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An Investigation of the Impact of Family Dynamics on Obesity among African American Adolescent Girls

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AN INVESTIGATION OF THE IMPACT OF FAMILY DYNAMICS ON OBESITY AMONG AFRICAN AMERICAN ADOLESCENT GIRLS

by

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ABSTRACT

Children who are overweight and obese are more likely to maintain their weight status into adulthood (Fletcher, Cooper, Helms, Northington, & Winters, 2009; World Health Organization [WHO], 2015). The prevalence of obesity has shown a more consistent increase among African Americans aged 2-19 (Flegal, Carroll, Kit, & Ogden, 2012; Ogden, Carroll, Kit, & Flegal, 2012; Ogden, Carroll, Kit & Flegal, 2014) with an even greater disparity among African American girls (Ogden & Carroll, 2010). Family dynamics is one of the many factors of the environment that has been linked to obesity among children and adolescents. The purpose of this study was first, to explore to what extent family dynamics impact obesity among 12-16 year old African American adolescent girls and secondly, to generate a model of family dynamics that would predict obesity.

This study employed data from the 2009/2010 United States of America (USA) Health Behaviors of School-Aged Children (HBSC) Study database. The final sample included 806 12-16 year old African American adolescent girls. Data were collected for the four variables of family dynamics: family affluence scale score, family structure, perceived parental promotion of autonomy, and perceived parental affection. Body mass index (BMI) weight status categories were used to determine obesity in this study.

Data analysis was conducted using a variety of statistical analyses. Spearman's Rho correlation was used to determine the relationship between family affluence scale score, perceived parental promotion of autonomy, perceived parental affection, and BMI weight status categories. Cramer's V was used to determine the relationship between family structure and BMI weight status categories. Results from a multinomial logistic

regression were used to predict BMI weight status categories using a model of family dynamics.

The findings of this study indicated that family affluence was a significant predictor of BMI weight status categories. Adolescent girls with high affluence were more likely to be in a lower BMI weight status categories as opposed to girls with low affluence. The investigator-generated model of family dynamics correctly predicted 68.23% of the BMI weight categories among adolescent girls. Prospective research studies should explore the impact of the various elements of family affluence on obesity among African American adolescent girls.

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DEDICATION

This dissertation is dedicated to my parents, the late Elder John and Evangelist Pearline McDyess. I appreciate my parents for portraying a Godly example and living a life that represents Christ. My parents have always motivated me to achieve greatness and to strive for excellence. Finally, my parents have always believed in me and encouraged me to move beyond just ordinary to extraordinary.

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LIST OF ABBREVIATIONS

AACAP	American Academy of Child and Adolescent Psychiatry
Aff	Affection
AHA	American Heart Association
Aut	Autonomy
BMI	Body Mass Index
CDC	Center for Disease Control and Prevention
FAS	Family Affluence Scale
HBSC	Health Behaviors of School-Aged Children
IOM	Institute of Medicine
MSDH	Mississippi Department of Health
SES	Socioeconomic Scale
SPSS	Statistical Package for the Social Sciences
USA	United States of America
WHO	World Health Organization

CHAPTER I – RESEARCH PROBLEM

Introduction

Obesity among children and adolescents has increased both nationally and globally at an alarming rate to the point of being epidemic. In the United States, obesity among children and adolescents has nearly tripled and currently affects approximately 17% of all children and adolescents aged 2-19 (Ogden, Carroll, Kit & Flegal, 2014; Robert Wood Johnson Foundation, 2011). Between 2003-2004 and 2009-2010, obesity appeared to have leveled off (Flegal, Carroll, Kit, & Ogden, 2012; Ogden, Carroll, Kit, & Flegal, 2012). While there has been no significant change in prevalence of obesity among children between 2003-2004 and 2011-2012 (Kolbo, Zhang, Molaison, Harbaugh, Hudson, Armstrong, & Werle, 2012; Ogden et al., 2014), prevalence rates have shown a disproportionate increase among racial and ethnic minorities with nearly 40% of African American and Hispanic children being overweight and obese (Robert Wood Johnson Foundation, 2011). In 2011-2012, obesity prevalence among non-Hispanic African Americans aged 2-19 was 20.2%, 22.4% among Hispanics, and 14.1% among their non-Hispanic White counterparts (Ogden et al., 2014). While Hispanics show an increase prevalence of obesity, non-Hispanic African Americans or African Americans have shown more of a consistent increase overtime (Flegal et al., 2012; Ogden et al., 2012; Ogden et al., 2014) with an even greater disparity among non-Hispanic African American girls (Ogden & Carroll, 2010). For this study, obesity was defined as a body mass index, BMI, $\geq$ the 95^{th} percentile as established by the Centers for Disease Control (CDC) weight status categories for age for the year 2000 (Centers for Disease Control & Prevention, 2015).

Many studies have concluded that the increase in obesity among African American children is the result of increased soft drink consumption, increased television time, consumption of non-nutritious foods, lack of physical activities, onset of menarche, neighborhood safety, family dynamics, and parental socioeconomic status (Davis & Cooper, 2008; Loos & Bouchard, 2003; Robinson & Butler, 2011; Stafford et al., 2007; Wang, 2011).

Family dynamics is one of the many factors that has been linked to obesity in children and adolescents. Parents and families play a primary role in the health of a child. Researchers note that the obesity risk of the child is greatly impacted by family through genetics (Lawlor et al., 2008) and home environment (Strauss & Knight, 1999).

Researchers indicate that various elements of family dynamics impact obesity. The maternal weight has been strongly linked to the weight of the child (Danielzik, Longnasek, Must, Spethmann, & Muller, 2002). Although maternal influence is often higher, paternal influence is also important (Hair, Moore, Garrett, Ling, & Cleveland, 2008; Linabery et al., 2013). Lower obesity rates are noted in children living with grandparents and in foster care (Dorsey, Wells, Krumholz, & Cancato, 2005).

Familial socioeconomic status, referred to as family affluence in this study, has been directly correlated with obesity. Low-income families are more likely to have more overweight children than high-income families (Levine, 2011). Children of low-income families are also less likely to eat healthy meals (Levine, 2011).

Family structure has also been associated with the health outcome of the child. According to Huffman, Kanikireddy, and Patel (2010), children who live in single-parent households are more overweight than children of a two-parent household. Single parent

households are reported to be headed by 21.2% of African American females as compared to 6.2% of Caucasian females and 2.0% of African American males as compared to 1.8% of Caucasian males (US Census Bureau, 2016).

Family relationships, particularly parent-child relationships are essential to understanding the obesity risk and well-being. Higher degree of parental affection has been positively correlated with increased child well-being (Operario, Tschann, Flores, & Bridges, 2006; Steinberg & Silk, 2002). Families who promote autonomy among their adolescents are correlated with improved child well-being (Lekes, Gingras, Philippe, Koestner, & Fang, 2010; Wang, Peterson, & Morphey, 2007). In contrast, children of parents who deny or negatively respond to autonomy show a decrease sense of well-being (Wang, Peterson, & Morphey, 2007). Furthermore, children with authoritarian parents who are characterized with decreased levels of interaction and responding and increased levels of demand are 35% to 41% more likely to be obese than children with authoritative parents (Kakinami, Barnett, Seguin, & Paradis, 2015).

The Surgeon General's call to prevent and treat obesity encourages environmental changes and identification of culturally appropriate interventions (Office of the Surgeon General, 2001). In agreement with the Surgeon General's call, it has been well documented that many state and country wide initiatives have been implemented which may be associated with the lack of significant increase in the overall prevalence of obesity and overweight among children and adolescents (Kolbo et al., 2012). However, prevalence among African American children and adolescents is yet increasing particularly among African American girls.

While many studies have made suggestive speculations as to the cause of the lack of obesity decline among African American girls, there is yet no definitive answer. The studies are often limited and not generalizable to the U.S. population. Many interventions have been implemented based on these data; however, the prevalence of obesity among African American adolescent girls remains the highest when compared to girls from other racial groups.

Attempts have been made to treat this epidemic, yet obesity among children and adolescents presents many serious challenges in the 21st century. Obesity is a multidimensional healthcare problem and presents many complexities to healthcare providers and policymakers. Despite the wealth of knowledge about the many factors that contribute to childhood obesity, little is known about the extent of the impact of specific elements of the factors on obesity among a nationally representative sample of African American adolescent girls. Little is also known about the integration of those elements and the extent of their impact on obesity in this population. Therefore, it is vitally important that research be conducted that examines the various elements in a child's familial environment and then determine to what extent these elements impact obesity. Furthermore, it is important to generate a model that will predict obesity from various elements of a child's familial environment. Hence, the purposes of this study was to explore to what extent do family dynamics impact obesity among 12-16 year old African American adolescent girls and, to generate a model of family dynamics that would predict obesity. The research questions answered in this study were: 1) What is the relationship between family affluence scale score and BMI weight status categories among 12-16 year old African American adolescent girls? 2) What is the relationship

between family structure and BMI weight status categories among 12-16 year old African American adolescent girls? 3) What is the relationship between perceived parental promotion of autonomy and BMI weight status categories among 12-16 year old African American adolescent girls? 4) What is the relationship between perceived parental affection and BMI weight status categories among 12-16 year old African American adolescent girls? 5) To what extent will an investigator-generated model of family dynamics best predict weight status categories among 12-16 year old African American adolescent girls? Descriptions of the research variables are provided in Table 1. The major focus of these research questions was BMI weight status categories, from which obesity was determined. Obesity was calculated from BMI and further defined by BMI weight status categories. For initial analyses of each research question, BMI weight status categories were used. BMI weight status categories are provided in Table 2. This study was posited to help bridge the gap in understanding specific elements of family dynamics that have the greatest impact on obesity among African American adolescent girls and to generate a model that predicts obesity as a result of BMI weight status categories. This study may assist healthcare providers in developing and implementing appropriate interventions.

Development and implementation of these interventions may positively affect obesity among African American adolescent girls by aiding in restoring them to health. This study examined to what extent does family dynamics impact obesity among a nationally representative sample of 12-16 year old African American adolescent girls. Results of this study helped determine which individual element or combination of elements had a significant impact on obesity among African American adolescent girls.

Table 1 *Description of research variables included for analysis*

Domain	Variable	Item
Family affluence	Family affluence scale score	How well off do you think your family is?
		How many computers does your family own?
		Do you have your own bedroom for yourself?
		Does your family own a car, van, or truck?
		During the past 12 months, how many times did you travel away on vacation with your family?
Family structure	Family structure—adult responsible for your care (main home)	Please answer the question for the home where you live all or most of the time and check all the people who live there.
		Mother; Father; Stepmother or Father's Girlfriend; Stepfather or Mother's Boyfriend; Grandmother; Grandfather; I live in a foster home or children's home; Someone else or Somewhere else
Autonomy	Perceived parental promotion of autonomy	My parent/guardian Lets me do what I like doing
		Likes me to make my own decisions
		Tries to control everything
		Treats me like a baby

Table 1 (continued).

Affection	Perceived parental affection	My parent/guardian Helps me as much as I need Is loving Understands my problems and worries Makes me feel better when I am upset

Table 2 *BMI-for-age weight status categories for girls*

GIRLS				
AGE	Underweight BMI $\leq$ 5th	Healthy Weight 5th < BMI $\leq$ 85th	At Risk of Overweight 85th < BMI $\leq$ 95th	Overweight BMI > 95th
12	BMI ≤ 14.8	14.8 < BMI ≤ 21.7	21.7 < BMI ≤ 25.2	BMI > 25.2
13	BMI ≤ 15.3	15.3 < BMI ≤ 22.5	22.5 < BMI ≤ 26.2	BMI > 26.2
14	BMI ≤ 15.8	15.8 < BMI ≤ 23.3	23.3 < BMI ≤ 27.2	BMI > 27.2
15	BMI ≤ 16.3	16.3 < BMI ≤ 24.0	24.0 < BMI ≤ 28.1	BMI > 28.1
16	BMI ≤ 16.8	16.8 < BMI ≤ 24.6	24.6 < BMI ≤ 28.8	BMI > 28.8

For the purposes of this study:

85th < BMI $\leq$ 95th percentile was considered overweight

BMI > 95th percentile was considered obese

Reference: http://www.cdc.gov/growthcharts/clinical_charts.htm

(CDC, 2017)

Problem Statement

Obesity among children and adolescents has shown a disproportionate increase across race, gender, and socioeconomic status. Obesity is higher among African Americans and Hispanics, nearly 40% of children are overweight or obese (Robert Wood Johnson Foundation, 2011). More importantly the prevalence of high body mass index (BMI) among adolescents 12-19 at or above the 85^{th} percentile was highest among African Americans at an average of 39.8 (Ogden et al., 2014). African American girls in the same category have the highest BMI with an average of 42.5 (Ogden et al., 2014). While the rate of childhood obesity has not increased, no significant change has been noted between 2003-2004 and 2011-2012 (Ogden et al., 2014).

Obese children have an 80% chance of being obese adults and remaining obese throughout life (American Academy of Child and Adolescent Psychiatry [AACAP], 2016; American Heart Association [AHA], 2016). One-third of adults in the U.S. are obese (Flegal et al., 2012; Ogden et al., 2014). Studies report that there has been no significant change between 2003-2004 and 2011-2012 (Flegal et al., 2012; Ogden, Carroll, Kit & Flegal, 2014). Parallel to insignificant change, the prevalence of grade 3 (BMI $\geq$ 40) was highest among women when compared to men, 8.3% and 4.4%, respectively (Ogden et al., 2014). Furthermore, the prevalence of grade 3 obesity was highest among non-Hispanic African American adults as compared to non-Hispanic Caucasian adults, non-Hispanic Asian adults, and Hispanic adults, 12.1%, 5.6%, 0.9%, and 5.8%, respectively (Ogden et al., 2014). Non-Hispanic African American women have the highest rate of overweight and obesity in the United States with 4 out of 5 (82%) being overweight or obese (CDC, 2016).

Purpose of the Study

The purpose of this study was to first, explore to what extent do family dynamics impact obesity among 12-16 year old African American adolescent girls and secondly, generate a model of family dynamics that will predict obesity. Data were utilized from the 2009/2010 Health Behaviors in School-Aged Children database. For the purpose of this study, family dynamics was defined by the constructs family affluence, family structure, perceived parental promotion of autonomy, and perceived parental affection. Family dynamics was measured using the variables: Family Affluence Scale score, family structure, perceived parental promotion of autonomy, and perceived parental affection. This study will assist nurses, policymakers, healthcare providers, and stakeholders to ensure that programs and interventions are developed that enhance the determinants and decrease the risk factors of obesity among African American adolescent girls.

Research Questions

1. What is the relationship between family affluence scale score and BMI weight status categories among 12-16 year old African American adolescent girls?
2. What is the relationship between family structure and BMI weight status categories among 12-16 year old African American adolescent girls?
3. What is the relationship between perceived parental promotion of autonomy and BMI weight status categories among 12-16 year old African American adolescent girls?
4. What is the relationship between perceived parental affection and BMI weight status categories among 12-16 year old African American adolescent girls?

5. To what extent will an investigator-generated model of family dynamics best predict BMI weight status categories among 12-16 year old African American adolescent girls?

Research question 1 used the variables family affluence scale score and BMI weight status categories. Research question 2 used the variables family structure and BMI weight status categories. Research question 3 used the variables perceived parental promotion of autonomy and BMI weight status categories. Research question 4 used the variable perceived parental affection and BMI weight status categories. Research question 5 used the variables family affluence scale score; family structure; perceived promotion of autonomy, perceived parental affection, and BMI weight status categories.

Theoretical Framework

The Neuman Systems Model of nursing provided the framework for this study. The Neuman System Model views the client as dynamic and operating as an open system with five interrelated variables: physiological, psychological, sociocultural, developmental, and spiritual and in constant interaction with the environment (Neuman, 2002). The environment is the key element that affects this system. The environment can be internal, external, or created and can affect the system either positively or negatively (Neuman, 2002). Neuman's model focuses on how the client reacts to environmental stressors and what interventions are necessary for the client to adapt to or reconstruct as a result of the stressors (Neuman, 2002).

Neuman (2002) identified four concepts, which constitute the nursing paradigm: the person, the environment, health, and nursing. The person is a dynamic system that is in constant interaction with its environment. The person is in constant change moving

toward system stability and an optimal state of wellness or illness. The person has a core center, which represents the basic structure energy resources. The core is the center of basic survival mechanisms such as organ functioning and temperature control. The core is protected by three lines of defense: the flexible line of defense, the normal line of defense, and the lines of resistance. These lines of defense protect the core from being invaded by stressors. The flexible line of defense, which represents the outer layer protects the system and more importantly the normal line of defense from being invaded by stressors. However if the flexible line of defense does not protect the client against a stressor, the normal line of defense will be affected. The interruption of the normal line of defense causes the inner lines of resistance, which represents the internal response to a stressor, to attempt to restore the client to equilibrium or stability through reconstitution. If reconstitution fails after the client has been treated by secondary prevention intervention, death will ensue (Neuman, 2002).

Health is viewed on a wellness-illness continuum. The state of wellness is influenced by intrapersonal, interpersonal, and extrapersonal stressors. Optimal wellness is present when the client system needs are met. Illness occurs when the client system needs are not met. Death occurs when the client system does not have enough energy for reconstitution (Neuman, 2002).

Nursing as a profession is concerned with the stabilization of the client system through implementing the appropriate action for the reaction resulting from the stressor. In order to achieve the equilibrium or stability of the client, nursing interventions (primary, secondary, or tertiary) are utilized. These interventions help to identify and reduce the risk of the stressor occurring; treat the symptoms that resulted from reaction to

the stressor, and protect the reconstitution and preserve the energy of the core (Neuman, 2002).

This study was framed using the following explanation of Neuman Systems Model. The client system is open and in constant exchange with its environment. When the flexible line of defense can no longer protect the normal line of defense, the client system is invaded by environmental stressors. The invasion causes an instability in the system and activates the lines of resistance which causes a reaction of symptoms. The system goes from wellness to illness. Lines of resistance work to protect the core and stabilize the system through reconstitution. Nursing acts to help stabilize the system through prevention as intervention. Secondary prevention is implemented to treat symptoms and strengthen the lines of resistance. If treatment is effective and reconstitution begins, stabilization has occurred and tertiary prevention can begin taking place in order to maintain wellness and preserve energy. If treatment is not effective and reconstitution does not occur, death ensues because the core did not have enough energy to support and stabilize the system.

In this study, African American adolescent girls were the client system or person. The client system will be in constant interaction with its environment (family) and the possible stressors (family dynamics) that this environment imposes. The stressors will invade the client system. Health of the client is viewed on a continuum from wellness to illness inside the normal line of defense. The reaction to the stressors will move the person's health to a level of illness, obesity. Nursing will assist the client system in achieving stability by developing and implementing appropriate primary, secondary, and tertiary interventions necessary to adapt or reconstruct as a result of the influence of the

stressors on the client system. The stability of the client system will improve the health of the system, which will most notably lead to a decrease in the prevalence of obesity among African American adolescent girls. Therefore, this research study was necessary because it provided an approach to obesity among African American adolescent girls, which encompassed the impact of family dynamics as possible environmental stressors on obesity among the girls.

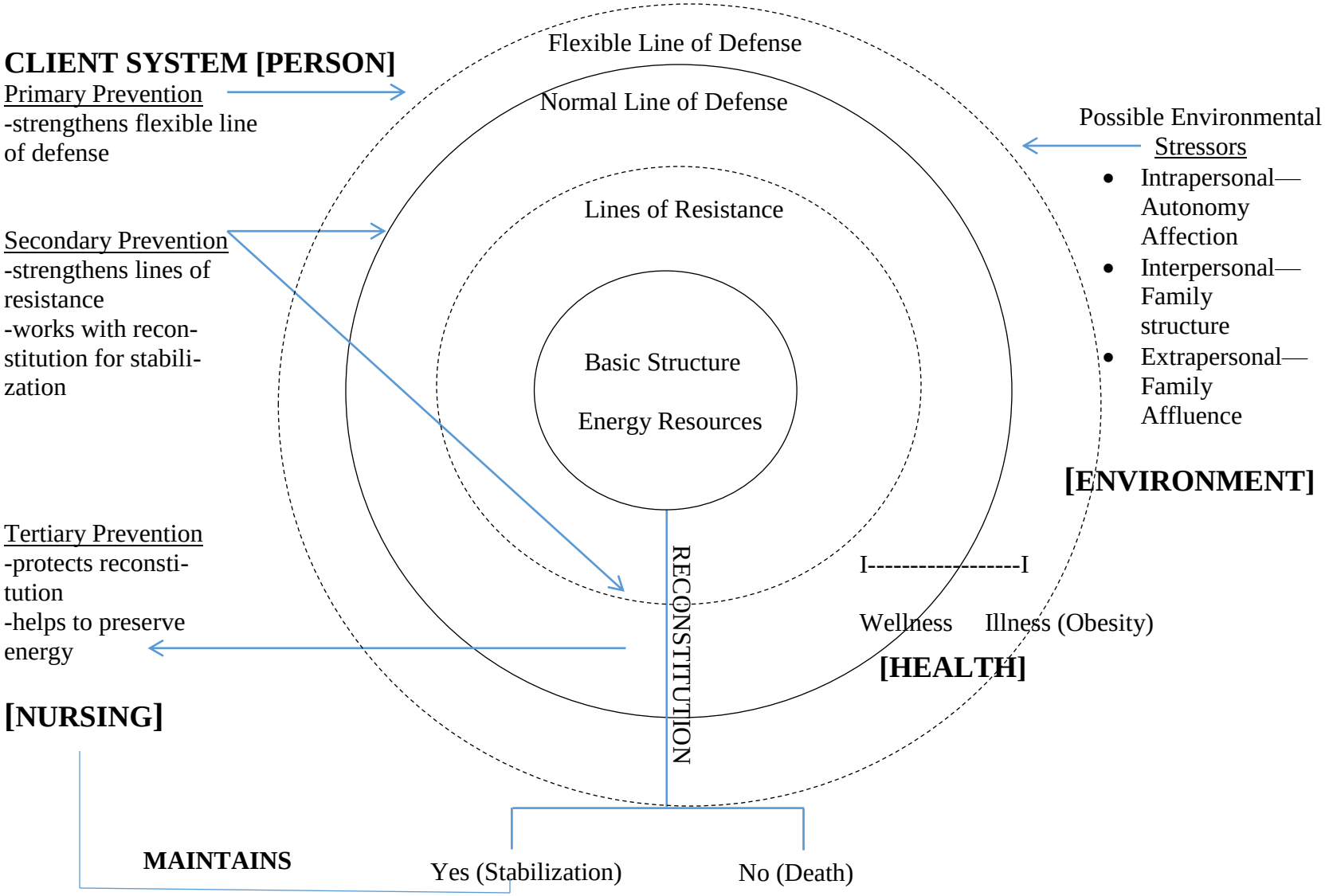

Figure 1. Adaptation of Betty Neuman Systems Model

Operational Definitions

For the purposes of this study, family dynamics was defined by the constructs family affluence, family structure denoted by living arrangements, perceived parental promotion of autonomy, and perceived parental affection. Family dynamics was measured using the variables: Family Affluence Scale score, family structure, perceived parental promotion of autonomy, and perceived parental affection (Iannoti, 2013).

The Family Affluence Scale was used to measure socioeconomic status. Family affluence was measured by the adolescent's responses to the following questions (Questions 11-15): 1) How well off do you think your family is?; 2) How many computers does your family own?; 3) Do you have your own bedroom for yourself?; 4) Does your family own a car, van, or truck?; 5) During the past 12 months, how many times did you travel away on vacation with your family (Iannoti, 2013). Responses to question 1 were coded: Very well off = 1; Quite well off = 2; Average = 3; Not very well off = 4; and Not at all well off = 5. Responses to question 2 were coded: None = 1; One = 2; Two = 3; and More than two = 4. Responses to question 3 were coded: No = 1; Yes = 2. Responses to question 4 were coded: No = 1; Yes, one = 2; Yes, two or more = 3. Responses to question 5 was coded: Not at all = 1; Once = 2; Twice = 3; More than twice = 4. The FAS score was computed based on the total from the answers of the previous 5 questions. The FAS scores were coded from 0-low to 9-high (Iannoti, 2013).

Family structure was measured by the responses to the following questions in regards to responsible adult(s) with whom the child lived in their main home (Questions 16-1 to 16-8): 1) Please answer the question for the home where you live all or most of the time and check all the people who live there: mother, father, stepmother or father's

girlfriend, stepfather or mother's boyfriend, grandmother, grandfather, someone else or somewhere else, I live in a foster home or children's home. From these results, a responsible adult(s) with whom the child lived was tabulated and categorized.

Perceived parental promotion of autonomy (Jimenez-Iglesias, Moreno, Ramos, & Rivera, 2015; Klimidis, Minas, & Ata, 1992) was measured by the responses to the following questions (Questions 53 B, E, F, G): My parent/guardian lets me do what I like doing; likes me to make my own decisions; tries to control everything; and treats me like a baby (Iannoti, 2013). Responses was measured using a Likert scale: Almost Always = 1: Sometimes = 2; Almost Never = 3; and Don't Have or Don't See Parent/Guardian = 4 (Iannoti, 2013). Questions 53 F and G were reverse coded. This variable was dummy coded and placed into five categories: 1.00-high autonomy; 1.50; 2.00; 2.50; 3.00-low autonomy.

Perceived parental affection (Klimidis, Minas, & Ata, 1992; Jimenez-Iglesias, Moreno, Ramos, & Rivera, 2015) was measured by the responses to the following questions (Questions 53 A, C, D, H): My parent/ guardian helps me as much as I need; is loving; understands my problems and worries; and makes me feel better when I am upset (Iannoti, 2013). Responses was measured using a Likert scale: Almost Always = 1: Sometimes = 2; Almost Never = 3; and Don't Have or Don't See Parent/Guardian = 4 (Iannoti, 2013). This variable was dummy coded and placed into five categories: 1.00-high affection; 1.50; 2.00; 2.50; 3.00-low affection.

Demographics variables such as age, grade in school, BMI (self-report of weight and height), and BMI weight status categories were measured as part of the HBSC survey (Iannoti, 2013). Age was measured by the answer to the following question (Question

3B): How old are you?. The adolescent's answer choices for age included 10 or younger, 11, 12, 13, 14, 15, 16, 17 or older. The age range for this study was 12-16 years of age. Grade in school was measured by the answer to the following question (Question 4): What grade are you in? The adolescent's answer choices for grade in school included grade 5, 6, 7, 8, 9, 10. Weight was measured by the answer to the following question (Question 33): How much do you weigh without clothes? In pounds. The adolescent's self-reported weight was written at the top of the scale and bubbled in accordingly (Iannoti, 2013). Height was measured by the answer to the following question (Question 34): How tall are you without shoes? The adolescent's self-reported height was written at the top of the scale in feet and inches and bubbled in accordingly (Iannoti, 2013). For weight and height responses, the participants were provided with an example of the correct technique to log weight and height on a bubble formatted scale (Iannoti, 2013).

BMI was computed using the formula: [Weight (lbs) / [Height (inches) * Height (inches)]] * 703. The adolescents' BMI was interpreted using percentiles from the CDC year 2000 and assigned into BMI weight status categories (derived from computed BMI): Underweight—less than 5^{th} percentile coded with a value of 1; Healthy weight—between 5^{th} and 85^{th} percentile coded with a value of 2; At risk of overweight—between 85^{th} and 95^{th} percentile coded with a value of 3; and Overweight—greater than 95^{th} percentile coded with a value of 4. For the purposes of this study, overweight was defined by a BMI at the 85^{th} percentile but lower than the 95^{th} percentile. Obesity was defined by a BMI $\geq$ 95^{th} percentile (CDC, 2015).

Theoretical Variables

The Neuman Systems Model was used as a framework for this study. For this study, the following variables were used: client, basic structure energy resources, flexible line of defense, normal line of defense, lines of resistance, health, environment, environmental stressors, reconstitution, prevention as intervention, and optimal system stability. The client system is an open system that is constantly changing and evolving. The system is in constant interaction with its environment (Neuman, 1995; Neuman, 2002). The client system was 12-16 year old African American adolescent girls who were obese. The basic structure energy resources refers to the core of the client that consists of basic survival factors such as normal temperature range, genetic structure, response pattern, organ strength/weakness, and ego structure (Neuman, 1995; Neuman, 2002).

The flexible line of defense protects the normal line of defense from invasion of stressors. Weakening of this line of defense causes the system to be invaded by stressors (Neuman, 1995; Neuman, 2002). The normal line of defense represents the client's level of health that has been developed over time (Neuman, 2002). It is a standard to determine deviation from the normal level of health or wellness (Neuman, 1995). The lines of resistance protect the client system's core. The lines of resistance represent the internal response to a stressor. When the normal line of defense is invaded by stressor, a reaction of symptoms occurs (Neuman, 1995; Neuman 2002).

Health is the degree of system stability. Health is explained on a continuum from wellness to illness (Neuman, 1995; Neuman 2002). Obesity was viewed as the girl's state of illness. The environment is a domain that is pertinent to the client and its

functions. This domain affects the client and is affected by the client (Neuman, 1995; Neuman 2002). The environment was the girl's family. Environmental stressors refer to the force in the environment that can potentially affect the stability of the client system (Neuman, 1995; Neuman 2002). The stressors include intrapersonal which occurs within the client (perceived parental promotion of autonomy and perceived parental affection); interpersonal which occurs between the client and other individuals (family structure); and extrapersonal which occurs outside the client (Family Affluence Scale score).

Reconstitution refers to the client system returning to and maintaining stability after treatment. The client system may return to their level of health or a higher level (Neuman, 1995; Neuman 2002). Nursing is a profession that seeks to maintain or restore stability to a client system. It is concerned with implementing the most effective action in response to a reaction or possible reaction to a stressor (Neuman, 1995; Neuman 2002).

Prevention as intervention attempts to keep stressors and stress responses from having a great effect on the client's body through primary, secondary, and tertiary prevention. Primary prevention is the identification of risk of environmental stressors so that a reaction will not occur (Neuman, 1995; Neuman 2002). This type of prevention focuses on strengthening the flexible line of defense so the normal line of defense will not be invaded by stressors (Neuman, 1995; Neuman 2002). Secondary prevention is the treatment that occurs after there is a reaction to a stressor (Neuman, 1995; Neuman 2002). This type of prevention focuses on reducing effects from reaction to stressors through treating the symptoms (Neuman, 1995; Neuman 2002). Tertiary prevention is an adjusting process that occurs after secondary prevention has been implemented and

reconstitution begins (Neuman, 1995; Neuman 2002). This type of prevention moves the client toward primary prevention; protects reconstitution; and helps preserve energy (Neuman, 1995; Neuman 2002). Optimal system stability refers to the highest achievable health at a given time. Optimal system stability occurs when the client system needs are met and there is more energy than what is need by the system for support (Neuman, 1995; Neuman 2002).

Assumptions

1. The sample was representative of the young people in a particular age group living in the country.
2. The selected participants answered the questionnaire.
3. The questionnaires were administered in the school context.
4. The responses of the participants were kept anonymous.

Significance of the Study

Children who are overweight and obese are more likely to maintain this weight status into adulthood (WHO, 2015; Fletcher, Cooper, Helms, Northington, & Winters, 2009) with as much as a much as a five to nine fold likelihood (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). There is a relationship between the increased prevalence of obesity and co-morbid diseases such as cardiovascular disease and diabetes. Approximately 70% of children who are obese have at least one other risk factor for cardiovascular disease such as elevated total cholesterol, blood pressure, triglycerides, or insulin (Freedman, Mei, Srinivasin, Berenson, & Dietz, 2007). One in five teenagers in the United States have abnormal cholesterol, which is a major risk factor for heart disease (US CDC, 2010). Among adolescents ages 12-19, two million have prediabetes and

about 215,000 youth under the age of 20 have diabetes (American Diabetes Association, n.d.). Diabetes, being the seventh leading cause of death in the United States, costs the country an astounding $174 billion of healthcare cost (American Diabetes Association, n.d.). It is projected that by 2050, one in three adults will have diabetes (CDC, 2010).

Children who are obese have a higher risk of being diagnosed with asthma (Gilliland et al., 2003) and more likely to develop sleep-ordered breathing (Redline et al., 1999). The children are also predisposed to psychological problems such as depression, eating disorder, and negative self-image (Center for Mississippi Health Policy, 2008). Most importantly, children who are obese are two times as likely to die before the age 55 (Franks et al., 2010).

Currently, medical costs for a child with obesity equates to $19,000 over his or her lifetime (Finkelstein, Graham, & Malhotra, 2014). With African Americans making up 14.2% of the U.S. population (Rostagi, Johnson, Hoeffel, & Drewery, 2011), medical care can prove quite costly.

Summary

In decreasing the prevalence of obesity among African American adolescent girls, it is necessary to understand the impact of the individual elements of the adolescent's familial environment on their weight status. It is equally important to understand the impact of the combined elements of the adolescent's familial environment on their weight status. Being able to predict obesity as an outcome of these elements and/or stressors will better prepare and adequately educate stakeholders to intervene in the adolescent's familial environment.

Therefore, it is important to note to what extent specific elements and/or stressors influence the health of the adolescent and possibly affect the protective lines of defense. When lines of defense are affected, it is imperative that an intervention be implemented. By understanding the extent of the impact of elements and/or stressors on obesity, nurses can develop and implement primary, secondary, and tertiary interventions that will assist the adolescent in a restoration of stability to their system and ultimately decrease the prevalence of childhood obesity.

CHAPTER II – REVIEW OF LITERATURE

Introduction

This chapter is a literature review to explore to what extent do family dynamics impact obesity among African American adolescent girls. The findings assist in understanding the relationship of family dynamics and obesity among African American girls. This review includes: (a) childhood obesity and BMI, (b) prevalence of childhood obesity, (c) African American girls and obesity, (d) family affluence and obesity, (e) family structure and obesity, and (f) parent-child relationship (perceived parental promotion of autonomy and perceived parental affection) and obesity. This review of literature will help to justify the importance of this study in narrowing the existing gaps in the literature.

Childhood Obesity and BMI

Childhood obesity is a medical condition that can be detrimental to the health status of both children and adults (Mayo Foundation for Medical Education and Research, 2016). Obesity is simply defined as an excess of adipose tissue caused by an imbalance between caloric intake and the expenditure of energy (Daniels et al., 2005; Benjamin, 2010; Zhao & Grant, 2010; World Health Organization, 2016). Body mass index (BMI) is often used as a measurement of weight status in adults, children, and adolescents (Kuczmarski et al., 2002; Ogden & Carroll, 2010). According to the CDC, BMI is the result of weight in kilograms divided by height in meters squared (kg/m2) (CDC, 2015).

BMI has been recommended to establish weight status in both adults and children; however, the interpretation of the BMI results has changed over time. In previous years,

children above the 95th percentile of the sex-specific BMI growth charts were considered overweight (CDC, 2017). In 2002, the CDC classified overweight at or above the 95th percentile of BMI for age (CDC, 2015; Flegal, Weir, & Ogden, 2002). The CDC also classified at risk for overweight as a BMI between the 85th and 95th percentile of BMI for age (CDC, 2015). The Institute of Medicine (IOM) now reports that children and adolescents with a BMI $\geq$ 95th percentile are obese (IOM, 2012).

According to the 2000 CDC BMI-for-age growth charts for the United States, being overweight among children and teens is characterized by a BMI above the 85th percentile and below the 95th percentile (CDC, 2015). Obesity is characterized by a BMI at or above the 95th percentile for the same sex and age (CDC, 2015; Ogden & Carroll, 2010). The CDC growth charts are most often used to determine weight status among children in the United States (CDC, 2015).

The World Health Organization defines overweight and obesity by the WHO growth reference for school aged children and adolescents (WHO, 2016). Overweight status among school-aged children and adolescents is defined as one standard deviation of BMI for age and sex (WHO, 2016). Obese status is defined as two standard deviations of BMI for age and sex (WHO, 2016).

Despite BMI measurements having appropriately postulated overweight and obesity weight status among children, BMI can not directly measure the amount of body fat (CDC, 2015; AHA, 2016). In several studies, BMI has shown significant correlation with actual measurements of amount of body fat such as skinfold thickness and dual energy X ray absorptiometry (DXA) (Steinberger et al., 2005).

Prevalence of Childhood Obesity

Childhood obesity affects approximately 17% or 12.7 million of children and adolescents aged 2-19 in the United States (American Academy of Child & Adolescent Psychiatry [AACAP], 2016; Ogden & Carroll, 2010; Ogden et al., 2014). Despite being the topic of many studies and the prevalence of obesity remaining stable between 2003-2004 and 2009-2010, little progress has been made in decreasing childhood obesity (Ogden & Carroll, 2010; Ogden et al., 2014). As a result of its prevalence, childhood obesity has become a public health issue and is being regulated by such entities (Benjamin, 2010; IOM 2012; Khan et al., 2009).

In 2011-2012, 31.8% of children aged 2-19 were overweight or obese with 16.9% of the children being obese (Ogden et al., 2014). The prevalence was lowest among Asian children as opposed to non-Hispanic Caucasian, non-Hispanic African American, and Hispanic children, 8.6%, 14.1%, 20.2%, 22.4%, respectively (Ogden et al., 2014). Between 1976-1980 and 2007-2008, obesity increased from 5% to 18.1% among 12-19 year old adolescents. There was a significant increase among ethnic groups between 1988-1994 and 2007-2008. Among adolescent boys, Mexican Americans had the highest prevalence with an increase from 14.1% to 26.8% (Ogden & Carroll, 2010). Prevalence of obesity was highest among non-Hispanic African American girls with an increase from 16.3% to 29.2% (Ogden & Carroll, 2010).

Childhood obesity has more than doubled from 7% to 17.5% among children 6-11 years of age and quadrupled from 5% to 20.5% among adolescents 12-19 years of age in the past 30 years (National Center for Health Statistics, 2012; Ogden et al., 2014). Among high school students in 37 states, obesity was greater than 15% in 11 states and

no state had below 10% (Kann et al., 2016). Globally in 2010, it was estimated that 43 million children were overweight or obese with 35 million living in developing countries (Onis, Blossmer, & Borghi, 2010). Throughout the world, the prevalence of childhood overweight and obesity has increased from 4.2% in 1990 to 6.7% in 2010 and is projected to reach 9.1% (60 million) by 2020 (Onis, Blossmer, & Borghi, 2010).

African American Adolescent Girls and Obesity

Despite the leveling and stability of prevalence of obesity among children and adolescents, African American girls yet remain as the highest risk group (Kolbo et al., 2012; Mississippi Department of Health [MSDH], 2011; Ogden et al., 2012). Both national and regional studies confirm that African American girls regardless of age and grade level have a statistically higher prevalence of obesity when compared to Caucasian students (Barr-Anderson, Adams-Wynn, DiSantis, & Kumanyika, 2013).

In a study that examined the prevalence of obesity and overweight among MS public school students, among African American girls at the elementary level, 29.7% were obese and 19.9% were overweight with 17.0% of Caucasian girls being obese and 11.2% being overweight. Among middle school participants, 32.0% of African American girls were obese and 19.9% were overweight while 16.5% of Caucasian girls were obese and 20.5% were overweight. At the high school level, 26.4% African American girls were obese and 19.3% were overweight whereas 17.8% of Caucasian girls were obese and 20.4% were overweight (Kolbo et al., 2012). This statistically significant data is consistent with other studies when comparing African American girls with Caucasian girls (Barr-Anderson et al., 2013).

Health in adolescence has been identified as a precursor to health in adulthood. Dietz (2004) noted that being overweight in adolescence may increase the risk of being obese as an adult. Dietz (2004) also claimed that girls are more likely to become overweight than boys during adolescence due to increase in the girls' fatness (Dietz, 2004).

Psychological factors such as depression, and anxiety have been seen among African American girls who are overweight or obese. These psychological factors may cause low self-esteem (Palapattu, Kingery, & Ginsburg, 2006). In adolescence, self-esteem is noted to decrease but it decreases at a slower rate among African American girls as compared to Caucasian girls. African American girls continue with higher self-esteem as an adult (Gray-Little & Hafdahl, 2000). When compared to other racial and ethnic groups, African American girls also have lower levels of dissatisfaction with their bodies and do not perceive themselves as being overweight (Nishina, Ammon, Bellmore, & Graham, 2006).

Family Affluence and Obesity

For this study, FAS was used as a measurement of socioeconomic status (SES). The Family Affluence Scale utilized in the HBSC survey provides data about material wealth, perception of family wealth, and socioeconomic status (Schnohr et al., 2008). Socioeconomic status and its relationship to obesity are important because obesity is determined by social, cultural, economic, and environmental factors (WHO, 2016).

Understanding the prevalence of obesity and its risk factors in relation to the familial affluence scale is vitally important. In a 44-study meta-analysis to examine the relationship between subjective socioeconomic status and health outcomes among

adolescents aged 12-19 years, higher subjective socioeconomic status was positively related to better health outcomes. Subjective socioeconomic status was largely related to mental health outcomes with a strong link to depression, self-rated health, and general health symptoms. However, a smaller effect size was found in the relationship between socioeconomic status and obesity (Quon & McGrath, 2014).

Several studies report findings of SES and obesity being inversely correlated (Dalton, 2004; Ogden et al., 2010; Levine, 2011). However, researchers of a study conducted to determine perceptions of childhood obesity in rural Georgia found that not having enough money was not a risk factor for childhood obesity among these respondents (Alexander, Alfonso, & Hansen, 2015). Approximately 42% had an income below $19,000. Sixty-two percent of the respondents even agreed that they had enough income to help prevent their child from becoming obese (Alexander, Alfonso, & Hansen, 2015).

McCormack, Howe, and Perry (2011) explored whether obesity risk factors differed among children according to their familial affluence. The FAS score was positively correlated only with a weekly consumption of fruit ($r=0.14$, $p<0.05$) in that families with increased FAS scores consumed more fruits (McCormack et al., 2011). Correlations with other risk factors were not found. However, some of the risk factors were positively correlated with other risk factors; frequency of vigorous physical activity was positively associated with vegetable consumption (McCormack et al., 2011). Despite the weakness of this study, it can be useful in determining possible relationships with family wealth and healthy behaviors. It can also be useful in identifying risk factors for various disorders (McCormack et al., 2011).

Many families are aware of the foods that their children should eat but oftentimes access is limited (Dalton, 2004). Some low-income areas do not have access to supermarkets in order to make healthy food choices but in turn have full access to fast food restaurants and unhealthy food choices (Dalton, 2004; Sallis & Glanz, 2009).

Obesity prevalence decreases as income increases (Levine, 2011), but these findings are not consistent among race and ethnic groups (Ogden et al., 2010). No significant trend exists among African American and Mexican-American boys and girls (Ogden et al., 2010). Ogden et al. (2010) provide data that most obese children are not low income, only 38% of children and adolescents live below 130% of the poverty level while 62% live between 130% and 350% or above 350% of the poverty level. Obesity usually declines among Caucasian children with an increase in parental income and education (Troiano & Flegal, 1998) but not in African American girls (Kimm et al., 1996). In contrast, obesity rates showed an increase with an increase in parental income among African American girls (Troiano & Flegal, 1998). Furthermore, research shows that obesity rates are increased among African American girls with higher and lower income when compared to middle income (Gordon-Larsen, Adair, & Popkin, 2003).

Family Structure and Obesity

Single-parent homes in the United States are increasing. In 1970, there were 3 million, this number increased to 10 million by 2003 (Rostagi, Johnson, Hoeffel, & Drewery, 2011). Among these homes, African American girls comprise 21.2% of single-parent homes as opposed to 6.2% being headed by non-Hispanic, Caucasian girls (US Census Bureau, 2016). Living in a single-parent home has been associated with

behaviors such as depression and anxiety among African American children which may cause decreased self-esteem (Palapattu, Kingery, & Ginsburg, 2006).

There are consistent reports that family structure has been linked to childhood obesity. Huffman, Kanikireddy, and Patel (2010) used data from The National Health and Nutrition Examination Survey 1988-1994 to analyze structure of households as predictors for BMI, dietary nutrient intakes, and blood cholesterol. The sample included 1000 children varying in ages from 6-11 from 219 single-parent households and 780 two-parent households. The researchers concluded that significantly lower BMI (19.2 ± 5.4; $p<0.01$) was seen among children from two-parent household as opposed to higher BMI (21.5 ± 6.5; $p<0.01$) being among children from single-parent households (Huffman, ,Kanikireddy, and Patel 2010). African American children living in single-parent households were noted to have the higher BMI when compared to Caucasian children (Huffman, Kanikireddy, and Patel, 2010). Despite the statistically significant relationship between single-parent household and increased weight of the child, the specific elements of the single-parent dynamic is yet unclear (Huffman, Kanikireddy, and Patel, 2010). In contrast, a study posited to determine whether there was an inverse relationship between socioeconomic status and obesity among African American and Caucasian girls and their parents found that among Caucasian girls, number of parents in the household was negatively associated with obesity whereas among African American girls, there was no significant relationship (Kimm et al., 1996). The weight status of the father has less association with the child's weight (Hood et al., 2000); whereas, the mother's weight status has a greater association (Crawford et al., 2010). Furthermore, children with two

obese parents are at an even greater risk of being overweight (Mamun, Lawlor, O'Callaghan, Williams, & Najman, 2005).

Davis, McGonagle, Schoeni, and Stafford (2008) reports findings of the first national study to determine a relationship between child's weight status and obesity among grandparents. These researchers performed a secondary analysis of the Panel Study of Income Dynamics, Child Development Supplement study. The sample included 2591 children aged 5-19 years of age for whom 61% of grandparental BMI data was available. The study does include information about grandparents residing with the children but does not include duration. Prevalence of grandparental obesity was significantly associated with prevalence of overweight among children, if grandparents were obese, there was a 17.4% prevalence that children would be overweight as opposed to a 7.9% prevalence if grandparents were normal weight (Davis, McGonagle, Schoeni, & Stafford, 2008). In 2000, over half a million African American grandparents were raising their grandchildren (Minkler & Fuller-Thomson, 2005).

Parent-Child Relationships and Childhood Obesity

The quality of the family relationship is vitally important to the development of the adolescent (Hair et al., 2008). Parents are core to the adolescents' well-being (Joronen & Astedt-Kurki, 2005). One study suggested that parents are a vital component of preventing childhood obesity but parents have a misconception of the true weight status of their child (Alexander, Alfonso, & Hansen, 2015). Several studies have contributed childhood obesity to the perception of the parent or the caregiver (Reedy & Krebs-Smith, 2010; Singh, Siahpush & Kogan, 2010; Zhao & Grant, 2011).

According to Hair et al. (2008), both relationships with mother and father are important during adolescence, but the maternal influence was deemed slightly more important than the paternal relationship. Furthermore, adolescents with authoritative parents show a better sense of well-being (Milevsky, Schelechter, Netter, & Keekn, 2007). Steinberg and Silk (2002) informs that the authoritative parenting style promotes better well-being because it encompasses the basis of affection, communication, control, and autonomy. In contrast, overprotective parents who do not positively react to the individuality of their children cause a deficit in their child's well-being (Steinberg & Silk, 2002).

In a Canadian study of approximately 40,000 youth, children with authoritarian parents were more likely to be obese when compared to those with authoritative parents (Kakinami, Barnett, Seguin, & Paradis, 2015). The findings of a multivariate logistic regression indicated that pre-school children with authoritarian parents are 35% more likely to obese as compared to children with authoritative parents (Kakinami et al., 2015). School-aged children with authoritarian parents were 41% more likely to be obese than those with authoritative parents (Kakinami et al., 2015). Researchers suggest that authoritarian parents may not respond to the child's indication of hunger or being full due to their decreased interaction or responding and the high demands that they place on the child (Kakinami et al., 2015).

Parental affection is equally important in promoting well-being among adolescents (Cheng & Furnham, 2004; Operario et al., 2006; Steinberg & Silk, 2002). When comparing mothers and fathers, the affection of the mother is the most important for well-being among the adolescent (Cheng & Furnham, 2004). A study conducted to

examine family dynamics of adolescents' health related quality of life found that both maternal and paternal promotion of autonomy and affection are significant predictors of a higher health related quality of life among adolescents (Jimenez-Iglesias et al., 2014). Paternal affection even had a greater affect than maternal affection (Jimenez-Iglesias et al., 2014). Researchers have found that adolescence especially around the age 14 is a crucial stage in life when emotional support, parental affection, and care for physical needs may be most important (Hashimoto, Onuoha, Isaka, & Higuchi, 2011). Failure to do so can result in a detriment to the psychological state of the adolescent (Hashimoto et al., 2011).

This chapter included a review of literature related to childhood obesity and BMI, prevalence of childhood obesity, African American girls and obesity, family affluence and obesity, family structure and obesity, and parent-child relationships and obesity. The research findings suggested that there is a need to understand the extent of the impact of elements of family dynamics on obesity among African American adolescent girls. Chapter III focuses on the methodology being used to collect and analyze data for this study.

CHAPTER III - METHODOLOGY

Introduction

This chapter provides a description of the methodology for this study. This chapter includes a description of the research design, target population and sample, protection of human subjects, instrumentation, reliability and validity of instrument, data collection procedure, and data analysis. The investigator conducted an exploratory study to investigate to what extent family dynamics impact obesity denoted by BMI weight status categories among 12-16 year old African American adolescent girls.

Research Design

An exploratory descriptive correlational research design was used for this study. Predictive modeling was also established in this study. Correlational research involves research that examines relationships among variables. "Correlational research involves the systematic investigation of relationships between or among two or more variables…..If the relationships exist, the researcher determines the type (positive or negative) and the degree or strength of the relationships" (Burns & Grove, 2009, p. 25).

The descriptive correlational research design allows for identification of interrelationships in a situation that has already occurred or is occurring currently (Burns & Grove, 2009, p. 246). The exploratory descriptive correlational research design allows for exploration and determination of relationship among variables by the researcher (Burns & Grove, 2009). Predictive modeling involves selecting aforementioned variables as predictor variables in order to predict future outcomes based on patterns from the selected set of variables (Polit & Beck, 2014). A combination of exploratory descriptive correlational research design and predictive modeling was used in this study. These

designs were used due to the nature of the research questions which aimed to determine the relationship between family dynamic variables and BMI weight status categories and to establish to what extent BMI weight status categories can be predicted from a model of family dynamics. The 2009/2010 Health Behavior in School-Aged Children (HBSC) study database was utilized to collect participants' responses needed to conduct this study. The HBSC study is a cross-national, school-based longitudinal study of health-related attitudes and behaviors of young people sponsored by The World Health Organization (WHO) Regional Office of Europe (Iannotti, 2013).

In an effort to achieve the purpose of this study, Spearman Rho correlation, Cramer's V, and multinomial logistic regression analyses were performed using the SPSS statistics program (Polit & Beck, 2014). Spearman's Rho correlation measures the strength of relationship between two ordinal data (Field, 2009; Polit & Beck, 2014). Spearman's Rho correlation was used to measure the relationship between family dynamic variables (family affluence, perceived parental promotion of autonomy, and perceived parental affection) and BMI weight status categories. Cramer's V measures the strength of the relationship between nominal data particularly categorical variables when the variables has two or more categories (Field, 2009; Polit & Beck, 2014). Cramer's V was used to measure the relationship between family dynamic variable (family structure—living arrangements) and BMI weight status categories. Multinomial logistic regression is an extension of logistic regression in which the categorical variable outcome is predicted by multiple predictor variables (Field, 2009). Multinomial logistic regression was used to predict BMI weight status categories from a model of family dynamics.

Sample and Setting

The 2009/2010 USA HBSC study surveyed 12,642 students from 314 public, Catholic, and other private school students in grades 5-10 or the equivalent in the 50 states and the District of Columbia. The sample was a nationally representative sample collected using a three-stage stratified design with census divisions and grades as strata, and school districts as primary sampling units. In order to obtain a more accurate estimate of population parameters, African American and Hispanic students were oversampled (Iannotti, 2013). Survey responses were obtained from a public use database.

The sample for this study included 12-16 year old African American adolescent girls (N = 806). The girls provided responses to the 2009/2010 HBSC survey. Responses from 12-16 year old girls from other races and ethnicities particularly Caucasian and Hispanic were used only as comparison data.

Eligibility Criteria

Inclusion Criteria: The criteria were set to determine the eligibility for the study. Only responses from 12-16 year old African American girls who were participants of the USA HBSC survey 2009/2010 were included in the study. Responses from girls from all weight status categories were analyzed.

Human Subjects Consideration

Approval from the Institutional Review Board Human Subjects Protection Review Committee at The University of Southern Mississippi was obtained to ensure that human subject protection measures were implemented (Appendix A). This review was

exempt from a separate review. All identifier variables in the 2009/2010 HBSC study were collapsed and recoded to protect the respondents.

Instrumentation

The HBSC 2009-2010 survey is a survey used to measure the health-related attitudes and behaviors of young people. The 2009/2010 HBSC study was sponsored by The World Health Organization (WHO) Regional Office of Europe. Since 1982, WHO has sponsored these national studies in more than 40 participating countries. The HBSC survey contains 173 variables and data are collected from students on topics such as family composition, relationships with family and friends, perceptions of school as a supportive environment, physical health of the student, eating habits, dieting, physical activity, body image, health problems, computer usage, substance abuse, and bullying (Iannotti, 2013).

Initially, the HBSC study began in England, Finland, and Norway to obtain an understanding of smoking behaviors among adolescents (Roberts, Freeman, Samdal, Schnohr, Looze, Gabhainn, & Iannotti, 2009). In the early development, WHO approached countries for membership but now countries are seeking to obtain membership (Roberts et al., 2009). Prior to countries being accepted, the country must pilot a national survey to determine capabilities of being able to collect data and secure funds for a national survey (Roberts et al., 2009).

Family affluence scale score (questions 11-15), family structure or responsible adult(s) with whom you live (questions 16-1 to 16-8), perceived parental promotion of autonomy (questions 53 B, E, F, G), and perceived parental affection (questions 53 A, C, D, H) were part of this survey. Questions are provided on Table 1. These variables were

used as family dynamics variables. Body mass index weight status categories were used as outcome variables.

Reliability and Validity

A study utilizing the HBSC survey protocol was conducted in Beijing, China with a sample of 5876 boys and girls aged 11, 13, and 15 to measure internal consistency and external and construct validity of FAS II items (Liu et al., 2012). Cronbach's alpha was used to examine internal consistency. A moderate association (0.58) was found among the items of FAS (Liu et al., 2012). The alpha coefficient increased to 0.60 when the item 'do you have your own bedroom for yourself' was removed (Liu et al., 2012). Other validation studies have also shown moderate internal reliability (.40, .35 respectively) among items of FAS (Molcho, Nic, & Kelleher, 2007; Lin, 2011). The internal consistency of FAS in this study was Cronbach's alpha = .29. The alpha coefficient would increase to .45 if the item, 'how well off is your family' was removed.

Spearman's Rho correlation and univariate, and multivariate ordinal logistic regression analyses were used to measure external validity of FAS by examining associations between FAS and parents' educational level and perceived family wealth (Liu et al., 2012). Moderate associations between FAS scores and father's education (r_s = 0.49, $p < 0.001$), mother's education ($r_s = 0.48$, $p < 0.001$), and perceived family wealth ($r_s = 0.51$, $p < 0.001$) were noted (Liu et al., 2012). Findings for a study proposed to examine the validity of self-reported SES among 74 adolescents aged 11-13 and 14-16 suggests a significant but weak correlation ($r_s = 0.29$, $p < 0.001$) between parents' occupations, FAS, and perceived SES (Svedberg, Nygren, Staland-Nyman, & Nyholm, 2016).

Cronbach's alpha was used to determine the internal consistency among the items of perceived parental promotion of autonomy and perceived parental affection. The items of perceived parental promotion of autonomy had an adequate reliability, Cronbach's alpha = .72. The items of perceived parental affection had a high reliability, Cronbach's alpha = .83. Cronbach's alpha of .80 or greater are highly desirable, alpha of .7 denotes adequate reliability (Field, 2009; Polit & Beck, 2014).

Procedure

Utilizing data from the Quality Education Data Inc., the researchers of the HBSC study selected public, private, and Catholic schools for participation. After three stages of sampling, 475 schools were eligible for participation but only 314 schools participated in the study. These 314 schools had a total of 12,642 students to participate in the study. The 2009-2010 HBSC survey was administered in a regular classroom by a school representative such as a teacher, nurse, guidance counselor, etc. The survey was administered in three versions: 5th and 6th graders; 7th, 8th, and 9th graders; and 10th graders. The self-report survey took about 45 minutes to complete (Iannotti, 2013).

For the purposes of this study, access to the public use database was gained through the website www.icpsr.umich.edu. The database along with the code book and all three surveys were downloaded onto a password protected computer. The demographics of interest were age, gender, grade in school, race, height, weight, BMI, and BMI weight status categories. Initially, data cleaning was implemented to code for missing data and to remove variables not utilized in this study.

The dataset was then further cleaned to include only responses from girls aged 12-16. Girls from all races were included in the dataset. Caucasian and Hispanic girls were

included only for comparison data. The final sample was 806 African American girls aged 12-16. The variables of interest included family affluence scale score, family structure, perceived parental promotion of autonomy, perceived parental affection, and BMI weight status categories. The SPSS (Version 24) was the software package used to analyze the data.

Data Analysis

Descriptive statistics were used to analyze demographic data. Demographic data included age, grade in school, BMI, and BMI weight status categories. The SPSS program was utilized to conduct data analysis.

The major focus of the research questions was BMI weight status categories, from which obesity was determined. Obesity was determined from the computed BMI and its corresponding weight status category. Therefore, BMI weight status categories were used for initial analyses of each research question.

Research Question 1: What is the relationship between family affluence scale score and BMI weight status categories among 12-16 year old African American adolescent girls? Spearman Rho correlation was used to determine relationship between two ordinal categorical variables (Field, 2009). The descriptive statistic r_s denoted magnitude and direction of the relationship between FAS scores and BMI weight status categories among 12-16 year old African American adolescent girls.

Research Question 2: What is the relationship between family structure and BMI weight status categories among 12-16 year old African American adolescent girls? Cramer's V was used to determine strength of association between two categorical variables with one or both being nominal (Field, 2009). Cramer's V denoted strength of

association between living arrangements and BMI weight status categories among 12-16 year old African American adolescent girls.

Research Question 3: What is the relationship between perceived parental promotion of autonomy and BMI weight status categories among 12-16 year old African American adolescent girls? Spearman Rho correlation was used to determine relationship between two ordinal categorical variables (Field, 2009). The descriptive statistic r_s denoted magnitude and direction of the relationship between perceived parental promotion of autonomy and BMI weight status categories among 12-16 year old African American adolescent girls.

Research Question 4: What is the relationship between perceived parental affection and BMI weight status categories among 12-16 year old African American adolescent girls? Spearman Rho correlation was used to determine relationship between two ordinal categorical variables (Field, 2009). The descriptive statistic r_s denoted magnitude and direction of the relationship between perceived parental affection and BMI weight status categories among 12-16 year old African American adolescent girls.

Research Question 5: To what extent will an investigator-generated model of family dynamics best predict BMI weight status categories among adolescent girls? The multinomial logistic regression was conducted to predict BMI weight status categories from the predictor variables of family dynamics (FAS, family structure, perceived parental promotion of autonomy and perceived parental affection). The model of family dynamics predicted weight status categories among 12-16 year old African American adolescent girls.

Summary

This chapter provided a description of the methodology for this study, research design, target population and sample, protection of human subjects, instrumentation, the reliability and validity of the instrument, data collection procedure, and data analysis. Chapter IV will provide a description of the demographics of the sample. This chapter will also include a presentation of raw data in narrative and tables, the statistical data analysis, the interpretation of the data, and the key findings.

CHAPTER IV - DATA ANALYSIS AND FINDINGS

Introduction

The purpose of this study was first to explore to what extent do family dynamics impact obesity among 12-16 year old African American adolescent girls and secondly to generate a model of family dynamics that will predict obesity. Chapter IV provides a description of the demographics of the sample, the data analysis, and the key findings. Utilizing data from the 2009/2010 HBSC study, only responses from African American adolescent girls aged 12-16 years old were included in this study. Results of the Spearman Rho correlation helped determine the relationship between family dynamics (family affluence, perceived parental promotion of autonomy, and perceived parental affection) and BMI weight status categories. Results of the Cramer's V helped to determine the relationship family dynamics (family structure) and BMI weight status categories. Results of the multinomial logistic regression assisted the investigator in developing a model of family dynamics to predict BMI weight status categories.

Description of the Sample

A total of 985 12-16 year old African American adolescent girls provided responses to the 2009/2010 HBSC survey. Girls who had missing data were excluded from the sample. The final sample size was 806 girls. All of the girls in the sample identified themselves as African American or Black and age 12-16. There were a total of 4,571 girls aged 12-16 in the 2009/2010 HBSC study. Responses from girls from other races particularly Caucasians and Hispanics were used for comparison data.

The ages of the African American girls ranged from 12-16 with 12 (25.2%); 13 (26.2%); 14 (20.2%); 15 (18.4%); and 16 (9.8%). The calculated mean age of the girls

was 13.61. The grade in school ranged from the grade 5 to grade 10 with 5th (1.0%); 6th (8.9%); 7th (27.4%); 8th (25.8%); 9th (17.4%); 10th (19.5%). The girls provided self-reported height and weight information. Mean weights of the adolescent girls for each age are in Table 3. Mean heights of the adolescent girls for each age are in Table 4. Body mass index was computed from the self-reported height and weight and each girl was placed in a BMI weight status category. The overall mean BMI for the African American adolescent girls was M = 22.86, as compared to M = 20.98 among Caucasian girls. The calculated mean of BMI for each age is provided in Table 5.

Table 3 *Mean weight for different ages among African American adolescent girls*

	N	Minimum	Maximum	Mean	Std. Dev
How much weigh (in pounds)					
12	164	65.86	244.49	118.46	30.31
13	185	69.85	250.48	129.34	32.04
14	152	81.83	254.49	135.66	32.11
15	131	89.81	249.48	141.07	34.50
16	62	89.81	249.48	143.65	38.15

Table 4 *Mean height for different ages among African American adolescent girls*

	N	Minimum	Maximum	Mean	Std. Dev
How tall are you (in inches)					
12	168	49	69	60.77	4.197
13	177	52	77	62.23	3.68
14	153	52	71	62.38	3.234
15	134	57	73	63.43	2.987
16	69	54	75	63.03	3.642

Table 5 *Mean BMI for different ages among African American adolescent girls*

	N	Minimum	Maximum	Mean	Std. Dev
BMI-Computed					
12	146	12.52	41.25	22.12	5.63
13	167	13.64	44.19	22.49	4.76
14	146	12.18	41.36	23.63	5.28
15	125	15.91	42.82	23.73	4.95
16	57	15.80	44.19	24.62	5.73

Research Question One

Research Question 1—What is the relationship between family affluence scale score and BMI weight status categories among 12-16 year old African American adolescent girls? A Spearman Rho correlation was conducted to determine the

relationship between family affluence score and BMI weight status categories. Family affluence scale (FAS) score was used as a measure of socioeconomic status.

As part of the 2009/2010 HBSC survey, family affluence was measured by the answers the participants provided to five questions. Questions are provided in Table 1. Scores were computed and tabulated from 0 = low affluence to 9 = high affluence. Family affluence scores were scaled as ordinal continuous variables. BMI weight status categories were presented as an ordinal categorical variable (BMI for age weight status category).

The results indicated a significant relationship between family affluence score (M = 5.62, SD = 2.159) and BMI weight status categories, $r_s = -.139$, $p = 0.01$. Results are provided in Table 6. Family affluence score was negatively correlated with BMI weight status categories. Therefore, the girls are more likely to be in a lower BMI weight status category as family affluence increases.

Table 6 *Correlations between Family Dynamic Variables and BMI-for-Age Weight Status Categories*

		BMI Weight Status Cat.	MedianAff	MedianAut	FAS
BMI Weight Status Cat.	Correlation Coefficient		-.037	.013	-.139**
	Sig. (2 tailed)		.324	.726	.000
	N		714	713	789
MedianAff	Correlation Coefficient	-.037		.432**	-.037
	Sig. (2 tailed)	.324		.000	.288
	N	714		847	843

Table 6 (continued).

MedianAut	Correlation	.013	.432**		-.041
	Coefficient	.726	.000		.235
	Sig. (2 tailed)				
	N	713	847		847
FAS	Correlation	-.139**	-.037	-.041	
	Coefficient	.000	.288	.235	
	Sig. (2 tailed)				
	N	789	843	842	

* Correlation is significant at 0.05

** Correlation is significant at 0.01

Research Question Two

Research Question 2— What is the relationship between family structure and BMI weight status categories among 12-16 year old African American adolescent girls? A Cramer's V was conducted to measure the strength of association between family structure (responsible adult with who you live) and BMI weight status categories. Family structure was presented as a nominal categorical variable. BMI weight status categories were presented as ordinal categorical variables.

The results indicated no significant relationship between living arrangements and BMI weight status categories, Cramer's V = .088; p = .433. Results are provided in Tables 7 and 8. The results are similarly low in Caucasians and Hispanics, Cramer's V = .076, p = .019; Cramer's V = .118, p = .059, respectively.

Of the 793 valid cases, 317 (39.97 %) lived with mother only, 27 (3.4%) lived with father only, 140 (17.65%) lived with mother and stepfather, 20 (2.52%) lived with father and stepmother, 26 (3.28%) lived with grandparents, 39 (4.91%) lived with other arrangements such foster care or someone else, and 224 (28.25%) lived with both mother

and father. Results are provided in Table 5. The lack of significant relationship between family structure and BMI weight status categories could be due to low variability with 364 (45.90%) of the girls living in a two-parent home and 357 (45.02%) living in a single parent home; therefore, family structure did not impact BMI weight status categories.

Table 7 *Cramer's V—Correlation between BMI Weight Status Categories and Family Structure*

		Moth-er only	Fath-er only	Mother/ SF	Father/ SM	GP	Oth-er Arr	Mother/ Father	Total
BMI Wt Status Cat.	Under-weight -- less than 5th percentile	10	0	1	1	0	1	2	15
	Healthy weight- 5th to 85th percentile	174	12	87	7	14	22	134	450
	Overweight- 85th to 95th percentile	76	11	32	8	9	9	53	198
	Obese- greater than 95th percentile	57	4	20	4	3	7	35	130
Total		317	27	140	20	26	39	224	793

SF-Stepfather

SM-Stepmother

GP-Grandparents

Other Arr-Other Arrangements (Foster Homes, Other people)

Table 8 *Cramer's V Analysis*

		Value	Significance
Nominal by Nominal	Cramer's V	.088	.433

Research Question Three

Research Question 3— What is the relationship between perceived parental promotion of autonomy and BMI weight status categories among 12-16 year old African American adolescent girls? A Spearman Rho correlation was conducted to determine the relationship between perceived parental promotion of autonomy and BMI weight status categories. For analysis purposes, the median was used to reflect the perceived parental promotion of autonomy scores (MedianAut).

As part of the 2009/2010 HBSC survey, autonomy was measured by the answers the participants provided to four questions. Questions 53 B, E, F, G were used for the analysis. Questions 53 F and G were reverse coded. Questions are provided in Table 1. Perceived parental promotion of affection scores were dummy coded and presented as ordinal categorical variables based on the frequency distributions in Table 9. BMI weight status categories were presented as ordinal categorical variables.

The results indicated no significant relationship between perceived parental promotion of autonomy and BMI weight status categories, $r_s = .013$, $p = .726$. Results are provided in Table 6. The relationship was similarly non significant in other racial groups, Caucasians $r_s = .027$, $p = .253$; Hispanics $r_s = .018$, $p = .644$. Among the participants, 39.8% reported a high level of autonomy and 66.2% reported a mid to high level of autonomy. The lack of significance could have been due to the kinds of questions asked to measure autonomy. The questions may not be appropriate to adequately measure autonomy for this population.

Table 9 *Frequency Distribution for Perceived Parental Promotion of Autonomy--Median*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	214	21.7	25.2	25.2
	1.50	178	18.1	20.9	46.1
	2.00	260	26.4	30.6	76.7
	2.50	87	8.8	10.2	86.9
	3.00	111	11.3	13.1	100.0
	Total	850	86.3	100.0	
Missing	System	134	13.7		
Total		985	100.0		

1.00= high autonomy

3.00= low autonomy

Research Question Four

Research Question 4— What is the relationship between perceived parental affection and BMI weight status categories among 12-16 year old African American adolescent girls? A Spearman Rho correlation was conducted to determine the relationship between perceived parental affection and BMI weight status categories. For analysis purposes, the median was used to reflect the perceived parental affection scores (MedianAff). As part of the 2009/2010 HBSC survey, affection was measured by the answers the participants provided to four questions. Questions 53 A, C, D, H were used for the analysis. Questions are provided in Appendix A. Perceived parental affection scores were dummy coded and presented as an ordinal categorical variables based on the frequency distributions in Table 10. BMI weight status categories were presented as ordinal categorical variables.

The results indicated no significant relationship between perceived parental affection (MedianAff) and BMI weight status categories, $r_s = -.037$, $p = .324$. Results are provided in Table 6. The relationship was similarly not significant in other racial groups, Caucasians $r_s = .032$, $p = .181$; Hispanics $r_s = .001$, $p = .983$. Among the participants,

55.3% reported a high level of affection and 73.3% reported a mid to high level of affection. The lack of significance could have been due to the kinds of questions asked to measure affection. The questions may not be appropriate to adequately measure affection for this population. Despite no significant relationship with BMI weight status categories, perceived parental affection had a significant relationship with perceived parental promotion of autonomy, $r_s = .432$, $p = .01$. As the level of perceived affection increased so did the level of perceived autonomy.

Table 10 *Frequency Distribution for Perceived Parental Affection--Median*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	391	39.7	45.9	45.9
	1.50	153	15.5	18.0	63.9
	2.00	177	18.0	20.8	84.7
	2.50	85	8.6	10.0	94.7
	3.00	45	4.6	5.3	100.0
	Total	851	86.4	100.0	
Missing	System	134	13.6		
Total		985	100.0		

Research Question Five

Research Question 5—To what extent will an investigator-generated model of family dynamics best predict BMI weight status categories among 12-16 year old adolescent girls? A multinomial logistic regression was conducted to predict BMI weight status categories from the predictor variables of family dynamics (FAS, family structure, perceived parental promotion of autonomy and perceived parental affection). The predicted category was calculated based on the data and the BMI thresholds. From SPSS, three cumulative mean were predicted. From the predicted cumulative mean, a cumulative predictive probability was calculated for each category. The probabilities were further analyzed using a pivot table.

The model of family dynamics correctly predicted 68.23% of BMI weight status categories among 12-16 year old adolescent girls. Family affluence was the only significant predictor of BMI weight status categories among 12-16 year old African American girls, b = -.095, S.E. = .0238, p = .000. Results of multinomial logistic regression of the predictor variables are in Table 11.

Table 11 *Multinomial Logistic Regression Family Dynamic Variables with BMI Weight Status Threshold*

Parameter		b	Std. Error	Wald's Chi Square	Significance
Threshold					
1	BMI	-2.971	.3522	71.133	.000
2	BMI	-.489	.3192	2.347	.126
3	BMI	.311	.3190	.952	.329
FAS		-.095	.0238	16.015	.000**
Median Aff		-.793	.6195	1.637	.201
Median Aut		-.062	.8479	.005	.942
Median Aff x Median Aut		.640	1.0167	.396	.529
Family Structure		-.134	.1243	1.159	.282

* Correlation is significant at 0.05

** Correlation is significant at 0.01

FAS = family affluence scale

Median Aff = median affection

Median Aut = median autonomy

Reliability of Instrument

Reliability of FAS, perceived parental promotion of autonomy, and perceived parental affection was determined by Cronbach's alpha. Cronbach alpha of FAS was 0.286. This finding indicated low reliability. However, the alpha would increase to 0.45 with removing the item 'how well off is your family'. The Cronbach alpha of 0.45 is in line with other studies using FAS II (Lui et al., 2012; Svedberg, Nygren, Staland-Nyman,

& Nyholm, 2016). Family affluence scale II does not include 'how well off is your family' but this item is included in studies as a SES indicator and often correlated with FAS (Lui et al., 2012; Svedberg, Nygren, Staland-Nyman, & Nyholm, 2016). The FAS has been used in numerous studies as a measure of SES. The FAS is among the core questions used in the HBSC study, which is administered to participants in over 40 countries every four years (Roberts et al., 2009). Despite the low reliability among the items of FAS, it is yet a reliable instrument due to being comparable and its significance as a predictor in other studies.

The Cronbach's alpha of perceived parental promotion of autonomy was .72, which indicates adequate reliability. The Cronbach's alpha of perceived parental affection was .83, which indicates high reliability. Both perceived parental promotion of autonomy and perceived parental affection are reliable scales to measure the constructs of autonomy and affection.

External validity of FAS II was evaluated by determining association between FAS II and other SES factors (parents' educational level and perceived family wealth). The association between FAS and father's education ($rs = 0.49$, $p < 0.001$); mother's education ($rs = 0.48$; $p < 0.001$); and perceived family wealth ($rs = 0.51$, $p < 0.001$) were moderate (Lui et al., 2012). These findings indicate that FAS is an acceptable measure of SES.

Summary

Chapter IV provided a description of the demographics of the sample, the data analysis, and the key findings. Findings indicated that family affluence was a significant predictor and had a significant relationship with BMI weight status categories among 12-

16 year old African American adolescent girls. A model of family dynamics was also generated and correctly predicted 68.23% of BMI weight status categories. The findings in this section were reported both by narratives and tables. Chapter V will discuss the research findings, conclusions, limitations of the study, and provide recommendations for future research.

CHAPTER V - DISCUSSION, CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

Introduction

Chapter V provides a discussion of the research findings, conclusions, limitations of the study, and recommendations for future research. The purpose of this research study was to explore to what extent do family dynamics predict obesity among 12-16 year old African American adolescent girls. The 2009/2010 HBSC study dataset provided the data needed for this study.

Discussion

The study was posed to answer five research questions. The first research question that this study addressed was: "What is the relationship between family affluence and BMI weight status categories among 12-16 year old African American adolescent girls?" The family affluence score and BMI weight status categories of each of the girls in the sample were utilized. Family affluence score was coded for analysis (0 = no affluence to 9 = high affluence). BMI weight status categories were categorized for this study as (underweight = less than 5^{th} percentile; healthy weight = between 5^{th} and 85^{th} percentile; overweight = between 85^{th} and 95^{th} percentile; obese = greater than 95^{th} percentile).

A Spearman Rho correlation was conducted to analyze the relationship between family affluence and BMI weight status categories. The results indicated that family affluence had a significant relationship with BMI weight status categories. Family affluence was the only family dynamics variable that had a significant relationship with BMI weight status categories among 12-16 year African American adolescent girls. The

relationship was negatively correlated which indicates that as family affluence increases, girls are more likely to be in a lower BMI weight status category. As family affluence decreases, girls are more likely to be in a higher BMI weight status category. Lower affluence can hinder the girls' access to better food choices and healthcare. Levine (2011) noted that low-income families were more likely to have overweight children than high-income families. Among Caucasian girls, family affluence and BMI weight status categories had a significant relationship; however, among Hispanic girls there was no significant relationship.

The second research question that the study addressed was: "What is the relationship between family structure and BMI weight status categories among 12-16 year old African American adolescent girls?" The family structure or responsible adult(s) with whom the girls lived categorical variable and the BMI weight status category of each of the girls in the sample were utilized. Family structure was coded for analysis as (2.00 = mother only; 3.00 = father only; 4.00 = mother/stepfather; 5.00 = father/stepmother; 6.00 = grandparents; 7.00 = other arrangements; 8.00 = both mother and father).

A Cramer's V analysis was conducted due to categories of family structure being nominal data. The analysis was performed to analyze the relationship between family structure and BMI weight status categories. The findings indicated no significant relationship between family structure and BMI weight status categories. These findings indicated that family structure did not impact BMI weight status categories among 12-16 year old African American adolescent girls. The lack of significance may have been due to 44.46% of the girls reported living in a single-parent home and 48.42% reported living

in a two-parent home and 56.75% reporting height and weight representative of the healthy weight BMI category. Other research supported the idea that children who live in single-parent households are more overweight than children living in two-parent households (Huffman, Kanikireddy, & Patel, 2010). When calculated for Caucasian girls, family structure and BMI weight status categories had a significant relationship; however, among Hispanic girls there was no significant relationship.

The third research question that the study addressed was: "What is the relationship between perceived parental promotion of autonomy and BMI weight status categories among 12-16 year old African American adolescent girls?" The perceived parental promotion of autonomy score and BMI weight status category of each of the girls in the sample was utilized. Perceived parental promotion of autonomy was dummy coded for analysis as (1.00 = high autonomy to 3.00 = low autonomy). The median of autonomy was the central tendency used for this study.

A Spearman Rho correlation was conducted to analyze the relationship between perceived parental promotion of autonomy and BMI weight status categories. The findings indicated no significant relationship between perceived parental promotion of autonomy and BMI weight status categories. These findings indicated that perceived parental promotion of autonomy did not impact BMI weight status categories among 12-16 year old African American adolescent girls. The lack of significance could have been due to 76.7% of the girls perceiving that they had a high to medium level of autonomy and 56.75% reporting height and weight representative of the healthy weight BMI category. Lack of significance could have been due to 51.4% of the sample being age 12-13 and autonomy may not be as important to them as older adolescents. Other studies

support the idea that families' promotion of autonomy among their adolescents was correlated with improved child well-being (Lekes, Gingras, Philippe, Koestner, & Fang, 2010; Wang, Peterson, & Morphey, 2007). When compared with Caucasian and Hispanic girls, there was no significant relationship between perceived parental promotion of autonomy and BMI weight status categories. This finding is of interest due to autonomy being so important to the adolescent stage of life. Most adolescents in this study may feel that they have autonomy; therefore, autonomy and BMI weight status category are independent in nature. In the general population, adolescents may not have as high levels of autonomy.

The fourth research question that the study addressed was: "What is the relationship between perceived parental affection and BMI weight status categories among 12-16 year old African American adolescent girls?" The perceived parental affection score and BMI weight status category of each of the girls in the sample was utilized. Perceived parental affection was dummy coded for analysis as (1.00 = high affection to 3.00 = low affection). The median of affection was the central tendency used for this study.

A Spearman Rho correlation was conducted to analyze the relationship between perceived parental affection and BMI weight status categories. The findings indicated no significant relationship between perceived parental affection and BMI weight status categories. These findings indicated that perceived parental affection of autonomy did not impact BMI weight status categories among 12-16 year old African American adolescent girls. The lack of significance could have been due to 85.5% of the girls perceiving that they had a high to medium level of affection and 56.75% reporting height

and weight representative of the healthy weight BMI category. However, several studies support the idea that higher degree of parental affection was positively correlated with increased child well-being (Operario, Tschann, Flores, & Bridges, 2006; Steinberg & Silk, 2002). When compared with Caucasian and Hispanic girls, there was no significant relationship between perceived parental promotion of autonomy and BMI weight status categories. Most adolescents in this study may feel that they have parental affection; therefore, autonomy and BMI weight status category are independent in nature. The findings highlighted an interaction between perceived parental promotion of autonomy and perceived parental affection. The interaction was positively correlated which indicated as perception of autonomy increased so did perceived affection. Such findings could point to that African American adolescent girls perceive that having more autonomy is an indication of receiving more parental affection or having more affection from parents increases the likelihood that they would promote a greater level of autonomy among the girls. Despite the significant interaction between perceived parental promotion of autonomy and parental affection, this interaction was not a significant predictor of BMI weight status categories.

The fifth research question that the study addressed was: "To what extent will an investigator-generated model of family dynamics best predict BMI weight status categories among 12-16 year old adolescent girls?" The variables family affluence, family structure, perceived parental promotion of autonomy, perceived parental affection, and BMI weight status categories of each of the girls in the sample were utilized. The variables family affluence, family structure, perceived parental promotion of autonomy,

and perceived parental affection were used as predictor variables to predict BMI weight status categories.

A multinomial logistic regression was conducted to predict BMI weight status categories using an investigator-generated model of family dynamics. All of the aforementioned variables were included in the multinomial logistic regression. BMI weight status categories were categorized as thresholds for this analysis. The findings indicated that family affluence was the only significant predictor of BMI weight status categories among 12-16 year old African American adolescent girls. The findings also indicated that the model correctly predicted 68.23% of BMI weight status categories. Predicting the correct BMI weight status categories could assist the investigator to predict obesity among African American adolescent girls. These findings are paramount due to obesity risk of a child being greatly impacted by family through home environment (Strauss & Knight, 1999).

Conclusions

The overall findings indicated that family affluence is the only variable of family dynamics that was a significant predictor and had a significant relationship with BMI weight status categories among 12-16 year old African American adolescent girls. The overall findings indicated that among Caucasians, both family affluence and family structure are significant predictors on BMI weight status categories among Caucasian girls. For Hispanics, there were no significant predictors of BMI weight status categories among Hispanic girls. Finally, the overall findings indicated that the investigator-generated model of family dynamic correctly predicts 68.23% of BMI weight status categories among 12-16 year old adolescent girls.

Betty Neuman's Systems Model of nursing was supported by these findings. Neuman's System Model denotes that the environment (family) is the key element that affects the client (African American adolescent girls). Neuman's Systems Model focuses on how the client reacts to environmental stressors (family dynamics). The reaction to the stressors can move the client from health to illness (obesity). Family affluence was one of those stressors that had an impact on the BMI weight status category of the adolescent girl. Family affluence can hinder the access of healthy food choices, safe environments to play or exercise, and healthcare, which can ultimately move the adolescent girl from a state of health to illness (obesity).

Many families are aware of the foods that their children should eat but oftentimes access is limited (Dalton, 2004). Some low-income areas do not have access to supermarkets in order to make healthy food choices but in turn have full access to fast food restaurants and unhealthy food choices (Dalton, 2004; Sallis & Glanz, 2009). McCormack et al. (2011) explored whether obesity risk factors differed among children according to their familial affluence. The FAS score was positively correlated only with a weekly consumption of fruit ($r=0.14$, $p<0.05$) in that families with increased FAS scores consumed more fruits (McCormack et al., 2011).

The investigator-generated model of family dynamics can provide a model of assessment by which nurses are more effectively and efficiently able to provide appropriate individualized interventions. Such assessments will assist nurses to be able to implement interventions that appropriately help to prevent, adapt, or reconstruct obesity. These interventions will help to decrease the prevalence of obesity among African American adolescent girls.

The lack of significant relationships between family structure, perceived parental promotion of autonomy, perceived parental affection, and BMI weight status categories could possibly highlight another area of concern. Lack of impact on BMI weight status categories by these variables could be due to the adolescent's level of resilience. Regardless, of the family structure, perceived autonomy and perceived affection, the African American adolescent girl may be able to adapt and not allow these situations to become a stressor that could destroy lines of defense. Walsh (1998) stated that resilience goes beyond surviving and assuming the role of a victim, it means healing and being empowered to live a full life. In an effort to show resilience over negative images and stereotypes, researchers suggest that African American girls have been taught by society to be independent (Thomas & King, 2007). Ward (2000) expressed that African American girls possibly have higher self-esteem and decreased assaults on their self-esteem because they are raised to be strong and protect themselves. Family affluence can affect so many areas of an adolescent girl's life from where she lives to what she eats that it causes enough stress to destroy the lines of defense and impact the core, which ultimately leads the adolescent to becoming obese.

Limitations

After reviewing the findings of the study, a few limitations are noted. The first limitation of this study is the use of self-reported data from the adolescent girls. The girls reported that height and weight which were computed into BMI. The findings may differ if height and weight had been measured and reported by trained professionals. The second limitation is the exclusion of responses due to missing data. Of the 806 total 12-16 year old African American adolescent girls, 29.5% of the responses were excluded.

The missing data could have provided a greater insight into the prediction of BMI weight status categories by a generated model of family dynamics. The third limitation is that the questions that were asked to determine family affluence, family structure, perceived parental promotion of autonomy, and perceived affection may not be generalizable to all populations. The use of culturally appropriate scales or surveys could be more beneficial. The fourth limitation was that the participants for the study were obtained through cluster sampling for the primary study. Cluster sampling could possibly provide participants from similar backgrounds, which may not make the data results generalizable to the population. The fifth limitation is the low internal consistency of the FAS. The internal consistency increases when removing the item, 'how well off is your family'. The entire scale may need to be evaluated but particularly the aforementioned item. It is also possible that the participants did not fully understand the item. The final limitation is the use of secondary data because most often the data was collected for a different purpose and to answer different research questions. The use of primary data can allow the investigator to have more control over the data.

Implications

The findings of this study provided insight into the impact of family dynamics on BMI weight status categories among African American adolescent girls. Family affluence significantly impacted BMI weight status categories. Furthermore, family affluence was a significant predictor of BMI weight status categories and the model of family dynamics correctly predicted 68.23% of BMI weight status categories. Adolescent girls with high affluence were more likely in lower BMI weight status categories as opposed to girls with low affluence. In relation to previous studies (Dalton,

2004; Levine, 2011; Ogden, Lamb, Carroll, & Flegal), family affluence or socioeconomic status is inversely correlated with the weight status of the child.

Family affluence, being the overarching predictor of BMI weight status categories among African American girls, can affect many things such as the neighborhood in which an adolescent lives, access and means to buy healthy food, and participation in activities outside the home. Studies have indicated that obesity is the result of consumption of more calories than expended (Loos & Bouchard, 2003; Robinson & Butler, 2011; Wang, 2011). However, family affluence may have the greatest impact due to families only being able to afford or have access to unhealthy food choices. Some low-income families do not have access to places such as supermarkets where healthy food choices can be made (Dalton, 2004; Morland, Wing, Diez, & Poole, 2002) but have full access to fast food restaurants where unhealthy choices can be made (Pereira et al., 2005). Parents know what foods that children should eat but access and money may be limited (Kumanyika & Grier, 2006).

Family affluence encompasses many elements. These elements include education and occupation of the provider and family income. The findings from this study points to the need of exploring the different elements of family affluence and their impact on BMI weight status categories.

The findings should also provide an awareness of the need for culturally sensitive assessment tools, surveys, and interventions when collecting data on different races and ethnicities. Family affluence was the only significant predictor of BMI weight status categories among African American girls. Both family structure and affluence were significant predictors among Caucasian girls. However, there were no significant

predictors for weight status categories among Hispanic girls. Such findings point to the conclusion that culture is a factor and the questions used to determine the family dynamic variables should be culturally sensitive.

Nurses, stakeholders, and policymakers are in a unique position to help decrease the prevalence of obesity among African American adolescent girls. Nurses should take the lead as researchers to conduct research to provide evidence that will help to guide nursing practices. Utilizing results of predictive modeling, nurses can conduct longitudinal studies that begin early in the child's life and implement interventions early on that will decrease the risk factors of becoming obese. Nurses are in a position to take the lead in the development, implementation, and evaluation of appropriate patient-centered interventions that will help to decrease the prevalence of obesity. Nurses can also advocate for policies to be changed that will improve the affluence of families and provide better access to healthy environments. Stakeholders who are interested in the outcomes, should be engaged in all processes that lead to the results. Stakeholders including healthcare providers, policy makers, and patients provide valuable insights that help to produce optimal outcomes. In addition, policymakers are in the position to view obesity from a broader perspective. Thereby not only instituting policies that would decrease the prevalence of obesity but more importantly reducing health disparities that are associated with prevalence of obesity.

Recommendations for Future Research

The prevalence of obesity among African American adolescent is steadily increasing. Future research should incorporate more primary data with a nationally representative sample that is representative of adolescents from various types of schools, neighborhoods, backgrounds, socioeconomic status, family structures, family affection, and family autonomy. Primary data from such a sample will allow the investigator to answer research questions with subsequent validity. Use of primary data will also allow the investigator to have control over the data quality.

Qualitative studies should be conducted as future research studies. Qualitative studies can provide insight into more specific elements of family dynamics that impact BMI weight status categories from the adolescent girl's perspective. These studies can also provide insight into helpful interventions that should be implemented.

Future studies should include comparative effectiveness research. Proper evaluation for outcome effectiveness is instrumental in helping to decrease the prevalence of obesity. Many programs have been initiated but lack proper evaluation of outcomes for effectiveness. Studies that employ random sampling should also be conducted. These studies can provide a wealth of knowledge about elements of family dynamics and their impact on obesity among individuals of the same race but from a variety of backgrounds (family structure, family affluence, neighborhood, health disparities).

In addition, studies that examine the impact of the elements of family affluence on the weight status of African American adolescent girls should be conducted. Although, family affluence was a significant predictor on weight status categories, identifying the specific element of family affluence that has the greatest impact can prove more

beneficial in decreasing the prevalence of obesity. More studies should also be conducted that examine resiliency among African American adolescent girls as it relates to obesity and familial environment. These studies should use culturally appropriate assessment tools to examine these topics and their relationships. Studies should be conducted that explore the impact of family dynamics on the weight status of the entire family. The results should be utilized to conduct a family-based intervention study.

Finally, studies should be conducted to assist in improving the questions and scales utilized in the HBSC study. Family affluence was the only significant predictor of BMI weight status categories among African American girls. There were no significant predictors of BMI weight status categories among Hispanic girls. The questions and scales need to ensure cultural appropriateness for various cultures and ethnicities.

Summary

Obesity among adolescents is a multifaceted disease. Therefore, the many factors encompassed by this disease must be treated using a multi-level systems approach. The multi-level systems approach helps to determine the factors that have the greatest impact. Understanding the factors with the greatest impact can assist in generating predictive models of obesity among adolescent girls. Recognizing the predictors of obesity can assist nurses and other healthcare professionals in developing and implementing appropriate culture-sensitive assessments, surveys, and interventions to decrease the prevalence of obesity among African American adolescent girls.

APPENDIX A – IRB APPROVAL LETTER

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 17050101
PROJECT TITLE: An Investigation of the Impact of Family Dynamics on Obesity among African American Adolescent Girls
PROJECT TYPE: New Project
RESEARCHER(S): Tina McDyess
COLLEGE/DIVISION: College of Nursing
DEPARTMENT: Systems Leadership and Health Outcomes
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Exempt Review Approval
PERIOD OF APPROVAL: 05/01/2017 to 04/30/2018
Lawrence A. Hosman, Ph.D.
Institutional Review Board

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