were combined and classified in the sports participation group, and the remaining 16% (*n*=33) of participants who indicated that they are not and did not participate in sports were classified in the no sports participation group.

Determinants of physical activity. The PADS was used to measure personal and social factors that influence PA as related to PA level and BMI (see Appendix A). The mean score for the personal factor was 4.39 (*SD*=0.74), with a range of 2.75 to 5.88. The mean score for the social factor was 2.11 (*SD*=0.90), with a range of 1.00 to 5.60. For 19 of the 21 items in the PADS, respondents used the entire range of responses for each item, indicating adequate response variability. For items 2 and 7 of the personal factor, participants' responses ranged from 2 to 6. No participants responded *strongly disagree*. Factor I (personal) item mean scores tended to be near or above the expected midpoints (i.e., 3.50; see Table 7), and Factor II (social) item mean scores tended to fall below the expected midpoints (i.e., 3.50; see Table 8).

Measurement of physical activity. The 3DPAR and the LTEQ (including SI PA) were used to assess PA level (see Appendix A). The mean score for the 3DPAR was 1.77 (*SD*=0.23) with a range of 1.45 to 2.77. The mean score for the LTEQ was 55.62 (*SD*=31.03) with a range of 0 to 181, and the mean score for SI PA was 2.03 (*SD*=0.67) with a range of 1 to 3. Results from the 3DPAR indicated that none of the participants met the established research criteria for moderate to vigorous PA (≥ 4 METs). The maximum participant score was 2.77, therefore, all (*n*=211) scored in the low PA category (< 4 METs). Consequently, PA groups were created using a tertile split method. This method was selected instead of the median split method, because low and high tertiles would represent real differences in PA within the sample. Participants categorized in the low (≤ 1.65 METs), and high (≥ 1.81 METs) PA groups were used in subsequent statistical analyses. As a result, however, participants categorized in the moderate PA group were eliminated from the statistical analyses.

Table 7

PADS Factor I (Personal) Mean Scores & Standard Deviations

Item #	Item	*M*	*SD*
1	I am confident that I can do PAs 3 times per week for the next 6 months.	5.06	0.91
2	I am capable of doing most PAs.	5.04	0.94
3	My physical surroundings provide me with the opportunity to do PAs.	4.70	1.20
4	I am confident that I can do PAs even when I'm feeling down.	3.64	1.37
5	I can do PAs when the weather is bad.	4.05	1.41
6	I am confident that I can do PAs no matter how stressed I feel.	3.48	1.42
7	I can safely do PAs at these facilities (gym, park, recreation center).	5.25	0.93
8	I am confident I can do PAs no matter how busy I am.	3.36	1.32
9	I can do PAs when it is hot outside.	3.86	1.41
10	I am confident I can do PAs even when my friends criticize me for it.	5.10	1.33
11	I am confident I can do PAs even when I'd rather be doing something else.	3.86	1.43
12	I can safely do PAs in my neighborhood.	4.42	1.53
13	I am confident that I can do PAs 5 times per week for the next 6 months.	4.12	1.51
14	I can safely do PAs at my school.	5.11	1.00
15	I can do PAs when it is cold outside.	4.13	1.49
16	I can travel (by car, bike, bus, or walk) to places where I can be PA.	5.04	1.16

Table 8

PADS Factor II (Social) Mean Scores & Standard Deviations

Item #	Item	*M*	*SD*
1	I do PAs to be popular.	1.53	1.06
2	I do PAs to gain the approval of others.	1.75	1.25
3	My PAs are influenced by my neighbors.	2.02	1.35
4	My PAs are influenced by the media (TV, radio, magazines).	3.49	1.56
5	I do PAs to impress others.	1.77	1.30

Body mass index. Results of the height and weight measures indicated that the mean BMI score was 25.46 (*SD*=6.29), with a range of 15 to 54. Participants were classified as either non-overweight (BMI for age < 95th *P*) or overweight (BMI for age ≥ 95th *P*; Troiano & Flegal, 1998). Based on their BMI for age scores, 73% (*n*=154) were classified as non-overweight, and 27% of participants (*n*=57) were classified as overweight. The mean BMI for age scores were 22.43 (*SD*=2.93) for non-overweight, and 33.65 (*SD*=5.60) for overweight participants. The participants in this study had higher mean BMI for age scores than the U.S. norms (see Figure 1).

Inferential Statistics

Correlations. Bivariate relationships of all continuous variables (see Table 9) were assessed using Pearson Product-Moment Correlations. As expected, among demographic predictors, significant correlations were found between age in years and age at menarche (*r*=.53), participant's height (*r*=.17), and SI PA (*r*=-.26); between participant's weight and participant's height (*r*=.31); and between age at menarche and BMI (*r*=-.14). The personal and social factors of the PADS were expected to be positively related to PA level and negatively related to BMI

Figure 1

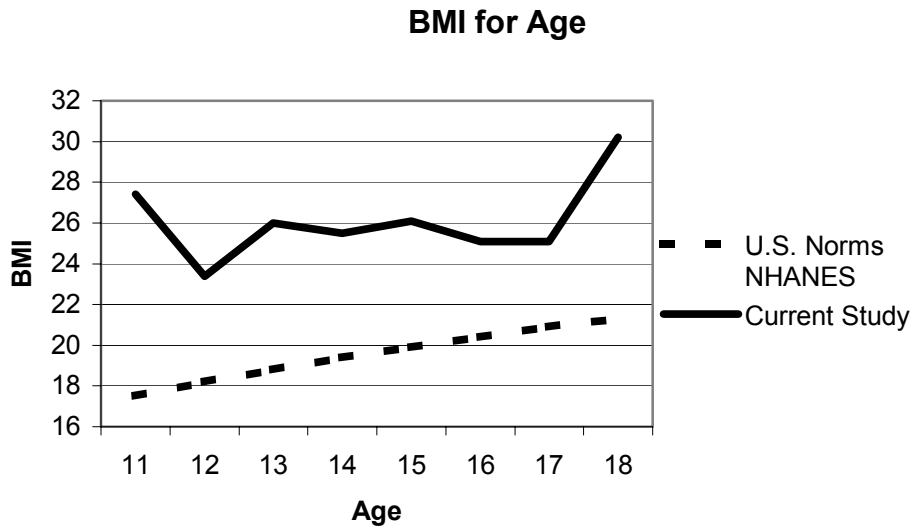

Figure 1. Comparison of current study BMI for age mean scores to U.S. norms.

scores. Measures among the PA scores (3DPAR & LTEQ) were expected to be positively related, and PA scores were expected to be negatively related to BMI scores. Among all predictors and outcomes, as expected, significant correlations were found between the personal factor and the 3DPAR (r=.39), LTEQ (r=.42), and SI PA (r=.39); and between social factors and SI PA (r=.15). Surprisingly, the social factor and BMI were unrelated. Concerning expected relationships among outcomes, significant correlations were found between the 3DPAR and the LTEQ (r=.39), SI PA (r=.33). The LTEQ was positively related to SI PA (r=.40). Neither the 3DPAR nor the LTEQ were related to BMI. Unexpectedly, social factors were negatively related to age in years (r=-.36), and age at menarche (r=-.26). This may indicate that as participants grow older, social factors that influence PA may be less important to this group of

Table 9

Correlations of Continuous Variables

	P	S	Age	Age at Menarche	Wgt. (kg)	Hgt. (m)	BMI	3DPAR	LTEQ	SI PA
P	1.00	-	-	-	-	-	-	-	-	-
S	.01	1.00	-	-	-	-	-	-	-	-
Age	-.02	-.36**	1.00	-	-	-	-	-	-	-
Age at Menarche	.03	-.26**	.53**	1.00	-	-	-	-	-	-
Wgt. (kg)	-.05	.02	.06	-.11	1.00	-	-	-	-	-
Hgt. (m)	.12	-.07	.17*	.01	.31**	1.00	-	-	-	-
BMI (kg/m²)	-.11	.04	.02	-.14*	.90**	-.13	1.00	-	-	-
3DPAR	.40**	.04	-.11	-.02	.06	.13	-.00	1.00	-	-
LTEQ	.42**	.08	-.03	.01	-.00	.01	-.04	.40**	1.00	-
SI PA	.39**	.15*	-.26**	-.26**	.02	.01	.00	.33**	.40**	1.00

Note. P = personal; S = social; Wgt. (kg) = weight in kilograms; Hgt. (m) = height in meters; BMI in kg/m² = weight in kilograms to height in meters squared; 3DPAR = the 3-Day Previous Recall Scale; LTEQ = the Leisure Time Exercise Questionnaire; SI PA = sweat-inducing physical activity.

* $p<.05$. ** $p<.01$.

adolescent AA females. Age at menarche was negatively related to SI PA (r=-.26). This may indicate that LMs, may be affected more by social factors that influence PA.

Hypothesis 1. A MR analysis was conducted to determine the relationship between both personal and social factors and PA (3DPAR) levels. The overall MR model for personal and

social factors on PA was significant, F (2, 208)=19.09, p<.001, R=.39, R^2=.16). The results, which mirrored the correlations reported earlier, indicated that the personal factor (B=.12, *SE B*=.02, β=.39, p<.001, r=.39) was a significant predictor of PA level. However, the social factor (B=.01, *SE B*=.02, β =.04, p=.54, r=.05) was not a significant predictor of PA level. Consequently, there was not a positive relationship between both personal and social factors that influence PA, and PA levels among adolescent AA females. Hypothesis 1 was partially supported by the results.

Hypothesis 2. A MR analysis using the *enter* method was conducted to determine the relationship between both personal and social factors and BMI. The overall MR model for personal and social factors on BMI was not significant, F (2, 208) =1.42, p=.24, R=.12, R^2=.01). The results, which again mirrored the correlations reported earlier, indicated that neither the personal factor (B=-.95, *SE B*=.59, β=.59, p=.11, r=-.11), nor the social factor (B=.22, *SE B*=.48, β =.04, p=.65, r=.03) were significant predictors of BMI. As a result, there was not a negative relationship between both personal and social factors that influence PA, and BMI among adolescent AA females. Hypothesis 2 was not supported by the results.

Hypothesis 3. Logistic regression analyses were conducted to determine the predictive validity of personal and social factors on PA level. The LR for personal and social factors on PA level was significant, χ^2 (2, 211)=33.72, p<.01 (see Table 10). Using personal and social factors the model accurately classified 68.6% of PA level cases. The model classified 65.7% (46 of 70) of the low PA cases and 71.4% of the high PA cases (50 of 70), indicating moderate sensitivity, and specificity, respectively. The variance for PA outcome accounted for by personal and social factors was also moderate (Nagelkerke's R^2=.29). Independently, the personal factor was a

significant (p<.001, *ExpB*=4.65) predictor of PA level, however, the social factor was not a significant (p=.13, *ExpB*=1.29).

Table 10

Results of the Logistic Regression for Personal (P) and Social (S) Factors on Physical Activity

Variable	χ^2	*df*	Nagelkerke's R^2	*p*	*ExpB*
Model	33.72	2, 211	.29	.00*	-
P	-	1	-	.00*	4.65
S	-	1	-	.13	1.40

* p<.001.

In a subsequent LR analysis, where the personal factor was entered without the social factor, it remained a significant (p<.001, *ExpB*=4.49) predictor of PA level, however, model coefficient and summary scores were slightly lower. The LR model for the personal factor was significant χ^2 (1, 211)=31.27, p<.001. The overall model for personal classified 71.43% of PA level cases. The model classified 65.7% (50 of 70) of the low PA cases and 70.0% of the high PA cases (49 of 70), indicating moderate sensitivity, and specificity, respectively. The variance for PA outcome accounted for by the personal factor was again moderate (Nagelkerke's R^2=.28). Results of the LR for the personal factor on PA level were statistically similar to the original personal and social model. Hence, the personal factor was predictive of PA, whereas the social factor was not. Hypothesis 3 was partially supported by the results.

Hypothesis 4. Logistic regression analyses were conducted to determine the predictive validity of personal and social factors on PA level and BMI for age. The LR for personal and social factors on BMI for age was not significant, χ^2 (2, 211)=5.47, p=.06 (see Table 11). Using

Table 11

Results of the Logistic Regression for Personal (P) and Social (S)Factors on Body Mass Index for Age

Variable	χ^2	*df*	Nagelkerke's R^2	*p*	Exp*B*
Model	5.47	2, 211	.04	.06	-
P	-	1	-	.33	.81
S	-	1	-	.03*	1.43

* $p<.05$.

personal and social factors the model accurately classified 73.93% of BMI for age cases. The model classified 93.4% (153 of 154) of non-overweight cases. However, only 5.3% (3 of 57) of the high (overweight) cases were correctly classified, indicating high sensitivity and very poor specificity, respectively. Moreover, the variance for BMI for age outcome accounted for by personal and social factors was low (Nagelkerke's R^2=.04). Within the model, independently, the personal factor was not a significant (p=.33, *ExpB*=.81) predictor of BMI for age among adolescent AA females, however, the social factor was a significant ($p<.05$, Exp*B*=1.43) predictor of BMI for age.

In a subsequent LR analysis, where the social factor was entered without the personal factor, it remained a significant ($p<.05$, *ExpB*=1.42) predictor of BMI for age, however, model coefficient and summary scores were slightly lower. The LR model for the social factor was significant χ^2 (1, 211)=4.52, $p<.05$. The overall model for the social factor classified 73.5% of PA level cases. The model classified 99.4% (153 of 154) of the low BMI for age cases and 3.5% of the high BMI for age cases (2 of 57), indicating high sensitivity, and poor specificity, respectively. The variance for BMI for age outcome accounted for by the social factor was low

(Nagelkerke's R^2=.03). Results of the LR for the social factor on BMI for age were statistically similar to the original personal and social model. Therefore, the social factor was predictive of BMI for age, whereas the personal factor was not. Hypothesis 4 was partially supported by the results.

Hypothesis 5. An ANOVA with a post hoc multiple-comparison analysis (using the Tukey HSD) was used to determine if the three maturity groups differed on PA level or BMI. A total of 206 participants, 40 EMs, 121 AMs, and 45 LMs were included in the analyses. Due to low correlations between the 3DPAR and BMI (r=-.01), and the LTEQ and BMI (r=-.04), separate ANOVA's were performed for the two PA measures (i.e., the 3DPAR, and the LTEQ) and BMI. Prior to performing the ANOVA, homogeneity of variance was checked using Levene's Test. Results were not significant for the 3DPAR (p=.16), or the LTEQ (p=.58), which indicated that variances for PA means for the maturation groups did not differ significantly. Results of the ANOVA indicated that there were no significant differences among the maturation groups on the 3DPAR, and LTEQ. However, there was a significant (p<.05) difference between maturers for SI PA. Post hoc analyses revealed a significant (p<.05) between group difference for AMs (M=2.08, SD=.65) and LMs (M =1.80, SD=.69), which indicated that AMs sweated more during PA than LMs. Regarding BMI, a significant (p<.05) difference existed among BMI means for the maturation groups. Post hoc analysis revealed that LMs had significantly (p<.05) lower BMI scores (M=23.21, SD=4.73) than both EMs (M=26.64, SD=6.45) and AMs (M=25.81, SD=6.62). Levene's test for homogeneity of variance was not significant (p=.08), indicating that variances of BMI means for each of the maturation groups did not differ significantly. Consequently, among adolescent AA females, LMs were not more physically active than EMs

and AMs, but they did have lower BMI scores than EMs and AMs. As a result, hypothesis 5 was partially supported by the results.

Exploratory question 1. A LR was used to determine if the exploratory three-factor age, SES, and sport participation demographic model was predictive of PA level and BMI for age. The LR for demographic factors on PA level was not significant, χ^2 (3, 211)=1.35, p=.72 (see Table 12). The overall model classified 50.7% of PA level cases. The model accurately classified 55.7% (39 of 70) of the low PA cases and 45.7% of the high PA cases (32 of 70), indicating low sensitivity, and specificity, respectively. The variance for PA outcome accounted for by the three factors was low (Nagelkerke's R^2=.01).

Table 12

Results of a Logistic Regression for Demographic Factors on Physical Activity

Variable	χ^2	*df*	Nagelkerke's R^2	*p*	Exp*B*
Model	1.35	3, 211	.01	.72	-
Age	-	1	-	.35	.90
SES	-	1	-	.88	1.05
Sports Participation	-	1	-	.65	.79

Note. SES = socioeconomic status.

The LR for the three-factor model on BMI for age was significant, χ^2 (3, 211)=11.68, p<.05 (see Table 13). The overall model classified 72.0% of BMI for age cases. The model classified 94.2% (145 of 154) of the non overweight BMI for age cases and 12.3% (7 of 57) of the overweight BMI for age cases were correctly classified, indicating high sensitivity, and poor

Table 13

Results of a Logistic Regression for Demographic Factors on Body Mass Index for Age

Variable	χ^2	*df*	Nagelkerke's R^2	*p*	*Exp*B
Model	11.68	3, 211	.08	.01*	-
Age	-	1	-	.01*	.74
SES	-	1	-	.61	1.19
Sports Participation	-	1	-	.41	1.44

Note. SES = socioeconomic status.

* $p<.05$.

specificity. The variance for BMI for age outcome accounted for by demographic the three factors was relatively low (Nagelkerke's R^2=.08). Socioeconomic status and sports participation were not significant (p=.61, *ExpB*=1.19; and p=.41, *ExpB*=1.44, respectively) predictors of BMI for age among adolescent AA females, however, age was a significant ($p<.05$, *ExpB*=.74) predictor of BMI for age.

In a subsequent LR analysis, where age was entered without SES and sports participation, it was a significant ($p<.05$, *ExpB*=.73) predictor of BMI for age, however, model coefficient and summary scores were slightly poorer. The LR model for age was significant χ^2 (1, 211)= 10.85, $p<.05$. The overall model for age classified 72.0% of BMI for age cases. The model classified 98.7% (152 of 154) of the low BMI for age cases and 8.8% of the high BMI for age cases (5 of 57), indicating excellent sensitivity and poor specificity, respectively. The variance for BMI for age outcome accounted for by age was relatively low (Nagelkerke's R^2=.07). The results of the LR for age on BMI for age were statistically similar to the original three-factor model. Overall, the demographic factors were not useful in predicting PA or BMI for age.

Exploratory question 2. A LR was used to determine which of all continuous and categorical predictors were most predictive of PA level and BMI for age. The LR for the exploratory (all continuous and categorical predictors) seven-factor (i.e., age, SES, sports participation, age at menarche, personal, social, and BMI) model on PA level was significant, χ^2 (7, 211)=38.80, $p<.001$ (see Table 14). The overall model for all factors classified 69.3% of PA level cases. The model classified 68.6% (48 of 70) of the low PA cases and 70.0% of the high PA cases (49 of 70), indicating moderate sensitivity and specificity, respectively. The variance for PA outcome accounted for by all continuous and categorical predictors was moderately high (Nagelkerke's R^2=.32). Additionally, the personal factor was a significant ($p<.05$, *ExpB*=5.36) predictor of PA among adolescent AA females (see Table 14).

The LR for the exploratory nine-factor (i.e., age, SES, sports participation, age at menarche, personal, social, 3DPAR, LTEQ, and SI PA) model on BMI for age was not significant, χ^2 (9, 211)=13.20, p=.15 (see Table 15). The overall model for all factors classified 79.6% of BMI for age cases. The model classified 97.6% (164 of 168) of the low BMI for age cases and 9.3% of the high BMI for age cases (4 of 43), indicating excellent sensitivity and poor specificity, respectively. The variance for BMI for age outcome accounted for by all continuous and categorical predictors was low (Nagelkerke's R^2=.10). However, age at menarche (.01, $p<.05$, *ExpB*=.80) was a significant predictor of low BMI for age among adolescent AA females (see Table 15).

Sports participation ANOVAs. A series of ANOVAs were conducted to determine if there were any significant differences in current sports participation (yes/no) on the continuous dependent variables (age at menarche, 3DPAR, LTEQ, SI PA, and BMI). Of the participants

Table 14

Results of a Logistic Regression for All Factors on Physical Activity

Variable	χ^2	*df*	Nagelkerke's R^2	*p*	Exp*B*
Model	38.80	7, 211	.32	.00*	-
P	-	1	-	.00*	5.36
S	-	1	-	.31	1.27
Age	-	1	-	.88	.98
SES	-	1	-	.89	.94
Sports Participation	-	1	-	.51	1.53
Age at Menarche	-	1	-	.30	.91
BMI (kg/m^2)	-	1	-	.19	1.04

Note. P = personal; S = social; SES = socioeconomic status; BMI = body mass index.

* $p<.001$.

included in the analyses, 54% (n=114) reported current sports participation, and 46% (n=97) reported no current sports participation. Prior to performing the ANOVA, homogeneity of variance was checked using Levene's Test. Results were not significant for age at menarche (p=.62), the 3DPAR (p=.05), the LTEQ (p=.08), and BMI (p=.29). This indicated that variances for age at menarche, the 3DPAR, the LTEQ, and BMI means for the sports participation groups did not differ. Results were significant for SI PA (p<.001), which indicated that variances for SI PA means for the sports participation groups did differ. Hence, results involving SI PA should

Table 15

Results of a Logistic Regression for All Factors on Body Mass Index for Age

Variable	χ^2	*df*	Nagelkerke's R^2	*p*	Exp*B*
Model	13.20	9, 211	.10	.15	-
P	-	1	-	.24	.71
S	-	1	-	.47	.86
Age	-	1	-	.64	1.06
SES	-	1	-	.77	.89
Sports Participation	-	1	-	.50	1.39
Age at Menarche	-	1	-	.01*	.80
3DPAR	-	1	-	.94	.93
LTEQ	-	1	-	.47	1.00
SI PA	-	1	-	.97	1.01

Note. P = personal; S = social; SES = socioeconomic status; 3DPAR = the 3-Day Previous Recall Scale; LTEQ = the Leisure Time Exercise Questionnaire; SI PA = sweat-inducing physical activity.

* $p<.05$.

be interpreted with caution. Results of the ANOVA indicated that there were no significant differences in current sports participation for age at menarche or BMI. However, the current sports participation group reported significantly ($p<.01$, $p<.001$, $p<.05$) more PA for the 3DPAR ($M=1.82$, $SD=.23$), the LTEQ ($M=63.26$, $SD=32.82$), and SI PA ($M=2.21$, $SD=.70$) than the no sports participation group for the 3DPAR ($M=1.73$, $SD=.21$), the LTEQ ($M=46.64$, $SD=26.21$),

and SI PA (*M*=1.82, *SD*=.58). As expected, adolescent AA females who currently participate in sports are more physically active than those who do not currently participate in sports. These results are consistent with previous findings (Bungum et al. 1999).

Confirmatory factor analysis. A follow-up CFA for the PADS was conducted using LISREL 8.2 (Joreskog & Sorbum, 1998). The sample for this investigation included (*n*=214) participants from this study on adolescent AA females. Based on previous research (Mitchell & Kontos, 2002), it was suspected that the PADS would consist of two first-order factors: (a) personal (Factor I), and (b) social (Factor II). The CFA was conducted using a maximum likelihood extraction on a Pearson correlation matrix. The 21 PADS items were loaded onto the personal and social factors. The CFA revealed sufficient factor loadings (λ) for the personal factor and marginal factor loadings for the social factor (see Tables 16-17). Sufficient loadings for reliable factors may be based on the number of items per factor, absolute magnitude of the loadings, and sample size (Stevens, 2002). Reliable factors should consist of (a) four or more items loading above .60 (regardless of sample size), (b) ten or more items loading above .40 with a sample size greater than 150, or (c) three or more items loading above .80 with a sample size greater than 300. The *t* values ranged from 6.47 to 10.09. The χ^2 value for the RMSEA was .08, which indicated a minimally acceptable fit, as the number should be less than .08 (Browne & Cudek, 1993). The χ^2 (188, *n*=214)=416.01, *p*<.001 was moderate. The values for the NFI (.80), CFI (.82), GFI (.84), and AGFI (.81) were slightly below the generally accepted (.90) value. However, these results are acceptable as they are near 1.0, the value that indicates best fit. The overall model solution was reasonable, however, it may be in need of modification. Specifically, item 4 of the personal factor, and several items (e.g., 2, 3, and 4) of the social factor may need to be eliminated from the scale or modified. Moreover, given the related results, the entire social

Table 16

CFA Factor I (Personal) Loadings (λ), Squared Multiple Correlations (R^2), and t Values

Item #	Item	λ	R^2	*t*
1	I am confident that I can do PAs 3 times per week for the next 6 months.	.64	.41	9.31
2	I am capable of doing most PAs.	.57	.32	9.64
3	My physical surroundings provide me with the opportunity to do PAs.	.44	.19	9.98
4	I am confident that I can do PAs even when I'm feeling down.	.64	.41	9.31
5	I can do PAs when the weather is bad.	.57	.33	9.62
6	I am confident that I can do PAs no matter how stressed I feel.	.62	.39	9.41
7	I can safely do PAs at these facilities (gym, park, recreation center).	.52	.27	9.79
8	I am confident I can do PAs no matter how busy I am.	.56	.31	9.68
9	I can do PAs when it is hot outside.	.65	.42	9.29
10	I am confident I can do PAs even when my friends criticize me for it.	.42	.17	10.02
11	I am confident I can do PAs even when I'd rather be doing something else.	.64	.41	9.34
12	I can safely do PAs in my neighborhood.	.40	.16	10.05
13	I am confident that I can do PAs 5 times per week for the next 6 months.	.61	.38	9.45
14	I can safely do PAs at my school.	.43	.19	9.99
15	I can do PAs when it is cold outside.	.50	.25	9.84
16	I can travel (by car, bike, bus, or walk) to places where I can be PA.	.39	.15	10.06

Table 17

CFA Factor II (Social) Loadings (λ), Squared Multiple Correlations (R^2), and t Values

Item #	Item	λ	R^2	*t*
1	I do PAs to be popular.	.78	.61	6.47
2	I do PAs to gain the approval of others.	.74	.55	7.34
3	My PAs are influenced by my neighbors.	.30	.09	10.09
4	My PAs are influenced by the media (TV, radio, magazines).	.40	.16	9.89
5	I do PAs to impress others.	.77	.60	6.68

factor may need to be eliminated from the scale. A uni-dimensional (i.e., personal factor only) scale may offer the best solution.

Reliabilities. Using Cronbach's Alpha, the internal reliability of the PADS for the follow-up investigation with adolescent AA females (*n*=214) was .82. Several of the social items (i.e., numbers 2, 3, 4, & 5) did not contribute to the overall alpha, and item number 1 made a very small .0009 contribution to the overall alpha. Inter-item correlations between individual items ranged from -.21 to .65 (see Appendix B), indicating low correlations but no multicollinearity (*R*>.70,Pedhazur, 1982). However, the large range of the correlations and inclusion of many negative correlations from social items suggest that it may not relate to the overall construct of PA for this group of adolescent AA females. To further assess multicollinearity of the CFA items, squared multiple correlations (SMC) were assessed. The SMC values ranged from 0.09 to 0.61, indicating more singularity (scores closer to zero) than multicollinearity (scores closer to one) among the CFA items (see Table 16-17). The reliabilities

were .86 for the personal factor, and .72 for the social factor. Inter-item correlations ranged from .07 to .65 for the personal factor, and from .18 to .62 for the social factor.

Summary of Hypothesis Testing

The analyses provided partial support for hypotheses 1, 3, 4 and 5. Related to hypothesis 1, the personal factor had a significant positive relationship (.39) with PA level. Regarding hypothesis 2, the personal factor had a negative relationship (-.11) with BMI, but it was not significant. Related to hypotheses 3 and 4, the personal factor was a significant ($p<.001$, *ExpB*=4.65) predictor of PA level, and the social factor was a significant ($p<.05$, Exp*B*=1.43) predictor of BMI for age. Regarding hypothesis 5, LMs had significantly ($p<.05$) lower BMI scores (M=23.21, SD=4.73) than both EMs (M=26.64, SD=6.45) and AMs (M=25.81, SD=6.62), but were not more physically active than EMs and AMs. Pertaining to the exploratory question 1, age was a significant ($p<.05$, *ExpB*=.74) predictor of BMI for age. Lastly, for exploratory question 2, the personal factor ($p<.05$, *ExpB*=5.36) was a significant predictor of PA, and age at menarche ($p<.05$, *ExpB*=.80) was a significant predictor of BMI for age.

Chapter V

Discussion

This study was unique in that it examined personal, social, and demographic factors and PA levels and BMI among adolescent AA females. This chapter begins with a summary of the results, which is followed by a general discussion of the results, a discussion of physical activity and overweight trends, study limitations, implications for educators, future research considerations, and a conclusion.

Summary of the Results

The results of this study offered support for several expected relationships and findings, however, unexpected relationships and findings were also found. Some expected relationships and findings were not supported by the results. The personal factor was predictive of PA level, providing some support for the usefulness of SCT for the prediction of PA related behavior in adolescent AA females. Independently, the social factor was predictive of low BMI for age, which may provide some support for the usefulness of SCT for the prediction of BMI for adolescent AA females. The proposed hypothesis for LMs having lower BMIs than both EMs and AMs was confirmed, supporting previous research (Malina, 1996). Regarding the exploratory questions, age, SES, and sports participation were not predictive of PA level, which is not consistent with the literature. However, age was predictive of low BMI for age. Among the continuous and categorical data, the personal factor was predictive of PA level, and age at menarche was predictive of low BMI for age. These findings carry theoretical implications, as

well as implications for measurement of factors that influence PA and the development of interventions designed to increase PA levels in adolescent AA females.

General Discussion

As speculated, the model for personal and social factors was predictive of PA level. However, within the model, the personal factor was the only factor predictive of PA level. In support of this finding, there were positive correlations between the personal factor and the PA measures (i.e., 3DPAR, LTEQ, and SI PA), indicating that as personal factor scores increase, PA levels increase. These findings suggest that the personal factor is more important than the social factor to the PA levels of this group of adolescent AA females. Although, they may have not been, it was expected that these females would have been equally impacted by the actions and expectations of others, as they were impacted by their PA confidence and ability, and the environment (Bandura, 1977, 1986; Malina, 1996).

The positive relationship between the personal factor and PA levels is similar to findings from other studies (Kohl III and Hobbs, 1998; Pate et al., 1997; Zakarian et al., 1994; and Trost et al., 1999). These researchers found that self-efficacy was a predictor of PA and was positively correlated with it. Research as typically focused on self-efficacy as a predictor of PA. However, PA maybe a predictor of self-efficacy and should be considered as such. Bandura (1986) posits that human behavior is determined by the bi-directional interaction of the person (emotion, biological events, and cognition like self-efficacy), the behavior (PA), and the environment. Bi-directional interaction implies that PA behaviors increase self-efficacy, just as self-efficacy increases PA behaviors. This notion is further supported by past performance accomplishments, which are the most influential source of self-efficacy information (Bandura). As performance improves and is interpreted as success, self-efficacy increases. Therefore, increases in one will

lead to increases in the other. This recursive relationship may explain why self-efficacy has been so successful in predicting PA behaviors. Biddle and Goudas (1996) also reported similar results pertaining to the personal factor. They found that strenuous PA was associated with perceived sports competence (a component of behavioral capability). Also, regarding the personal factor, contrary to previous findings, these participants felt that they could be physically active in unsuitable weather conditions, unlike Tappe et al. (1989) who reported unsuitable weather conditions as a barrier to PA for adolescent females.

Regarding the social factor and PA level, unexpectedly there were no significant correlations between the social factor and the 3DPAR, or the LTEQ. It is possible that the social factor of the PADS may not be applicable with this group of adolescent AA females. Moreover, SCT (Bandura, 1986) may not be valid with this group of adolescent AA females. These females may differ culturally and economically from the individuals that provided support for the development and use of the theory, which may help to explain the lack of predictive ability of the social factor for PA. In addition, the manner in which these adolescent females differ from other adolescents in public schools in regards to parental involvement may have affected results of this study. For example, the participants in this study may receive a great deal of encouragement and support from their parents, and therefore may not need to use PAs to gain gratification or approval from their peers.

In contrast to the 3DPAR and LTEQ findings regarding the social factor, as expected there was a significant positive correlation between the social factor and SI PA. This indicates that as social factor scores increase, participants perceive that they sweat more during PA. Because of these differences among the PA measures, and the correlation between the social factor and SI PA, one might speculate that these participants may want others, including this

researcher, to believe that they are more physically active than they actually are. These unexplained inconsistencies between PA measures may also result from participant recall bias related to how much they actually sweat during PAs or participants possibly misinterpreting PA questionnaire items. Nonetheless, these inconsistencies are indicators that these factors should be re-examined in future investigations.

Regarding the results for the social factor, the adolescent AA females in this study were not influenced by the need to be popular, having the approval of, or impressing others. These findings were consistent with Pate et al. (1997). They found that peer influences are not important to PA level. In contrast, Kohl III & Hobbs (1998) and Anderssen & Wold (1992) found that peer influences were important to PA for adolescent females. Findings from the current study suggest that these participants may be in control of their actions with regards to PA. Alternatively, they may be simply unaware of the role that the social factor (i.e., the actions and expectations of others) has on PA, or they may be minimizing the effects that the social factor has on PA.

The personal and social factor model was not predictive of BMI for age, and a negative relationship between the two factors and BMI did not exist. Independently, however, the social factor was predictive of low BMI for age. These findings suggest that PA alone may not be related to BMI in these participants, indicating that BMI may be determined by a more complex factor set (i.e., genetics, metabolism, nutrition, and physiology) not examined in this study. For example, inheriting a "good" genetic makeup, having a high metabolism, or receiving proper nutritional intake could lower BMIs just as PA might.

Results from this study indicated that for this group of adolescent AA females, LMs were no more physically active than both EMs or AMs. Conversely, Malina (1996) suggested that

LMs are more physically active than EMs and AMs, because they may be socialized into PA. Late maturers tend to be more skilled, due to the continued opportunity to participate in PAs, and they have physiques that are more ideal for success in sports and participation in PA. The current study's findings further support the notion that this group of adolescent AA females were more influenced by the personal component than the social component of behavior introduced by Bandura (1977, 1986). Late maturers may not be affected by sport socialization, or EMs may not be pressured by leisure socialization, as suggested by Malina. Although social factors may be an important aspect of adolescent's lives, they do not appear to be related to PA with this group of adolescent AA females. Perhaps these participants have enough confidence and capability in their physical abilities, and the encouragement to be physically active originates from within.

Late maturers had lower BMI scores than EMs and AMs. Bivariate correlations revealed a negative correlation between age at menarche and BMI, and age at menarche was predictive of low BMI for age, indicating that as age at menarche increases (representing LMs), BMI decreases. Malina (1996) suggested that LMs have more linear builds, longer legs and narrower hips, which would be more characteristic of lower BMIs. Conversely, EMs have higher BMIs, as they have more lateral builds, shorter legs, broader hips, and more breast development. This may lead to increased body weight for height. Additionally, related to PA and BMI, AMs reported more SI PA than LMs. This finding was probably due to AMs having significantly higher BMIs than LMs. As AMs have on average more body fat than LMs, it is possible that they sweat more during PA than LMs.

The exploratory three-factor age, SES, and sport participation demographic model was not predictive of PA level. The model was predictive, however, of low BMI for age for this

group of adolescent AA females. Independently, age was not predictive of PA level, however, bivariate correlations revealed negative correlations between age and the PA measures (i.e., 3DPAR, LTEQ, and SI PA). Even though they were not significant for the 3DPAR and the LTEQ, these correlations do point to an inverse relationship between age and PA level, where as age increases, PA level decreases. These findings are consistent with Kann et al. (1999) and the U.S. Department of Health and Human Services (1996), who found that as adolescent AA female age increases, PA levels decreases. Moreover, independently, age was predictive of low BMI for age, indicating that as age increases, BMI decreases. It might be reasonable to expect that BMI decreases with increases in age, if PA level increases with age. This study and other studies (Kann et al., 1999; U.S. Department of Health and Human Services, 1996), however, reported a decrease in PA with age. An alternative explanation for this result may be found in the correlation between age and height, which indicates that as age increases, height increases for these participants. Increases in height may improve the likelihood for decreases in BMI, as BMI is a measure of weight for height. This finding, along with current sports participants having higher BMIs than non-current sports participants, further substantiates the notion that increased PA level may not be related to decreases in BMI for this group of adolescent AA females. Rather, other factors may be more important in reducing BMI for these participants. For example, genetics, metabolism, nutrition, or physiology could contribute to increases in height, thus decreasing BMI.

The exploratory (all continuous predictors) seven-factor model was predictive of PA level. It was expected that the seven-factor model would be predictive of PA level, since it includes the personal factor, the only of the analyzed factors that was predictive of PA level. The exploratory (all continuous predictors) nine-factor model was not predictive of BMI for age

for this group adolescent AA females, however independently, age at menarche was predictive of low BMI for age. This finding was not surprising, as bivariate correlations revealed an inverse relationship between age at menarche and BMI. This outcome is again reflective of LMs having a linear physiques, longer legs, and narrower hips, which would be more characteristic of a lower BMI (Malina, 1996).

The follow-up investigation into the validation of the PADS, revealed that the instrument may need to be modified to improve the model fit. Improving the model fit may consist of eliminating the social factor. Results indicate that 4 of the 5 social factor items did not contribute to the overall alpha of the scale, and the fifth contributed minimally. Although acceptable, the reliability score for the social factor (.72) is considerably lower than the personal factor (.86). Also, there may not be enough items with sufficient loadings (λ) to adequately support the social factor (Stevens, 2002). These findings indicate that the PADS may actually be a uni-dimensional scale, which consists of only the personal factor. It is also possible, however, that the PADS may not be in need of modification. The participants may have minimized the significance of the social factor. This suggests that the PADS may consist of two factors, but the social factor may not be important to this group of adolescent AA females, as supported by descriptive and inferential statistics. The social factor mean score (2.11, *SD*=0.90) was below the 3.50 midpoint, and the factor was not predictive of PA level in any of the analyses. Another explanation that supports the two-factor model is that the participants may have been misled by the manner in which the instrument items were written, and therefore scored the instrument incorrectly. Future investigations should seek to improve the PADS factor structure. To improve the factor structure, any problematic items (i.e., those with insufficient factor loadings) from the personal and social factors should be removed or modified. After the scale has been

modified, CFAs with other samples of adolescent AA females and other racial/ethnic groups should be conducted with and without the social factor to determine which version of the scale offers the best model solution. Lastly, additional items may need to be developed, validated and added to the social factor.

Physical Activity and Overweight Trends

It has been recognized that during the adolescent years, as age increases, PA level decreases for AA females (Kann et al., 1999; U.S. Department of Health and Human Services, 1996), and this trend of PA decrease with age increase was evident in this study. Although not significant, negative correlations between age and PA (i.e., 3DPAR, and LTEQ) were found in the current study. Over half (54%) of the participants in this study reported current sports participation, however, current sports participation does not necessarily imply PA participation. Just as the audience is, many participants are spectators of sporting activities, especially in varsity and junior varsity sports. Furthermore, none of the participants in this study met the established research criteria for moderate to vigorous PA on the 3DPAR (Weston et al. 1997). These low PA scores may have been related to the validity of the measurement instrument, or reflective of actual low PA participation. The cause for PA decline with age and low levels of PA participation are not fully understood, however, it may be due to the novel interests (e.g., femininity or extended telephone conversations) that adolescents take on in their teenage years or the new and influential social roles (e.g., dating) (Malina, 1996). Further, if femininity or dating is the cause, adolescent AA females may want to look "presentable" at all times, and therefore not want to participate in PA. Sweat-inducing PA can make it difficult to manage coarse-textured hair (typical of AAs) and personal hygiene. Perhaps the decline in PA is related to cultural issues, including the belief that being physically active will lead to weight loss and

possible decreased desirability to AA males, who may prefer slightly heavier female physiques. Alternatively, low PA participation could be due to decreases in physical education enrollment, or increases in teenage pregnancy rates, smoking, and television viewing time.

Between 1970 and 1999, the percentage of overweight adolescent females increased from 5 to 14% in the U.S. (NHANES, 1999). The reported percentage was even higher among AAs (16%). The trend of overweight increase was evident in the current study, as 27% of participants (*n*=57) were overweight. Participants in this study also had higher BMI for age scores than the U.S. norms (NHANES). Because PA and current sports participation had no effect on BMI, these escalated figures may be due to lack of education regarding nutrition, limited availability of healthy food choices, or simply regional influences such as being expected to consume large portions of "Southern" cooking, which is characterized by high calorie, high fat fried meals, and "rich" desserts. These overweight differences may also be due to cultural influences related to preference in body image and type. Adolescent AA females may want to be heavier because it is culturally accepted by the AA racial/ethnic group, and, more specifically, by AA males. The participants in this study may intentionally have wanted to be heavier because of these cultural preferences. Regardless of the cause, increases in overweight rates are a major concern for health care providers, as overweight has been linked to a number of health consequences for adolescents (Dietz, 1998).

Limitations

When interpreting the present results, readers should consider several study limitations. The PADS was developed for this investigation and had not been tested beyond its validation study. The CFA results indicated that the model solution for the PADS may be in need of modification, suggesting that the scale may be a uni-dimensional scale. If the PADS consists of

only the personal factor, then social factor findings cannot be considered accurate, as the social factor would not have been a consideration in the current study. Another consideration for readers is that selected parochial school students were used as participants in this study, making it is difficult to generalize these results to the general adolescent AA female population. It is not known if or how these students differ from the general population. One might speculate that these participants are likely to be different because they attend tuition-based private schools, however, economics may not be a factor that distinguishes this group from the general population, as more than 50% of the participants were classified in the low SES group.

Additional limitations include the cross-sectional study design, which make it impossible to infer causal relationships between predictors and PA and low BMI for age. Recall bias must be considered as a data collection challenge with the use of self-report measures. Also, utilizing voluntary and non-random participant selection makes it difficult to generalize findings, due to a the possible subject self-selection effect.

Implications for Educators

Findings from the current study may be used by school personnel and educators to develop interventions to increase PA levels among adolescent AA females. When creating physical education programs of study, curriculum developers should focus on self-efficacy, behavioral capability, and environmental elements of adolescent life. They should write curricular and extracurricular programs that increase self-efficacy and promote enjoyable lifelong PA. Developers should also write appropriate knowledge building physical and health education curricula that improve behavioral capability. Regarding the environment, they should make sure that school recreation facilities are appropriate, functional, and do actually exist.

Instruction providers should assess self-efficacy, while they work to improve the adolescent's behavioral capability by teaching appropriate PA related skills. Based on observations from skills training, instructors should focus on students past performance accomplishments to increase their self-efficacy, as past performance accomplishments are the most influential source of self-efficacy information (Bandura, 1986). Regarding the environment, instructors should provide access to school facilities that enable safe participation in PA, and identify ways to overcome environmental barriers to PA (Patrick et al., 2001). They should also make sure that students have healthy food and beverage options in snack machines. Results may also be useful to postsecondary institution faculty for training future physical and health education, sport and exercise psychology, public health, and exercise physiology professionals in strategies to promote PA among adolescent AA females.

Future Research

This study provides a basis for future investigation related to determinants of PA for adolescent AA females. The results of this investigation indicated that there is a relationship between personal factors and PA levels, and that social factors and PA levels may be unrelated in this group of adolescent AA females. Future studies should attempt to understand the relationship between personal and social factors and PA levels among adolescent AA females.

Regarding the personal factor, these findings could be used to develop self-efficacy and behavioral capability increasing interventions that could be tested with the same sample or a similar one. For example, personal factor items of the PADS could be used to determine which aspects of the adolescent's PA skill set require guidance and assistance, and appropriate interventions could be developed based on results. These interventions could also be tested with

other samples of adolescents including Caucasians, other minority groups, and public school students.

The social factor should be reexamined, using reconstructed items, as the lack of predictability in the social factor may have been due to poor word construction of its items. This study should be replicated once another validation study of the PADS has been conducted. A more accurate PA determinant assessment tool could change results, affecting the interpretation of findings and related implications.

Future investigations could also explore how BMI fits into this complex equation of determinants, PA, and adolescent AA females. It is important to understand the part that PA plays in overweight prevention, or if it plays a part at all for adolescent AA females. It may be that BMI is determined by a more complex set of factors for this group, such as genetics, metabolism, nutrition, or physiology. Future investigations could also use more objective measures to determine overweight, like dual energy x-ray absorptiometry (DEXA), hydrodensiotometry (underwater weighing), or skinfold thickness assessed with calipers. These options could make a difference in overweight assessment.

This study should be replicated with other groups of adolescent AA females, or with other racial/ethnic groups. In particular public school adolescent AA females should be studied, as they may represent a different subset of AA females, and it is not known if or how they differ. African American parochial school girls may be unique, and therefore, not be representative of the adolescent AA population as a whole.

Conclusion

This study examined determinants of PA, PA levels, and BMI for a sample of adolescent AA females. Several important conclusions can be drawn from this investigation. The principal

finding supported the utilization of the personal factor as a predictor of PA level. Also of importance is that among this group of adolescent AA females, LMs were not more physically active than EMs or AMs. These findings suggest that these participants may be more in control of their choice to participate in PAs, rather than under the control of social influences, like peer pressure and sport socialization. Future investigations should attempt to understand the significance of personal and social factors on adolescent AA females. Another notable finding is that BMI does not appear to be affected by PA for these participants, which suggests that BMI is determined by factors that were not investigated in this study. This study also provided further validation for the PADS. However, future investigations should seek to improve its factor structure, as a valid and reliable measure can lead to accurate PA determinant assessment, which may lead to increased PA participation in adolescent AA females.

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Appendices

Appendix A

The Physical Activity Questionnaire

The Physical Activity Questionnaire

Fall 2003

University of New Orleans
The Department of Curriculum and Instruction
and
The Department of Human Performance and Health Promotion
New Orleans, LA 70148

Prepared by Flint D. Mitchell

To be completed by UNO staff:	
ID: _____	Date: ___/___/_____

Instructions for completing pages 1 - 3 (questions 1 – 29) of this questionnaire:

Please answer every question. Take the time to read and answer each question carefully before circling the answer that best represents your response.

EXAMPLE:

⇒ I enjoy listening to music.

Yes No

DEMOGRAPHIC INFORMATION

1. What is your age in years?

11 12 13 14 15 16 17 18 19 20+

2. What is your school grade classification?

5 6 7 8 9 10 11 12

3. What is your racial/ethnic group?

African American Caucasian Latina

American Indian Asian American Other _____

4. Are you eligible for a free or reduced price lunch at school?

Yes No

5. Are you **currently** participating in organized sports (e.g. varsity, junior varsity, club, or recreational sports)?

Yes No

- **If yes, skip to number 7.**

6. If no, have you participated in sports in the past?

Yes No

Continue on next page. ➔

MATURATION & BODY MASS INDEX INFORMATION

7. At what age did you have your first menstrual cycle (period)?

6 7 8 9 10 11 12 13 14 15 16 17 18 19

8. During which season did you have your first menstrual cycle (period)?

Winter Spring Summer Fall

To be completed by UNO staff:

1st Measure

Participant's height: _____ mm

Participant's weight: _____ lbs

2nd Measure

Participant's height: _____ mm

Participant's weight: _____ lbs

NOTE: _____

_____

_____

Conversion: mm to m _____

Conversion: m to m² _____

Conversion: pounds = _____ kg

Participants BMI: _____ kg/ m²

PHYSICAL ACTIVITY DETERMINANT INFORMATION

For the next section of this questionnaire, the term **physical activity** refers to any of the following activities that **make you breath hard or makes your heart beat fast**:

- Sports activities (basketball, track, volleyball, etc.)
- Play activities (dancing, bicycling, jumping rope, etc.)
- School activities (physical education [P.E.] classes, cheerleading, dance/drill team, etc.)
- Exercise (running, weight lifting, aerobics, etc.)

Turn to next page. Questions continue on back. ➔

How much do you agree with the following statements regarding physical activity (circle your answers):

		Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
9.	I am confident that I can do **physical activities** 3 times per week for the next 6 months.	1	2	3	4	5	6
10.	I am capable of doing most **physical activities**.	1	2	3	4	5	6
11.	My physical surroundings (home, neighborhood, school) provide me with the opportunity to do **physical activities**.	1	2	3	4	5	6
12.	I am confident that I can do **physical activities** even when I'm feeling down.	1	2	3	4	5	6
13.	I can do **physical activities** when the weather is bad.	1	2	3	4	5	6
14.	I am confident that I can do **physical activities** no matter how stressed I feel.	1	2	3	4	5	6
15.	I can safely do **physical activities** at these facilities (gym, park, recreation center).	1	2	3	4	5	6
16.	I am confident that I can do **physical activities** no matter how busy I am.	1	2	3	4	5	6
17.	I do **physical activities** to be popular.	1	2	3	4	5	6
18.	I can do **physical activities** when it is hot outside.	1	2	3	4	5	6
19.	I do **physical activities** to gain the approval of others.	1	2	3	4	5	6
20.	I am confident that I can do **physical activities** even when my friends criticize me for it.	1	2	3	4	5	6
21.	My **physical activities** are influenced by my neighbors.	1	2	3	4	5	6
22.	I am confident that I can do **physical activities** even when I'd rather be doing something else.	1	2	3	4	5	6
23.	I can safely do **physical activities** in my neighborhood.	1	2	3	4	5	6
24.	My **physical activities** are influenced by the media (TV, radio, magazines).	1	2	3	4	5	6
25.	I am confident that I can do **physical activities** 5 times per week for the next 6 months.	1	2	3	4	5	6
26.	I do **physical activities** to impress others.	1	2	3	4	5	6
27.	I can safely do **physical activities** at my school.	1	2	3	4	5	6
28.	I can do **physical activities** when it is cold outside.	1	2	3	4	5	6
29.	I can travel (by car, bike, bus, or walk) to places where I can be **physically active**.	1	2	3	4	5	6

Continue on next page. ➔

PHYSICAL ACTIVITY RECALL INFORMATION

Instructions for completing pages 4 – 9 of this questionnaire:

The purpose of this section of this questionnaire is to approximate the amount of physical activity that you perform. The name of each day that you will describe is in the top left-hand corner of each Activity Time Sheet.

1. For **each** time period, write in the activity number that corresponds to the **main** activity you actually performed during that particular time period. If you did more than one activity during the 30 minutes, record the activity that you did for **most** of the time. The activity numbers are found on the **Coding Instructions Sheet (see handout)**. Note that the first twenty (20) activities are shaded.
2. If the activity is shaded on the **Coding Instructions Sheet** then you do not need to fill out any of the remaining columns and you should go to the next time period. Otherwise, proceed with number 3.
3. For activities 19-61, rate how physically **hard** each activity was. Place a "✓" in the timetable to indicate one of the four intensity levels for each non-shaded activity. Refer to the **Intensity Scale Sheet (see handout).** Note: If # 61 is used, write in the name of the activity.

EXAMPLE: (Sample activity time sheet)

The table below shows the correct way to fill out the activity time sheets. Note that only **one** intensity level is checked for each physical activity.

	Activity Number	Light	Moderate	Hard	Very Hard
7:00-7:30	15				
7:30-8:00	14				
8:00-8:30	23		√		
8:30-9:00	18				
9:00-9:30	18				
9:30-10:00	21			√	
10:00-10:30	21			√	
10:30-11:00	18				
11:00-11:30	18				
11:30-12:00	1				

Turn to next page. Questions continue on back. ➔

SATURDAY

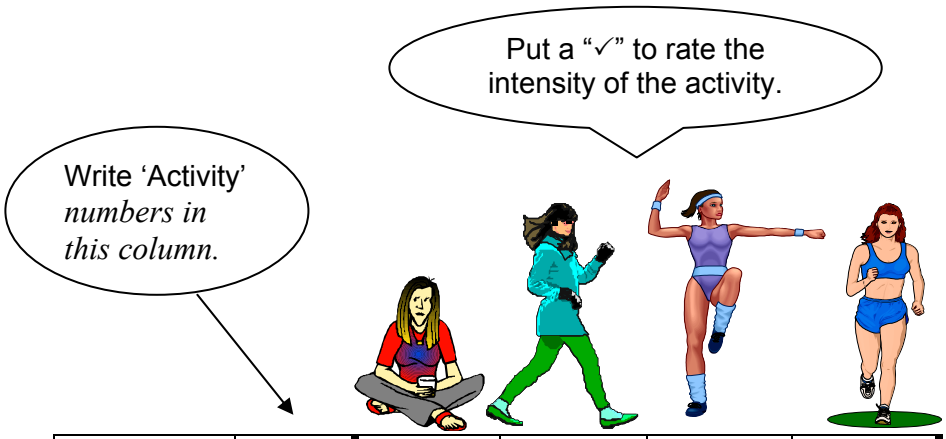
Put a "✓" to rate the intensity of the activity.

Write 'Activity' numbers in this column.

	Activity Number	Light	Moderate	Hard	Very Hard
7:00-7:30					
7:30-8:00					
8:00-8:30					
8:30-9:00					
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:00					
12:00-12:30					
12:30-1:00					
1:00-1:30					
1:30-2:00					
2:00-2:30					
2:30-3:00					
3:00-3:30					
3:30-4:00					
4:00-4:30					
4:30-5:00					
5:00-5:30					
5:30-6:00					
6:00-6:30					
6:30-7:00					
7:00-7:30					
7:30-8:00					
8:00-8:30					
8:30-9:00					
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:00					

Continue on next page. ➔

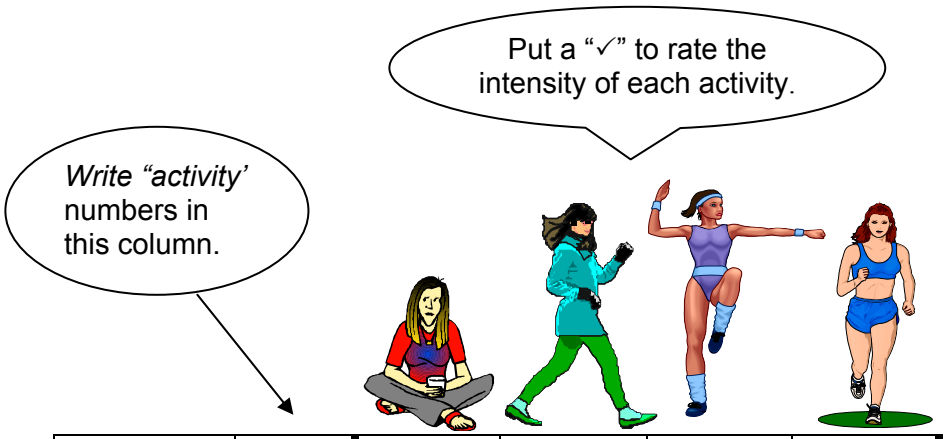
SUNDAY



	Activity Number	Light	Moderate	Hard	Very Hard
7:00-7:30					
7:30-8:00					
8:00-8:30					
8:30-9:00					
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:00					
12:00-12:30					
12:30-1:00					
1:00-1:30					
1:30-2:00					
2:00-2:30					
2:30-3:00					
3:00-3:30					
3:30-4:00					
4:00-4:30					
4:30-5:00					
5:00-5:30					
5:30-6:00					
6:00-6:30					
6:30-7:00					
7:00-7:30					
7:30-8:00					
8:00-8:30					
8:30-9:00					
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:00					

Turn to next page. Questions continue on back. ➔

MONDAY



	Activity Number	Light	Moderate	Hard	Very Hard
7:00-7:30					
7:30-8:00					
8:00-8:30					
8:30-9:00					
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:00					
12:00-12:30					
12:30-1:00					
1:00-1:30					
1:30-2:00					
2:00-2:30					
2:30-3:00					
3:00-3:30					
3:30-4:00					
4:00-4:30					
4:30-5:00					
5:00-5:30					
5:30-6:00					
6:00-6:30					
6:30-7:00					
7:00-7:30					
7:30-8:00					
8:00-8:30					
8:30-9:00					
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:00					

Continue on next page. ➔

Godin Leisure-Time Exercise Questionnaire

1. Considering a **7-Day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your **free time** (write on each line the appropriate number).

	Times Per Week
a) Strenuous Exercise **(Heart Beats Rapidly)** (i.e. running, jogging, flag football, soccer, basketball, karate, roller skating, jumping rope)	_____
b) Moderate Exercise **(Not Exhausting)** (i.e. fast walking, softball, tennis, easy bicycling, volleyball, badminton, swimming, dancing)	_____
c) Mild Exercise **(No Effort)** (i.e. yoga, frisbee, fishing from river bank, bowling, horseshoes, easy walking)	_____

2. Considering a 7-Day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

OFTEN	SOMETIMES	NEVER/RARELY
1. ☐	2. ☐	3. ☐

Thank you for completing this questionnaire.

Now you may hand in the questionnaire.

INTENSITY SCALE SHEET

• **<u>Light</u> - Slow breathing, little or no movement.**




•**<u>Moderate</u> - Normal breathing and some movement**.




• **<u>Hard</u> - Increased breathing and moderate movement**.




• **<u>Very Hard</u> - Hard breathing and quick movement.**




CODING INSTRUCTIONS SHEET

'Activity' Numbers:

EATING

1. Eating a meal
2. Snacking
3. Cooking

AFTER SCHOOL / SPARE TIME / HOBBIES

4. Church
5. Hangin' out
6. Homework
7. Listening to music
8. Music lesson / playing instrument
9. Napping
10. Playing video games / surfing internet
11. Reading
12. Shopping
13. Talking on phone
14. Watching TV, movie, or concert

SLEEP / BATHING

15. Getting dressed
16. Getting ready (hair, make-up, etc.)
17. Showering / bathing
18. Sleeping

SCHOOL

19. Lunch / free time / study hall
20. Sitting in class
21. Club, student activity
22. Marching band/flag line
23. P.E. Class

TRANSPORTATION

24. Riding in a car/bus
25. Travel by walking
26. Travel by bicycling

WORK

27. Working (part-time job, child care, etc.)
28. Doing house chores (vacuuming, dusting, washing dishes, animal care, etc.)
29. Yard Work (mowing, raking, etc.)

PHYSICAL ACTIVITIES

30. Aerobics, jazzercise, water aerobics, Taebo
31. Basketball
32. Bicycling, mountain biking
33. Bowling
34. Exercises (push-ups, sit-ups, jumping jacks, etc.)
35. Cheerleading, drill team
36. Dance (at home, at a class, in school, at a party, at a place of worship, etc.)
37. Exercise machine (cycle, treadmill, stair master, rowing, etc.)
38. Football
39. Frisbee
40. Gymnastics / Tumbling
41. Jumping rope
42. Kick boxing
43. Martial arts (karate, judo, tai kwan do, tai chi, boxing, etc.)
44. Playground games (4-square, dodge ball, kick ball, etc.)
45. Playing catch
46. Playing with younger children
47. Roller blading, roller skating
48. Running / Jogging
49. Skateboarding
50. Soccer
51. Softball / baseball
52. Swimming (laps)
53. Swimming (play, pool games – Marco Polo, water volleyball, etc.)
54. Tennis, racquetball, badminton, paddleball
55. Trampolining
56. Track & field
57. Volleyball
58. Walking for exercise
59. Weightlifting
60. Yoga, stretching
61. Other_____

Appendix B

Inter-item Correlation Matrix for the Confirmatory Factor Analysis

Item number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	.50	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	.30	.26	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	.40	.35	.27	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	.34	.19	.24	.38	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	.34	.36	.17	.65	.37	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	.39	.31	.27	.20	.31	.33	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	.32	.29	.18	.36	.35	.38	.34	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-
9	.03	-.04	.19	.06	.06	-.02	.01	-.08	1.00	-	-	-	-	-	-	-	-	-	-	-	-
10	.41	.43	.25	.38	.37	.41	.31	.32	.09	1.00	-	-	-	-	-	-	-	-	-	-	-
11	-.03	-.12	.04	.07	.12	-.04	.02	.04	.57	.11	1.00	-	-	-	-	-	-	-	-	-	-
12	.32	.34	.18	.30	.15	.28	.28	.17	-.14	.22	-.21	1.00	-	-	-	-	-	-	-	-	-
13	-.02	-.05	.20	-.01	.02	-.02	.05	.06	.27	.05	.19	.01	1.00	-	-	-	-	-	-	-	-
14	.36	.22	.24	.43	.48	.38	.29	.40	.06	.48	.13	.25	.21	1.00	-	-	-	-	-	-	-
15	.22	.24	.38	.13	.27	.14	.23	.10	.10	.31	.01	.17	.12	.25	1.00	-	-	-	-	-	-
16	-.16	-.10	.12	-.04	-.03	-.11	-.05	-.04	.26	-.05	.35	-.03	.26	.04	.13	1.00	-	-	-	-	-
17	.49	.41	.33	.37	.30	.28	.27	.42	.12	.44	.02	.19	.12	.38	.31	.02	1.00	-	-	-	-
18	-.08	-.06	.02	-.01	.11	-.04	-.03	-.03	.62	.07	.57	-.11	.20	-.04	.06	.29	-.02	1.00	-	-	-
19	.23	.22	.27	.17	.22	.22	.45	.17	-.16	.24	-.15	.31	.01	.23	.27	-.07	.27	-.18	1.00	-	-
20	.29	.17	.18	.36	.36	.32	.14	.34	-.08	.33	-.02	.08	-.04	.41	.24	-.03	.27	-.10	.31	1.00	-
21	.22	.27	.30	.21	.24	.20	.29	.20	-.12	.19	-.06	.27	.06	.21	.21	-.01	.17	-.07	.26	.25	1.00

Vita

Flint D. Mitchell was born in Lake Charles, Louisiana and received his B.A. from Northeast Louisiana University, in 1995 and M.S. from Southern University in Baton Rouge, LA in 1995 and is submitting this dissertation as part of the requirement for the Doctor of Philosophy Degree from the University of New Orleans in Curriculum and Instruction with a concentration in Human Performance and Health Promotion. Upon completion of degree and graduation from the University of New Orleans, Mr. Mitchell will seek an academic position in health education.